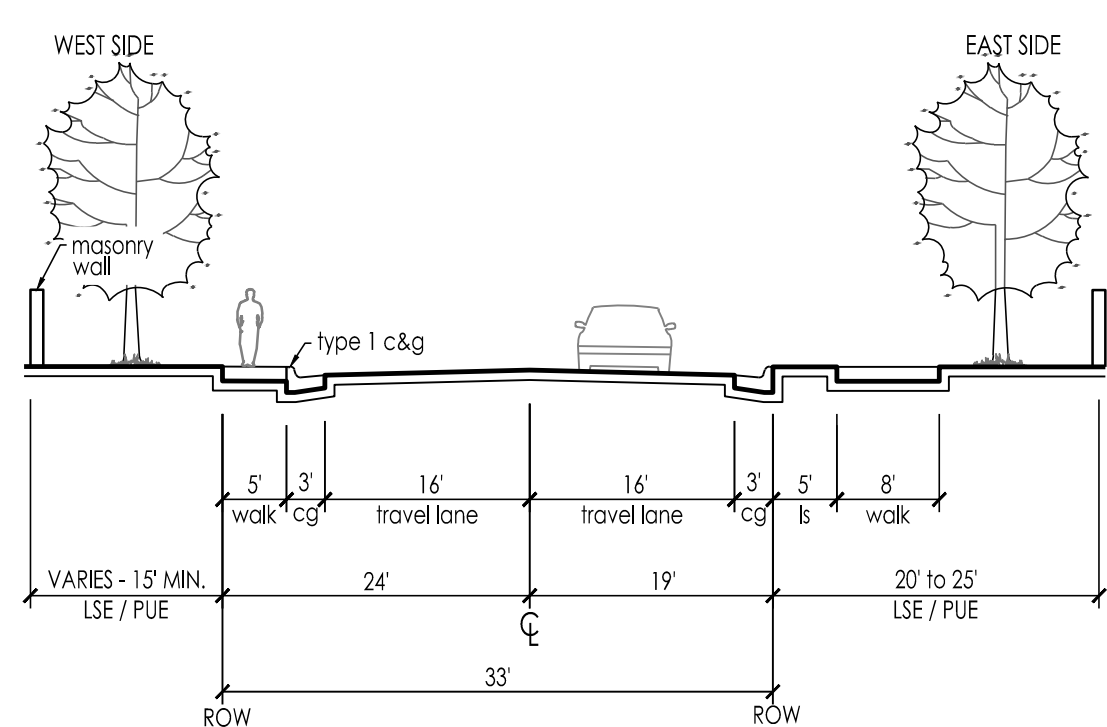
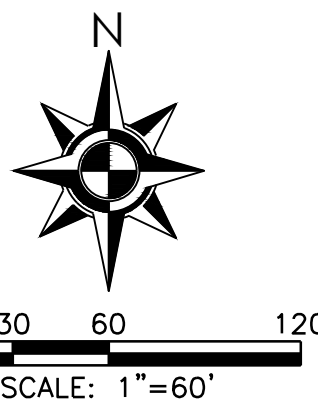


STANDARD ELBOW  
(CITY OF ROSEVILLE STD. DWG ST-16)  
n.t.s.



 EXISTING DAYLIGHT DRIVE  
PRIMARY RESIDENTIAL STREET  
n.t.s.



COVER SHEET  
TENTATIVE SUBDIVISION MAP

# PARCEL WB-41

of the Sierra Vista Specific Plan

Roseville, CA

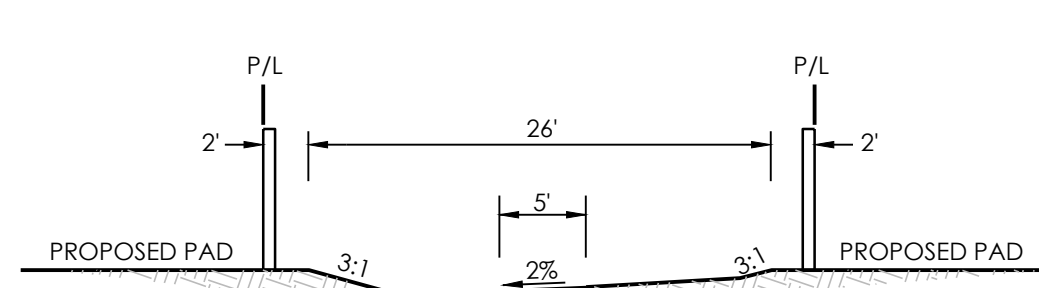
July 16, 2021

Sheet 1 of 2

**WESTPARK**  
communities

**MACKEY & SOMPS**  
ENGINEERS PLANNERS SURVEYORS





SECTION A-A  
PROPERTY LINE  
N.T.S.

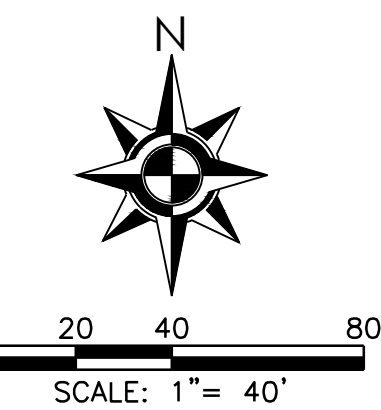
SECTION B-B

---

LS-3  
N.T.S.

**ESTIMATED  
EARTHWORK  
SUMMARY**

CUT: 12,000± c.y.  
 FILL: 12,000± c.y.  
 NET: 0± c.y.

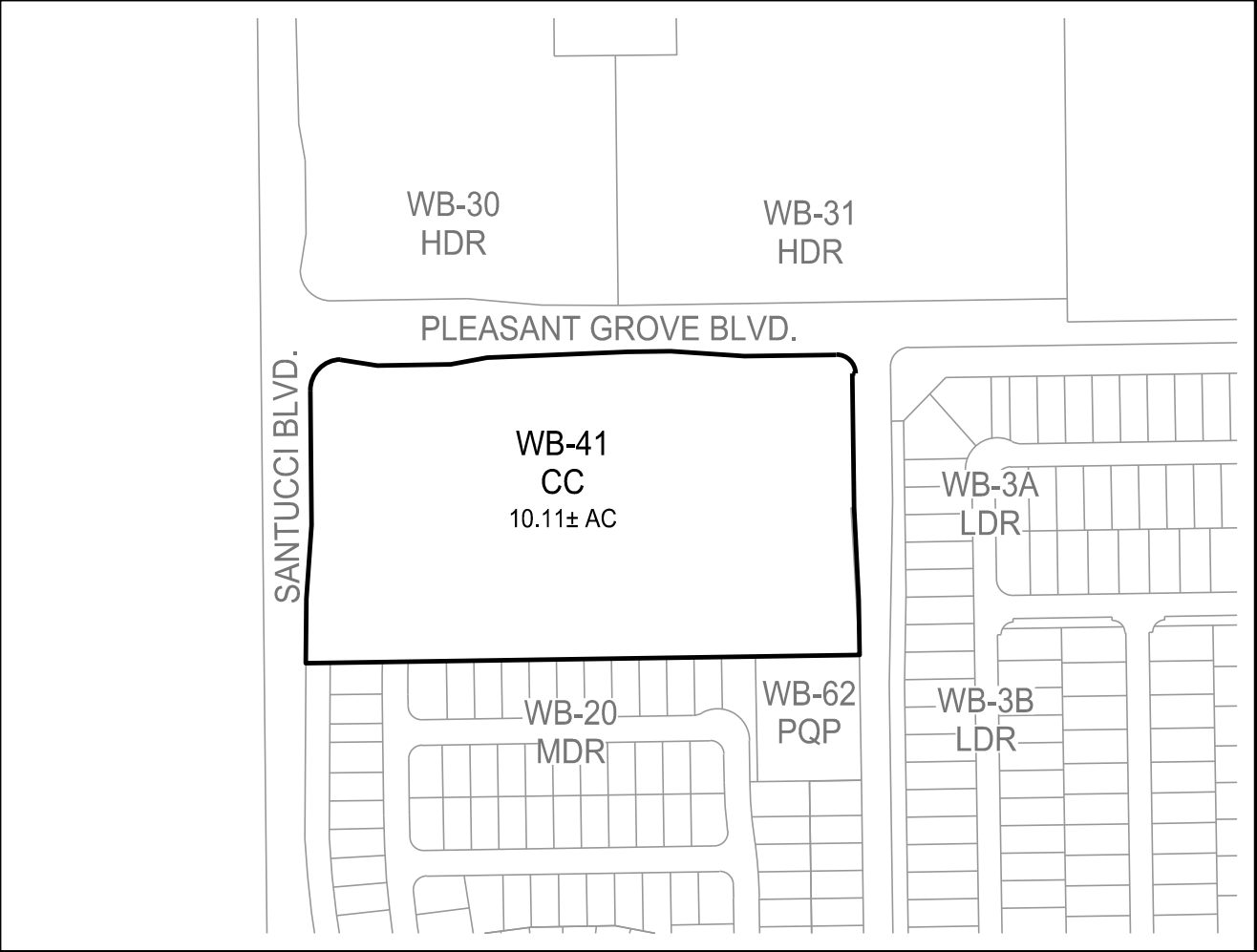


# PARCEL WB-41

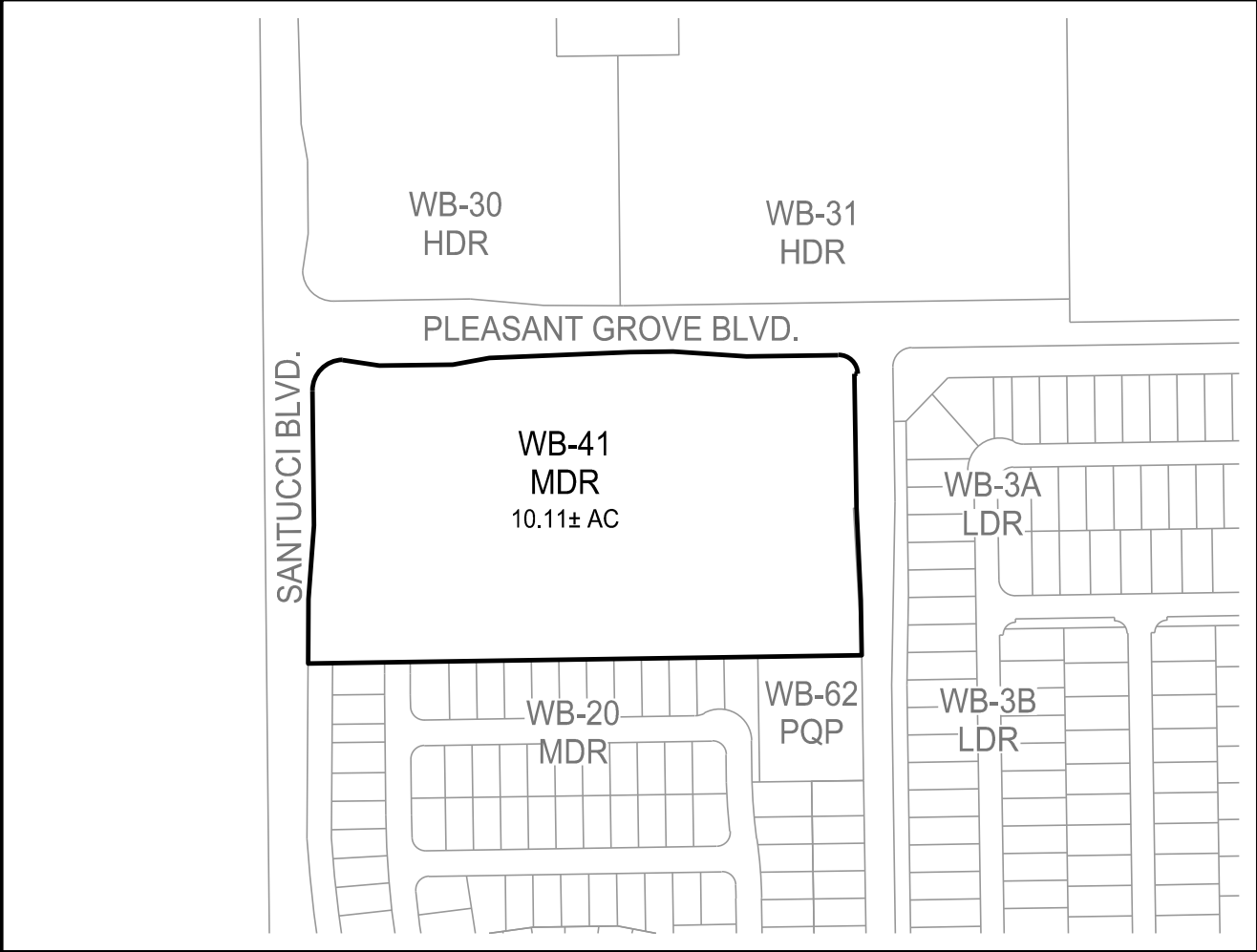



Sheet 2 of 2

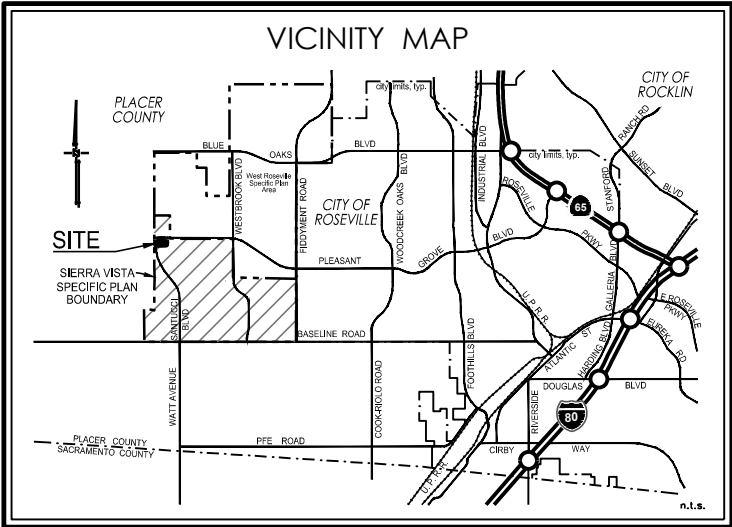




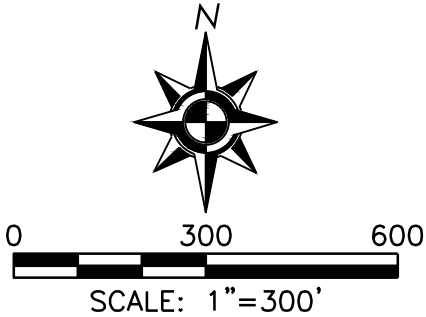
EXISTING LAND USE



PROPOSED LAND USE



Existing Land Use		Proposed Land Use	
Parcel Land Use	Acres	Parcel Land Use	Acres
WB-41 CC (Community Commercial)	10.11 ac.	WB-41 MDR (Medium Density Residential)	10.11 ac.
<b>TOTAL</b>	<b>10.11 ac.</b>	<b>TOTAL</b>	<b>10.11 ac.</b>



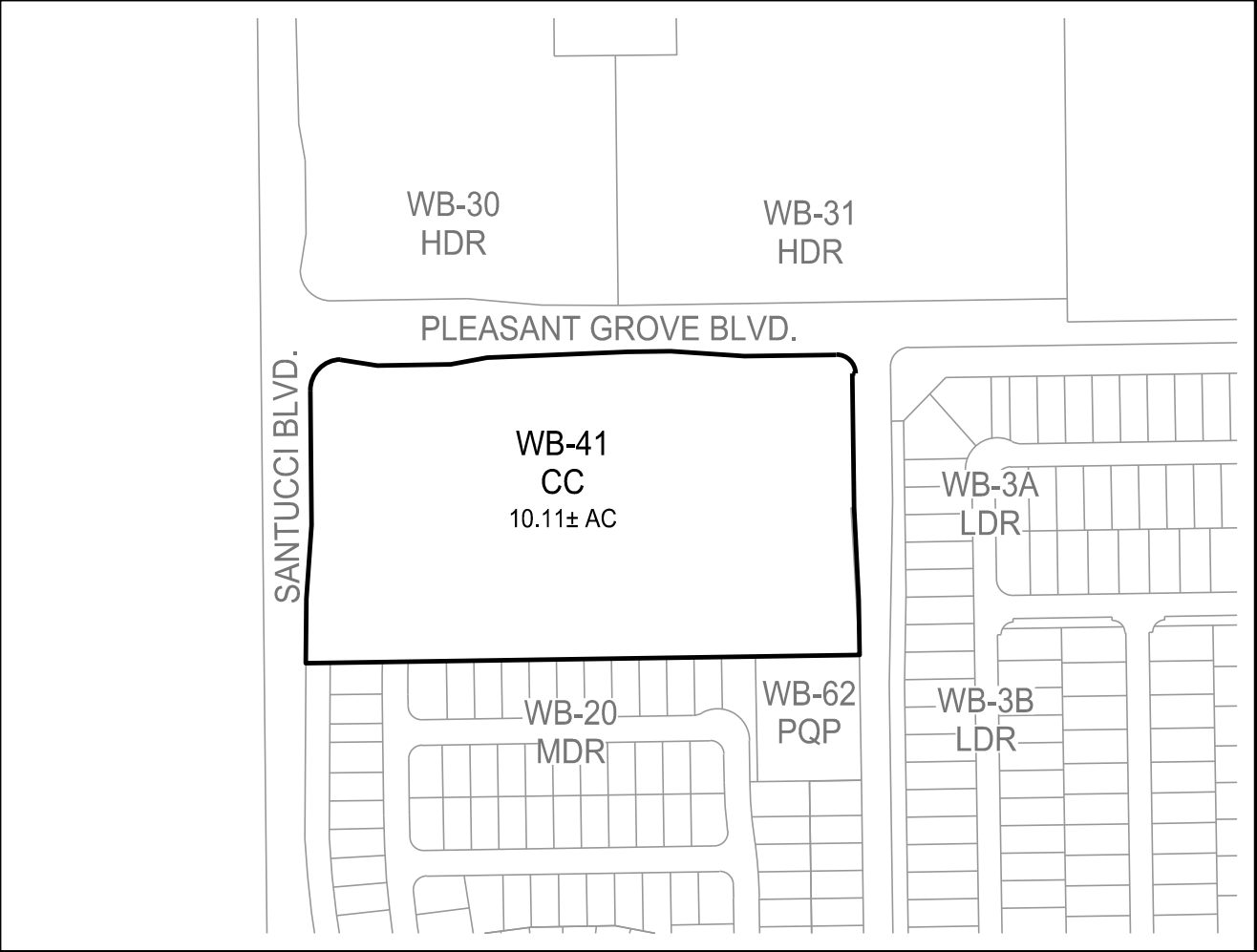
GENERAL PLAN AMENDMENT &  
SPECIFIC PLAN AMENDMENT EXHIBIT

PARCEL WB-41  
*of the Sierra Vista Specific Plan*

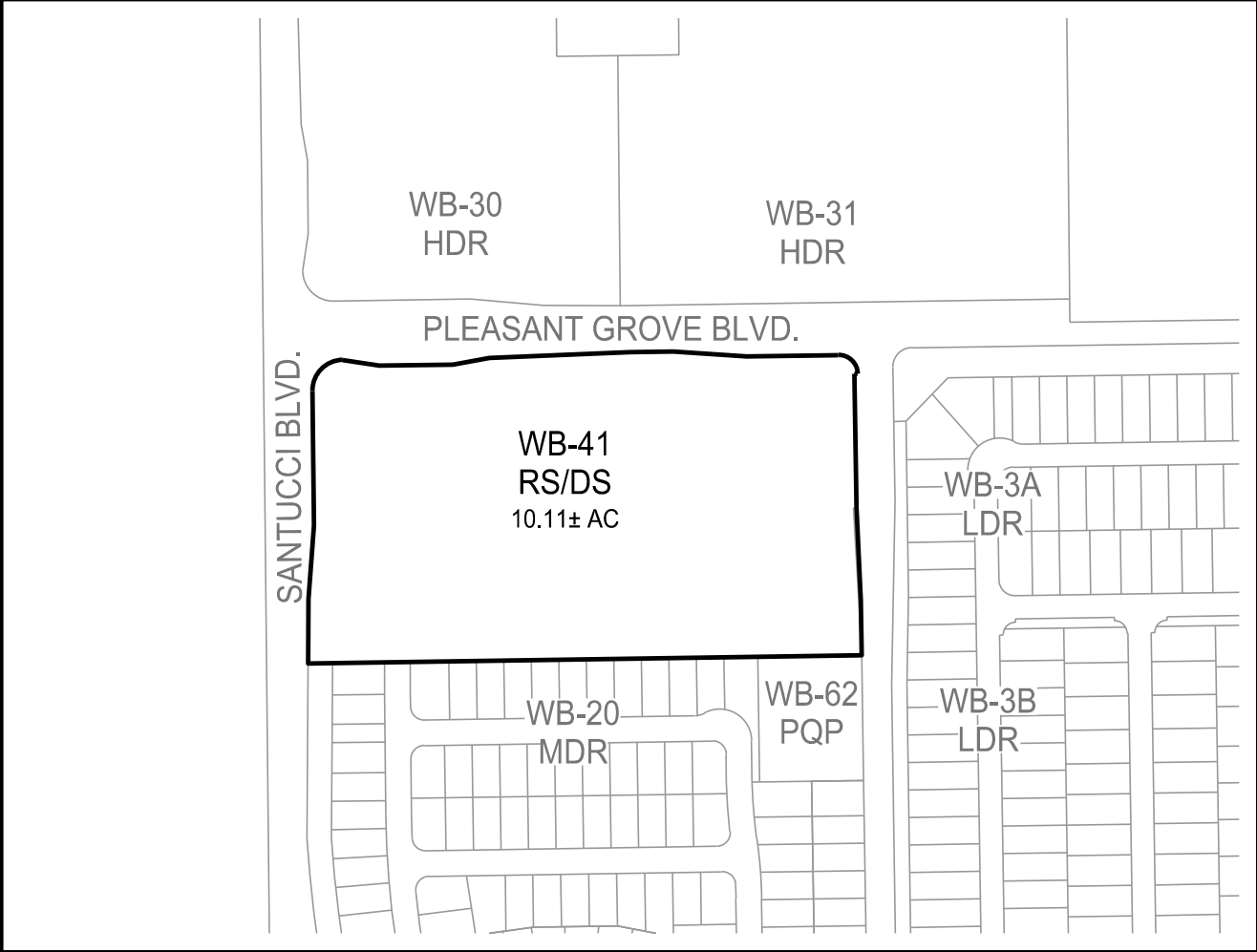
Roseville, CA

July 15, 2021

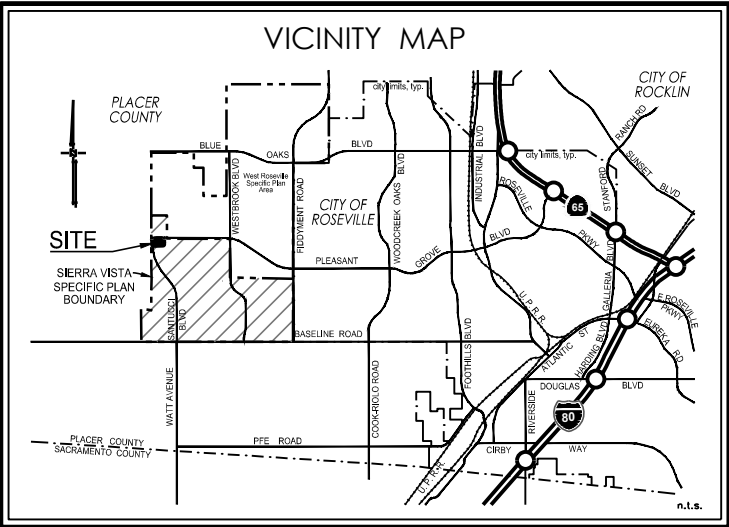




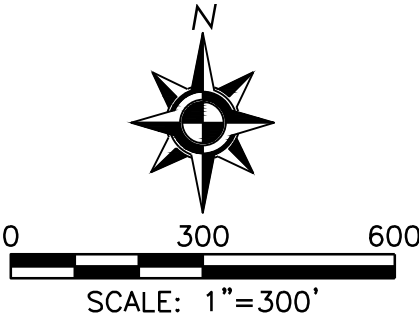
EXISTING ZONING



PROPOSED ZONING



Existing Zoning			Proposed Zoning		
Parcel Land Use		Acres	Parcel Land Use		Acres
WB-41 CC (Community Commercial)		10.11 ac.	WB-41 RS/DS		10.11 ac.
TOTAL		10.11 ac.	TOTAL		10.11 ac.



REZONE EXHIBIT

PARCEL WB-41

of the Sierra Vista Specific Plan

Roseville, CA

July 15, 2021



**Table 4-1: Plan Area Land Use Summary**

Land Use Designation		Applied Zoning Districts	Acres	% of Total Acres	Units	% of Total Units
<b>Residential Neighborhoods</b>						
LDR	Low Density Residential	RS/DS	614.7	29.7%	3,169	<del>36.5%</del> 36.1
LDR	LDR – Age Restricted	RS/DS	94.3	4.6%	493	5.7%
MDR	Medium Density Residential	RS/DS	<del>324.1</del> 334.2	<del>14.7%</del> 16.1	<del>2,431</del> 2,494	<del>28.0%</del> 28.4
HDR	High Density Residential	R3	92.0	4.4%	<del>2,337</del> 2,367	<del>26.9%</del> 27.0
<b>Sub-totals</b>			<del>1,125.1</del>	<del>54.3%</del> 54.8	<del>8,430</del>	<del>97.1%</del> 97.2
<b>Commercial and Employment</b>			1,135.2		8,523	
CC	Community Commercial (Commercial Mixed Use)	CMU/SA	29.1	1.4%	249	<del>2.9%</del> 2.8
CC/BP	Community Commercial/ Business Professional (Mixed Use)	CC/SA	25.4	1.2%	--	--
CC	Community Commercial	CC & GC	<del>177.5</del> 167.4	<del>8.6%</del> 8.0	--	--
<b>Sub-totals</b>			<del>232.0</del> 221.9	<del>11.2%</del> 10.7	249	<del>2.9%</del> 2.8
<b>Open Space/Public</b>						
P/QP	Public/Quasi-Public	P/QP	64.7	3.1%	--	--
PR	Parks & Recreation	PR	104.6	5.0%	--	--
OS	Open Space	OS	302.0	14.6%	--	--
OS	Paseo (60'-wide)	OS	13.4	0.6%	--	--
UR	Urban Reserve	UR	38.7	1.9%	--	--
<b>Sub-totals</b>			523.4	25.3%	--	--
Right of Way/ Landscape Corridor			191.7	9.2%	--	--
<b>TOTAL</b>			2072.2 ac	100%	<del>8,679</del> du 8,772	100%

**Note:** See Table 7-4 for net Paseo total acres

Last Updated April 2021



# SIERRA VISTA LAND USE PLAN

Figure 4-1

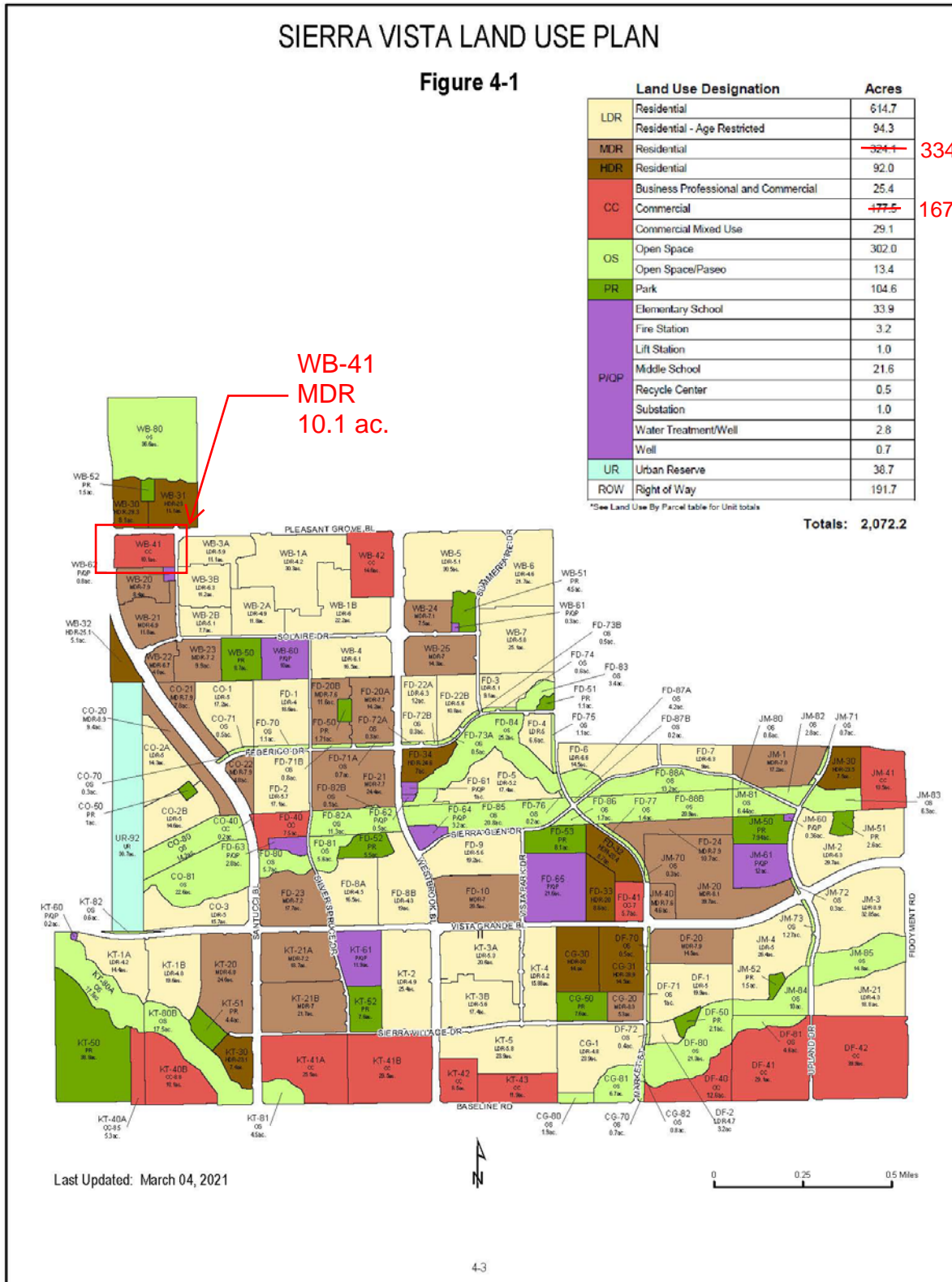


Figure 4-1: Land Use Map



Table 4-2: Land Use, Zoning, &amp; Acreage by Parcel (cont.)

PARCEL	GENERAL PLAN LAND USE (Specific Plan Land Use)	ZONING	ACRES	ALLOCATED UNITS	DENSITY
UR-92	Urban Reserve	UR	38.72		
<b>Sub-totals (Urban Reserve)</b>			<b>38.72</b>	<b>0</b>	
WB-1A	LDR (Residential – Age-Restricted)	RS/DS	30.30	126	4.2
WB-1B	LDR (Residential – Age-Restricted)	RS/DS	22.20	133	6.0
WB-2A	LDR (Residential – Age-Restricted)	RS/DS	11.81	58	4.9
WB-2B	LDR (Residential – Age-Restricted)	RS/DS	7.67	39	5.1
WB-3A	LDR (Residential – Age-Restricted)	RS/DS	11.10	66	5.9
WB-3B	LDR (Residential – Age-Restricted)	RS/DS	11.23	71	6.3
WB-4	LDR (Residential)	RS/DS	16.50	100	6.1
WB-5	LDR (Residential)	RS/DS	30.50	157	5.1
WB-6	LDR (Residential)	RS/DS	21.70	103	4.7
WB-7	LDR (Residential)	RS/DS	25.14	145	5.8
WB-20	MDR (Residential)	RS/DS	8.88	66	7.9
WB-21	MDR (Residential)	RS/DS	11.80	81	6.9
WB-22	MDR (Residential)	RS/DS	4.80	32	6.7
WB-23	MDR (Residential)	RS/DS	9.88	71	7.3
WB-24	MDR (Residential)	RS/DS	7.50	53	7.1
WB-25	MDR (Residential)	RS/DS	14.30	100	7.0
WB-30	HDR (Residential)	R3	8.06	237	29.4
WB-31	HDR (Residential)	R3	11.10	<del>263</del> 293	<del>23.7</del> 26.4
WB-32	HDR (Residential)	R3	5.11	128	25.0
WB-41	<del>CC (Commercial)</del> MDR (Residential)	<del>CC</del> RS/DS	10.11	63	
WB-42	CC (Commercial)	CC	14.55		
WB-50	PR (Park)	PR	8.74		
WB-51	PR (Park)	PR	4.47		
WB-52	PR (Park)	PR	1.50		
WB-60	Public/Quasi-Public (Elementary School)	P/QP	10.00		
WB-61	Public/Quasi-Public (Well)	P/QP	0.31		
WB-62	Public/Quasi-Public (Lift Station)	P/QP	0.80		
WB-80	OS (Open Space)	OS	36.58		
<b>Sub-totals (Westbrook)</b>			<b>365.64</b>	<del>2,029</del> 2,122	
ROW	Right of Way/Landscape Corridors		191.60		
<b>Sub-totals (ROW)</b>			<b>191.60</b>	<b>0</b>	
<b>Total</b>			<b>2,072.16</b>	<del>8,679</del> 8,772	

Table Updated April 2021  
(GIS acreages revised January 2021)



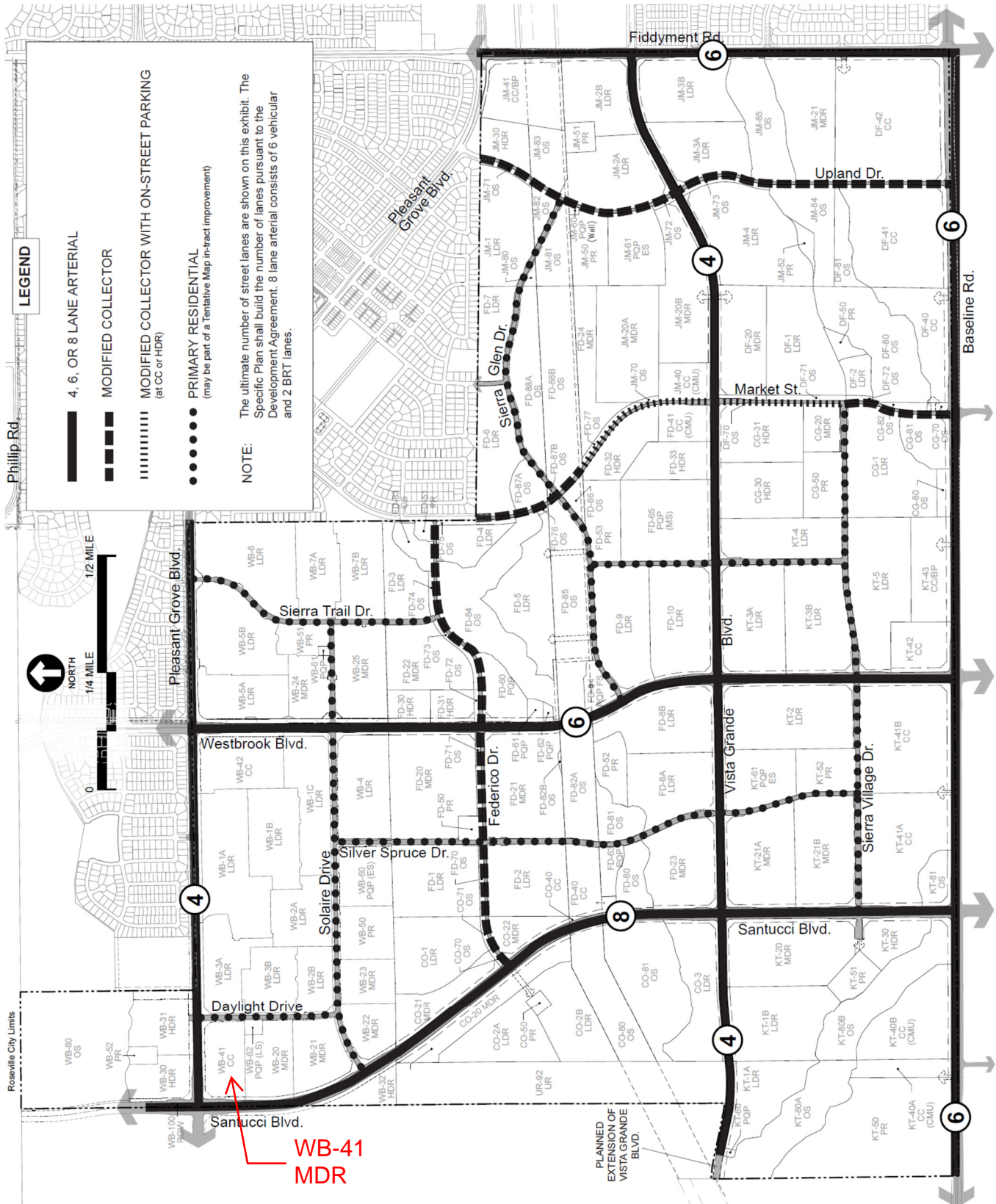


Figure 6-1: Roadway System



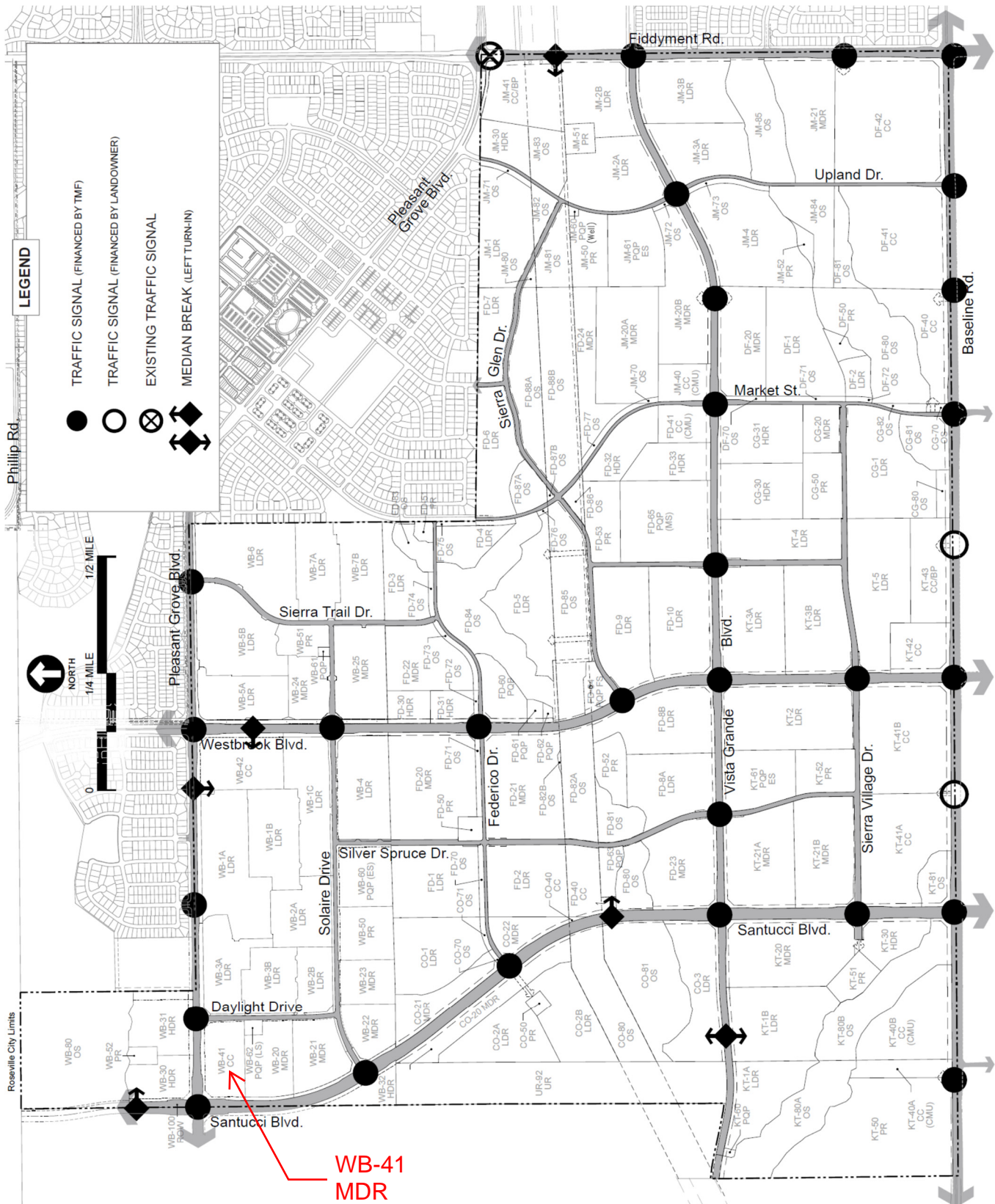


Figure 6-6: Arterial Roadway Traffic Signals and Median Breaks



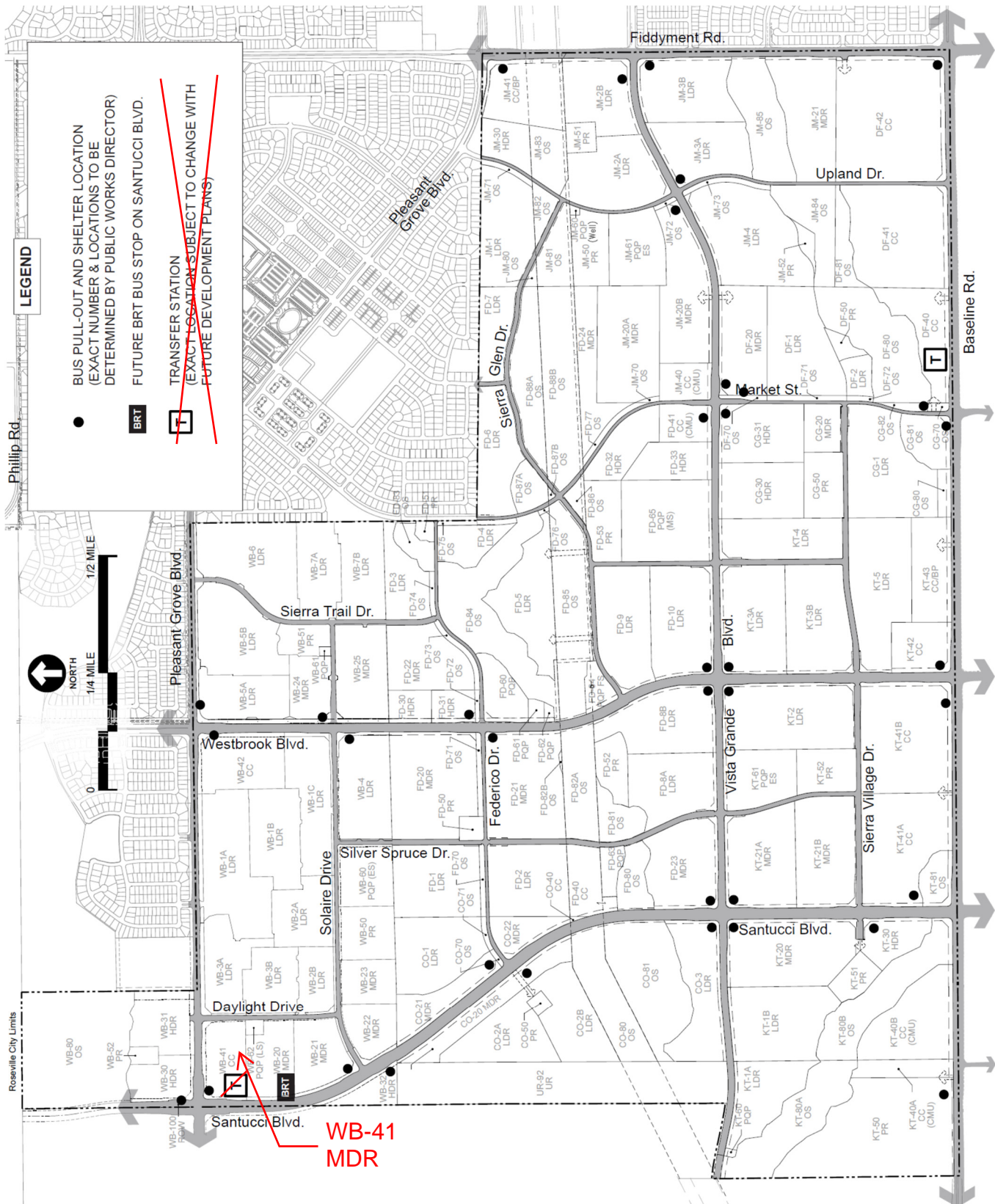


Figure 6-24: Bus Pull-Out and Shelter Locations



## 6.5 Park and Ride Facilities

---

Park and ride lots provide parking for commuters to leave their vehicles to meet carpools, vanpools or access transit. In the SVSP, a total of ~~3~~<sup>2</sup> park and ride lots are dispersed throughout the Plan Area near major roadway intersections on the Baseline Road, Fiddymont Road, and Santucci Blvd. corridors. The park and ride locations shown on SVSP Parcels DF-40 and KT-41A shall provide for 50 park and ride spaces each. ~~The park and ride location in SVSP Parcel WB-41 shall provide for 35 park and ride spaces.~~ Sites designated to provide park and ride facilities are identified on Figure 6-25.

Park and Ride spaces are in addition to the minimum required parking spaces for each project. These spaces will be installed with project development and maintained by the project developer, with all designated spaces signed in accordance with City standards. Park and Ride lots are intended to be made available to commuters during normal commute hours on a daily basis. Additional details regarding the obligations for the construction of park and ride lots, including related facilities, is included in the project development agreements.

## 6.6 Transportation Systems Management

---

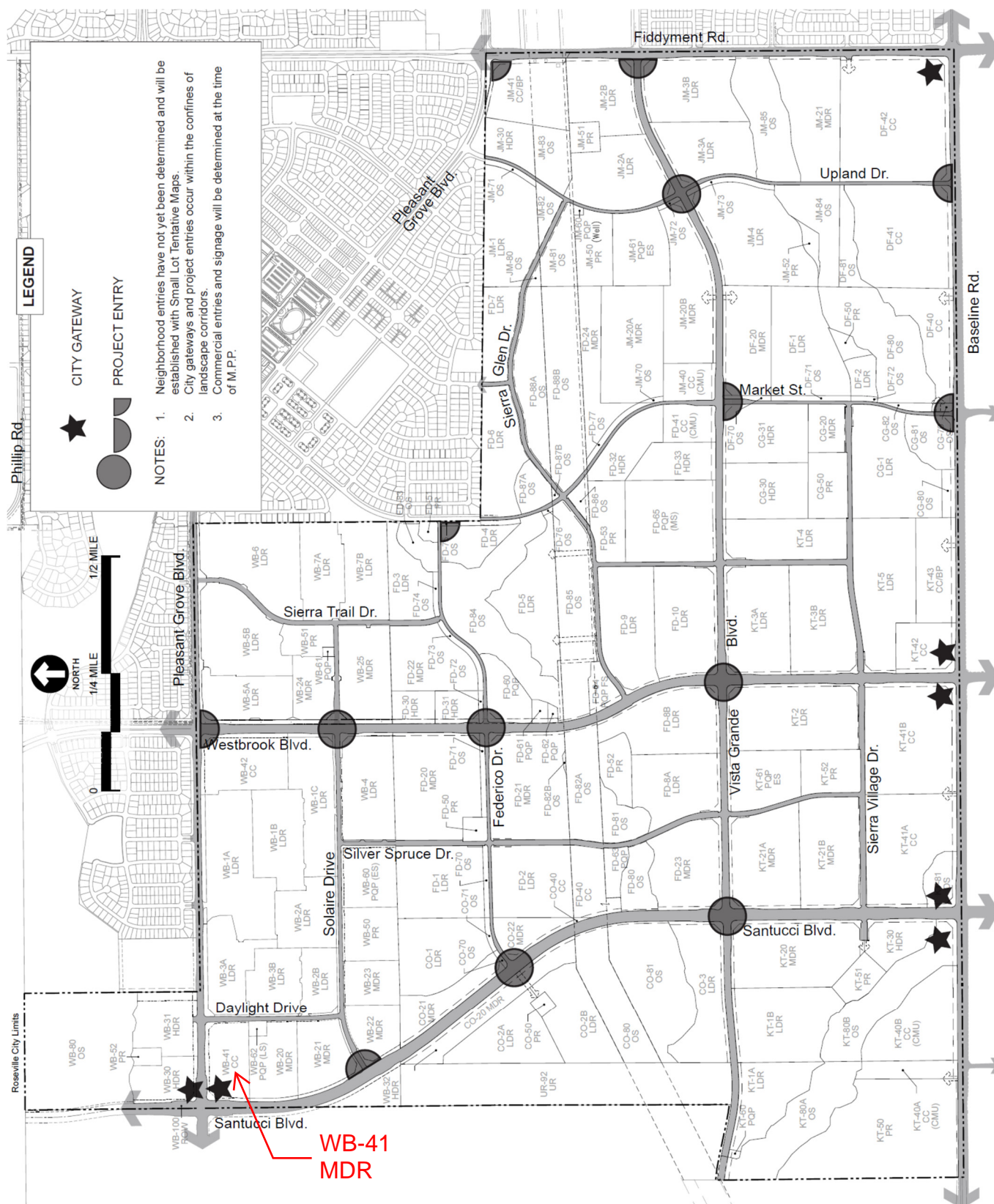
Transportation System Management (TSM) measures are designed to reduce the number and length of home-to-work commute trips through actions such as ridesharing, flexible work hours, and support of public transportation. Any project site, common work location, or employer with 50 or more employees is required to comply with the City of Roseville TSM Ordinance and shall incorporate TSM measures to the degree required by the Ordinance.



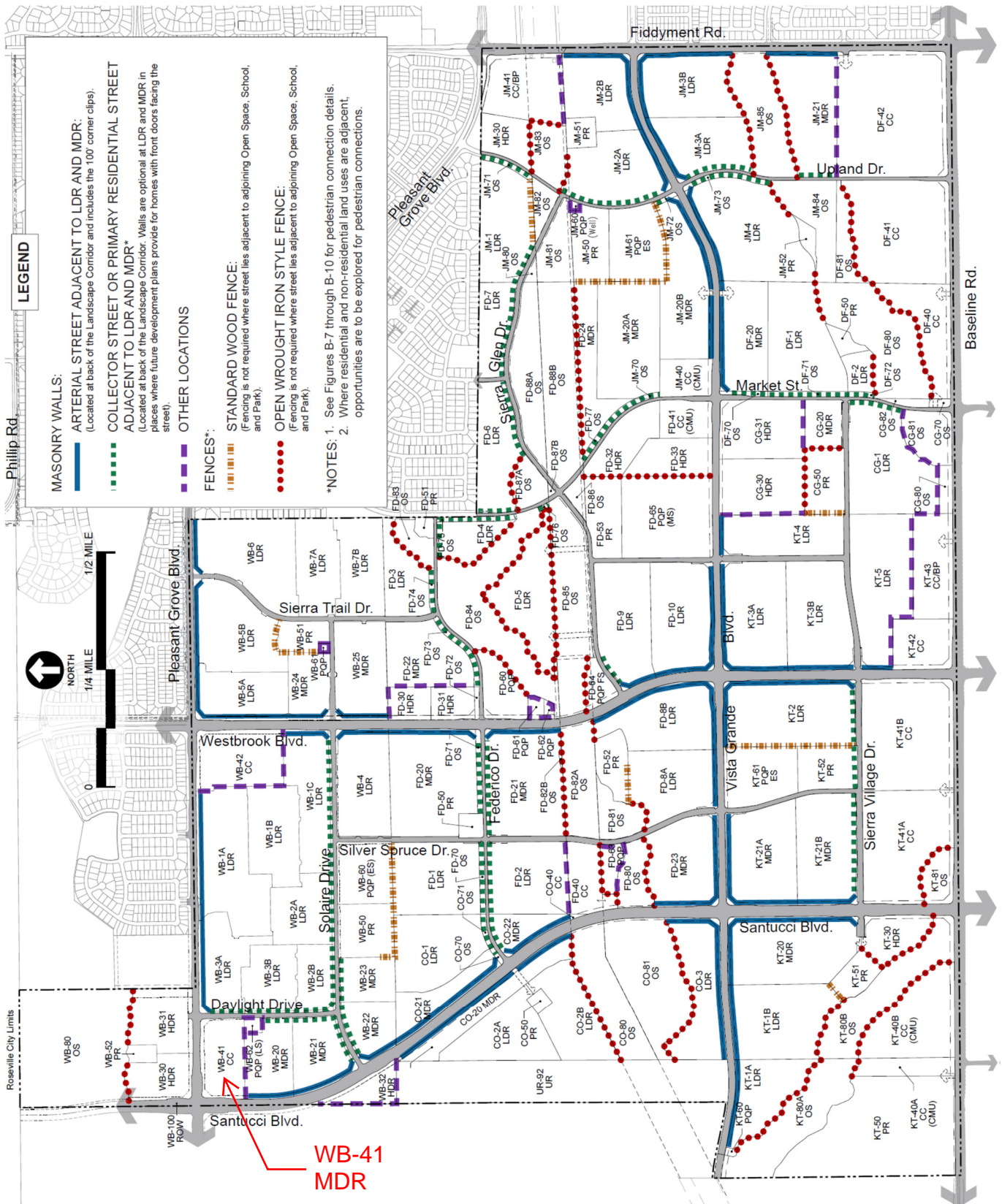
## 6-29



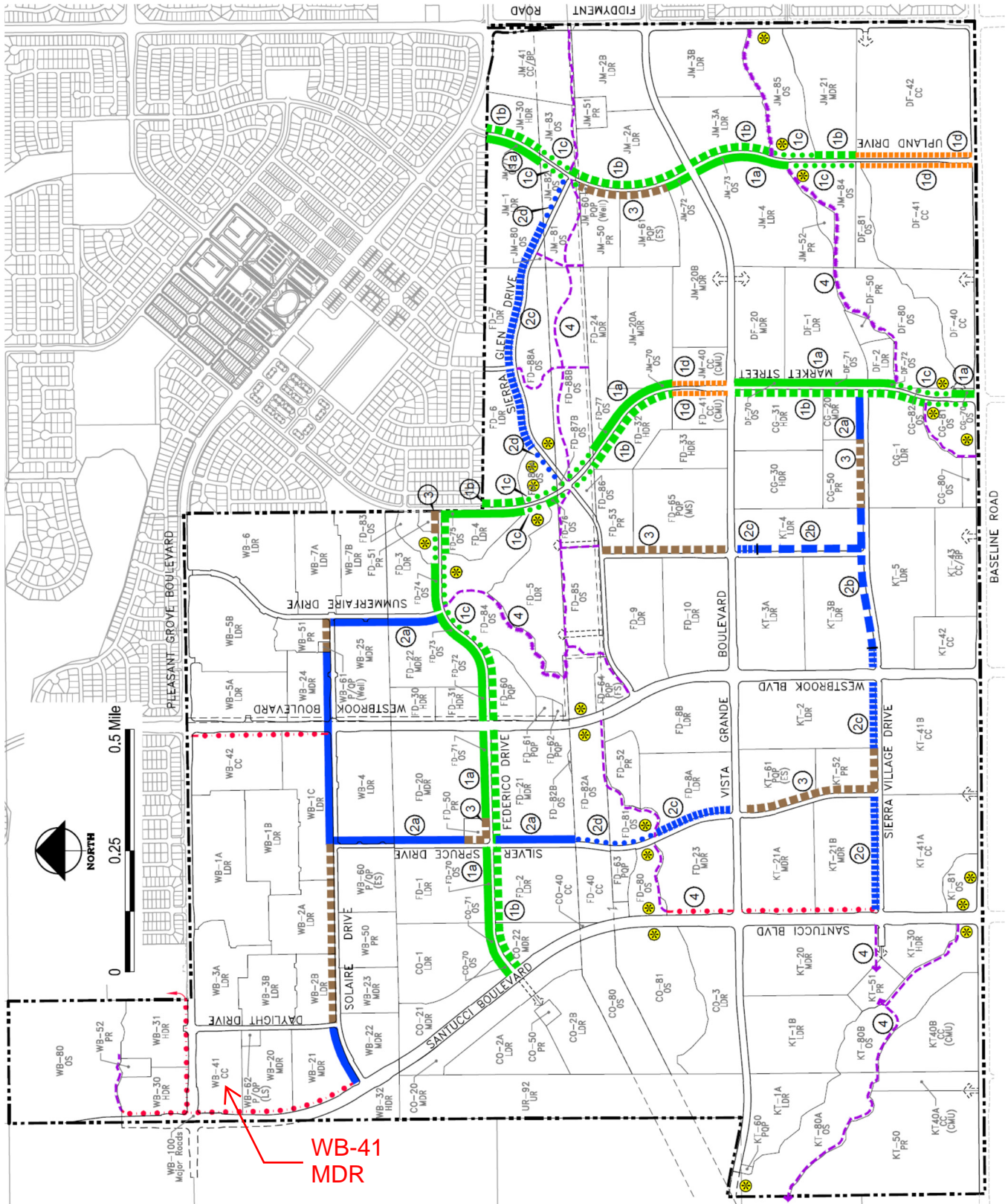












**Note:** Bikeway alignments in open space areas are conceptual and may be refined as detention facilities are designed.

**Figure B-5: Paseo Plan**







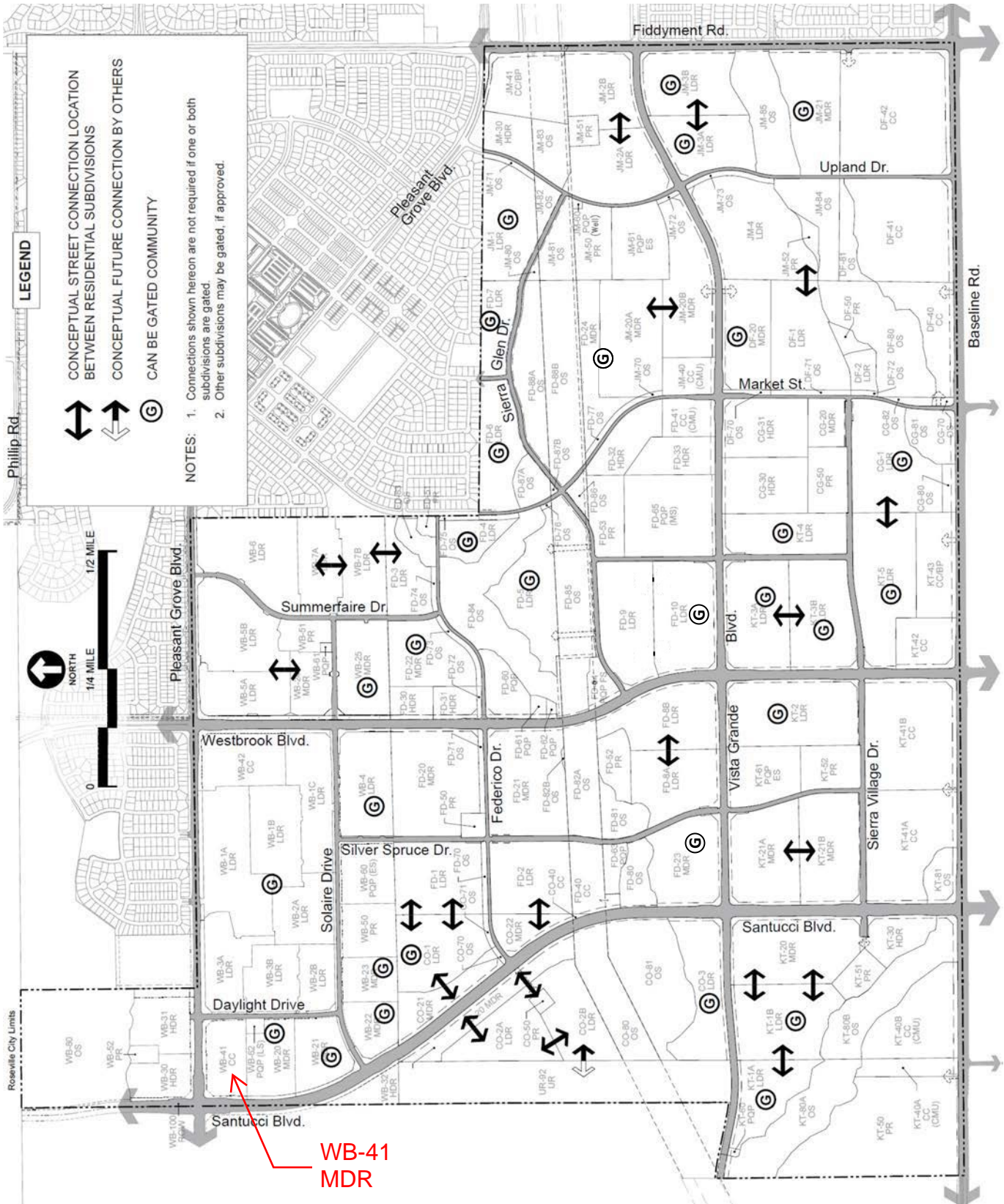


Figure B-25: Neighborhood Connectivity and Gated Subdivisions - updated April 2021



## B.12 Commercial Center for Parcels WB-41

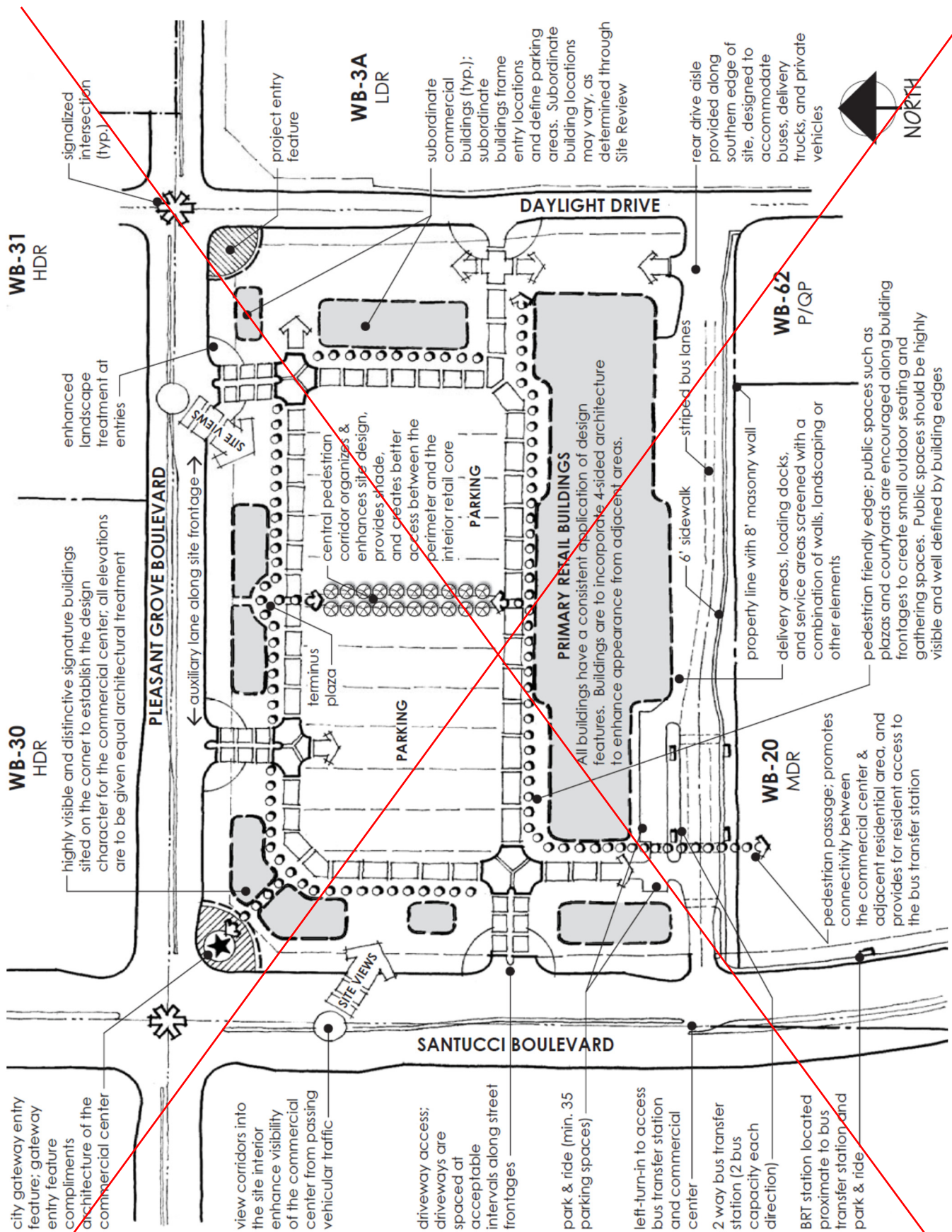
### Overview

Parcel WB-41 is a neighborhood-serving retail center that supports planned transit systems and facilitates pedestrian walkability. At 10 acres, development of approximately 175,000 sq. ft. of commercial and/or office space can be supported. This site is adjacent to a planned Bus Rapid Transit (BRT) route along Santucci Blvd. and as such, the site design concept accommodates a transit hub that supports both regional and local transit systems. In addition, the layout of retail buildings allows a point of connection to the adjacent residential neighborhoods, intended to facilitate pedestrian walkability to both this retail center and transit hub. The mix of uses and layout of buildings will be determined as subsequent entitlements are processed with the City per the guidelines below.

### Guidelines

The design concept in Figure B-30 should be used to help direct the final layout of the commercial site. Design consideration should be given to the site's visibility at a major street intersection and western entry into the City. The concepts and guidelines in this illustrative are intended to augment the City's adopted Community Design Guidelines for commercial centers.



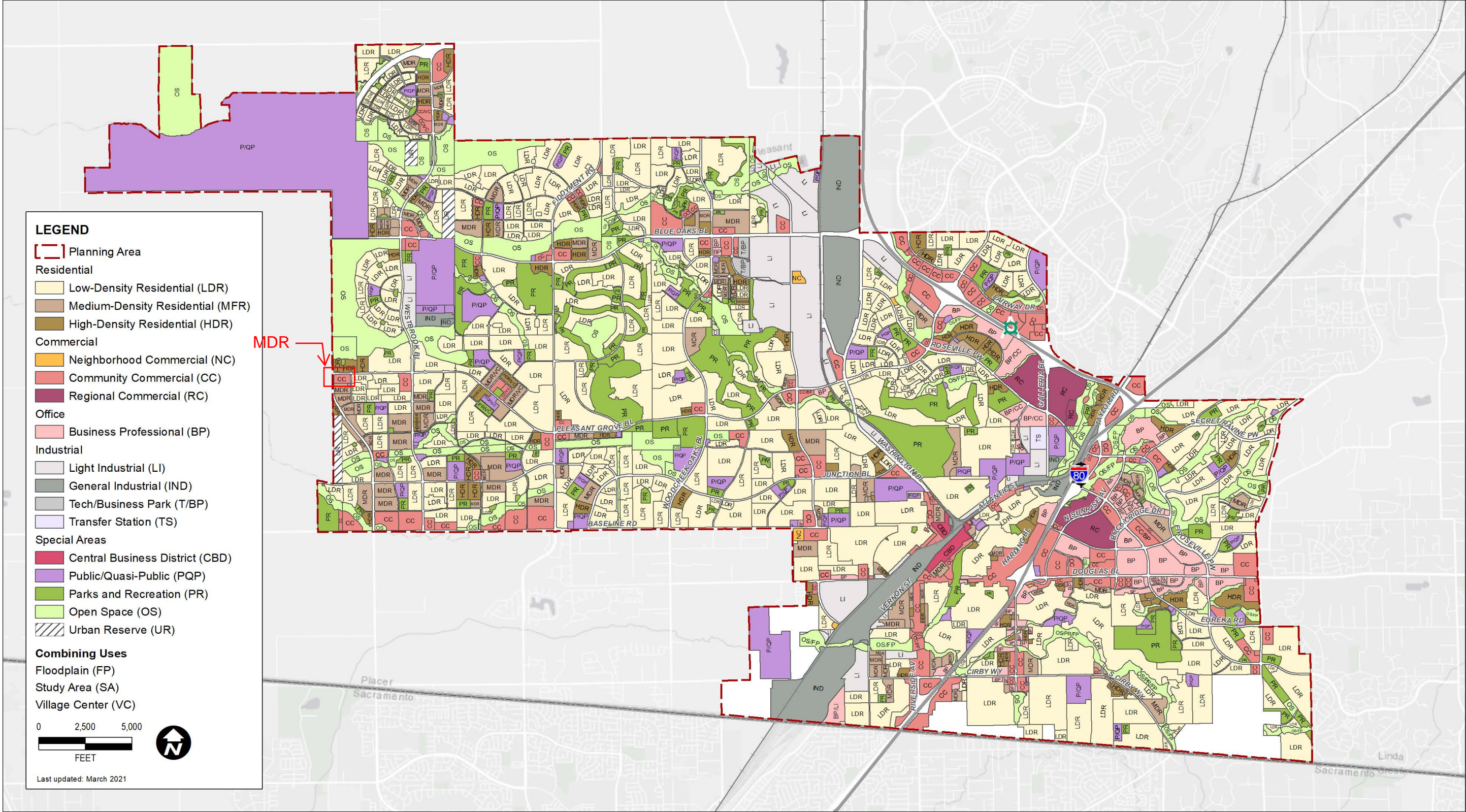


**Figure B-30: Concept Plan for Parcel WB-41**





Figure II-2 | Land Use Map





# TECHNICAL MEMORANDUM

---

**DATE:** July 16, 2021  
**TO:** City of Roseville  
**FROM:** Cindy Gwaltney  
**CC:** Ryan O’Keefe, Westpark SV, LLC.; Allison Wathen, Eric Crow  
**SUBJECT:** Preliminary Storm Water Quality Evaluation for Parcel WB-41

---

## Introduction & Overview

This Technical Memorandum (TM) is a technical storm water quality assessment for the proposed development project on Parcel WB-41 in the Sierra Vista Specific Plan area. The proposed project consists of a Small Lot Tentative Map for 63 medium-density residential lots and adjacent landscape on a  $\pm 10.1$ -acre area. This TM includes the appropriate level of analysis for the proposed storm water quality facilities serving the project.

The contributory area analyzed for Parcel WB-41 is comprised of 8.7-acres of medium density residential. The adjacent landscape was accounted for and analyzed in the Storm Drainage Evaluation for Westbrook Phase 3: Santucci Boulevard, Pleasant Grove Boulevard, and Solaire Drive dated April 30, 2019. The site is located within the Sierra Vista Specific Plan Area and is east of Santucci Boulevard, west of Westbrook Boulevard, south of Pleasant Grove Boulevard, and north of Baseline (Figure 1). The site discharges to existing storm drainage infrastructure in Pleasant Grove Boulevard which ultimately discharges to an existing bioretention facility located in the open space alongside a tributary of Curry Creek.

## Purpose

This TM is a drainage evaluation that supports the project entitlements for Parcel WB-41. This TM provides a preliminary assessment of the Low Impact Development measures needed and confirms the outfall bioretention facility has capacity to mitigate for the proposed site.

## Previous Studies

The Storm Drainage Evaluation for Westbrook Phase 3: Santucci Boulevard, Pleasant Grove Boulevard, and Solaire Drive (Westbrook SDTM) dated April 30, 2019 by MacKay & Soms was referenced. No other studies were utilized in the preparation of this report.

## Storm Water Quality & Hydromodification

To evaluate the storm water quality provisions and hydromodification management for the development, the West Placer Storm Water Quality Design Manual (SWQDM) was referenced and utilized in this analysis. Storm Water Quality (SWQ) is assessed for the fully-built out contributing area that includes Parcel WB-41 in the Westbrook SDTM. The previous SWQ analysis includes Parcel WB-41 as having a commercial land use which for this watershed is considered self-treating. The Westbrook SDTM analysis is updated to reflect Parcel WB-41 as medium density residential and the revised SWQ calculations are included in Appendix A.



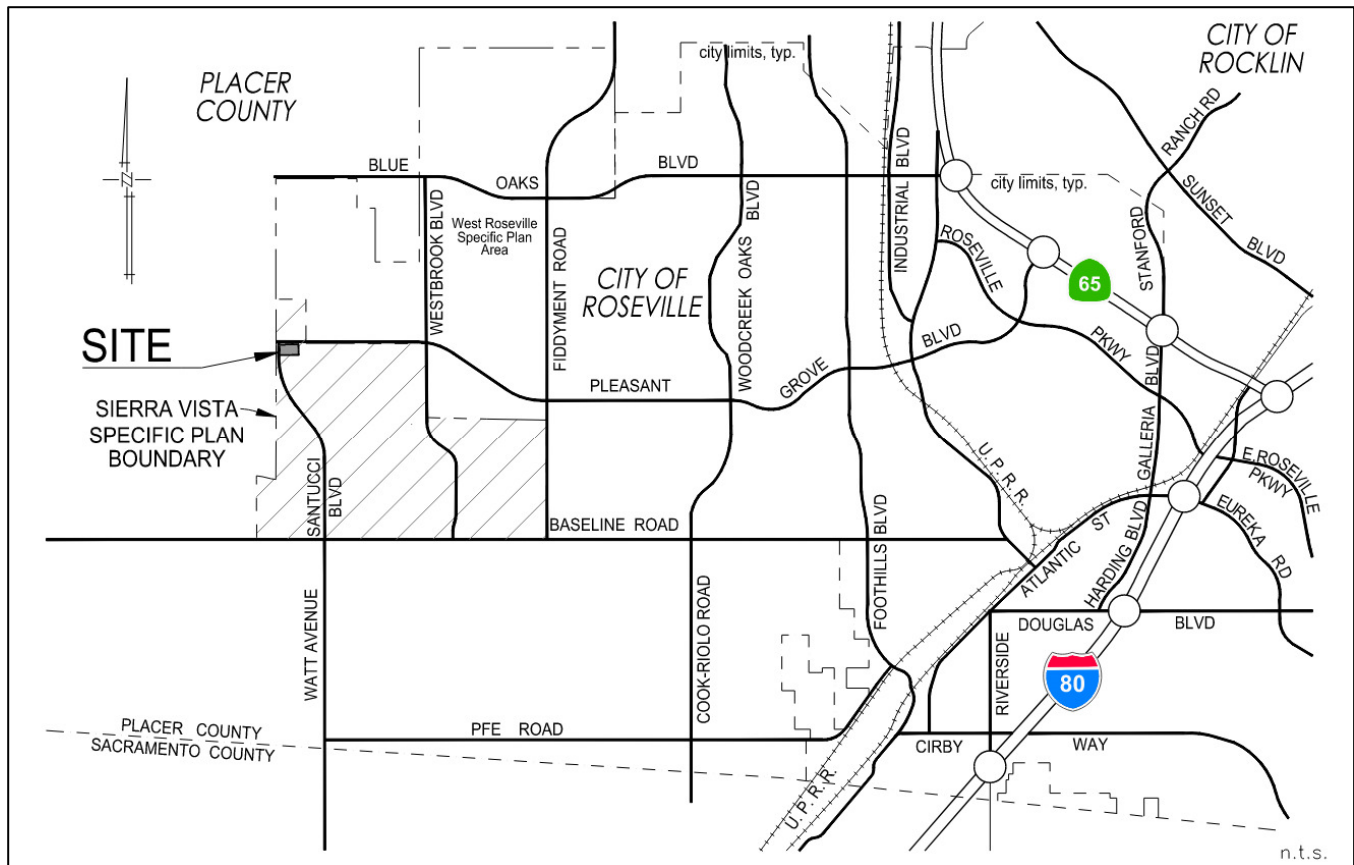


Figure 1. Project Location Map

The revised calculations resultant bioretention facility size needed for the updated contributory drainage area was compared to the size of the constructed bioretention facility. It is determined that the existing bioretention facility is adequately sized to include Parcel WB-41 as medium density residential with the application of the below described Low Impact Development measures for Parcel WB-41.

The proposed project creates more than one acre of impervious surface. Due to this, it is considered a Hydromodification Management Project per the Phase II MS4 Permit and is required to provide storm water treatment for the 85th percentile event and hydromodification for the 2-year event. Hydromodification requirements are demonstrated to be met in the Westbrook SDTM using the SWQPDM Templates. These templates are updated with this TM and are included in Appendix A.

The first line of defense in maintaining storm water quality is to keep urban runoff from commingling with clean water through the use of Source Controls. This can be done using structural and operational measures at the pollutant source. At this level of analysis, source control measures are not included however, measures may be specified at the improvement plan level of design and implemented with construction.

Several Low Impact Development strategies would be implemented with development of the project in order to reduce the post-development flows. The proposed LID measures include tree planting, soil quality improvement, disconnected impervious areas, and the existing bioretention facility at the outfall of the Westbrook Phase 3 drainage system. These strategies would remove pollutants from runoff, attenuate peak flows, and reduce runoff volume.



Planting trees is proposed at a rate of two trees per lot. Trees, at a minimum, decrease storm water runoff volume, reduce the amount of pollutants to reach downstream, are aesthetically pleasing, have a cooling effect through shade and evapotranspiration, and provide habitat for birds and insects

Soil quality amendments would also be added at a rate of 9 square-feet of 1-foot deep soil amendment per each tree planting, thus assisting the trees in becoming established as well as improving the soil. Soil quality amendments improve soil infiltration rates, reduce surface runoff quantities and erosion, improve soil filtration capabilities and pollutant removal, enhance plant survival rates and health, and decrease the need for landscape irrigation and fertilization.

Disconnecting impervious areas is another technique that would be implemented with the project. This includes rooftops or other hard surfaces such as streets/parking lots or sidewalks that drain directly to pervious areas such as landscape. The rooftop disconnection is achieved through disconnected roof drains that route the rooftop flows into pervious areas. The design parameter of twice the area of impervious to pervious area is used. Due to this design constraint, the average size of a lot for each parcel was analyzed for probable pervious area. Once this pervious area was determined, the amount of rooftop draining to the pervious area was calculated per each lot. For the proposed project, an estimated amount of 1300 square-feet of rooftop per lot. Disconnected impervious areas have the following benefits of decreasing runoff volume, reducing peak flow rates, and encouraging groundwater recharge.

All proposed measures were designed to the specifications outlined in the SWQDM and implemented to mitigate the 85th percentile, 24-hour storm event for storm water quality and the 2-year 24-hour event for hydromodification. The SWQDM Template was completed using the shed information presented in the Westbrook SDTM with Parcel WB-41 updated to medium density residential land use and is included in Appendix A. Storm water quality compliance is demonstrated on Form 3-6 with having zero untreated volume in Item 14 and hydromodification compliance is demonstrated on Form 4-3, Item 16.

## Conclusion

The results of the analysis performed for this Technical Memorandum demonstrate that the proposed development of Parcel WB-41 in Sierra Vista Specific Plan can be satisfactorily treated with the Low Impact Development measures as described and analyzed herein and the existing bioretention facility at the outfall of the Westbrook Phase 3. It adequately details the development's drainage characteristics and is suitable for submittal to the City of Roseville.





*Exhibit 1*  
*Parcel WB-41 SWQ Sheds*

## Westbrook Phase 3

City of Roseville  
Scale 1"=100'  
NGVD 29

**MACKEY & SOMPS**  
ENGINEERS PLANNERS SURVEYORS  
1552 Eureka Road, Suite 100, Roseville, CA 95661 (916) 773-1189

California  
April 2021  
18437.PH3

**PRELIMINARY - Subject to Revision**

[illegible]



## Appendix A

### Storm Water Quality Template



# **Post-Construction Storm Water Quality Plan**

**For:**

**Westbrook Phase 3 updated with Parcel WB-41  
City of Roseville**

**Prepared by:**

**MacKay & Soms Civil Engineering, Inc.  
1025 Creekside Ridge Dr., Ste 150  
Roseville, CA 95678  
916-773-1189**

**Preparation Date: March 2021**

**Approval Date:\_\_\_\_\_**



## Section 1 General Project Information

The undersigned owner of the subject property, is responsible for the implementation of the provisions of this plan, including ongoing operations and maintenance (O&M), consistent with the requirements of the West Placer Storm Water Quality Design Manual and the State of California Phase II Small MS4 General Permit (Order No: 2013-0001-DWQ). If the undersigned transfers its interest in the property, its successors-in-interest shall bear the aforementioned responsibility to implement the SWQP.

For all Regulated Projects (As identified in Form 1-2 below), the undersigned owner hereby grants access to all representatives of the Jurisdictional Agency for the sole purpose of performing O&M inspections of the installed treatment system(s) and hydromodification control(s) if any.

A copy of the final signed and fully approved SWQP shall be available on the subject site for the duration of construction and then stored with the project approval documentation and improvement plans in perpetuity.

Form 1-1 Project Identification and Owner's Certification		
Project Site Address:	3301 Pleasant Grove Boulevard, Roseville, CA 95661	
Owner Name:	Ryan O'Keefe	
Title		
Company	Westpark SV 400, LLC	
Address	1420 Rocky Ridge Drive, Suite 265	
City, State, Zip Code	Roseville, CA 95661	
Email	<a href="mailto:ryan@wpcommunities.com">ryan@wpcommunities.com</a>	
Telephone #	916-990-1071	
Signature	Date	
Engineer:*	Steve Smith	<b>PE Stamp*</b> (Required for all Regulated Projects)
Title		
Company	MacKay & Soms Civil Engineering, Inc.	
Address	1025 Creekside Ridge Dr., Ste 150	
City, State, Zip Code	Roseville, CA 95678	
Email	<a href="mailto:ssmith@msce.com">ssmith@msce.com</a>	
Telephone #	916-773-1189	
Signature		
Brief Description of Project:  (Attach additional sheets as necessary)	86.0 Acre Development	

\* Not required for Small Projects as determined in Form 1-2 below. Project owners are responsible for ensuring that all storm water facilities are designed by an appropriately licensed and qualified professional.



Form 1-2 Project Category	
Development Category (Select all that apply)	
<sup>1</sup> <b>Small Project</b> – All projects, except LUPs, that create and/or replace between 2,500-5,000 ft <sup>2</sup> of impervious surface or detached single family homes that create and/or replace 2,500 ft <sup>2</sup> or more of impervious surface and are not part of a larger plan of development.	
<sup>2</sup> Enter total new and/or replaced impervious surface (ft <sup>2</sup> )	
<sup>3</sup> <b>Regulated Project</b> – All projects that create and/or replace 5,000 ft <sup>2</sup> or more of impervious surface.	X
<sup>4</sup> <b>Regulated Redevelopment Project</b> with equal to, or greater than 50 percent increase in impervious area	X
<sup>5</sup> <b>Regulated Redevelopment Project</b> with less than 50 percent increase in impervious area	
<sup>6</sup> Enter total pre-project impervious surface (ft <sup>2</sup> )	0
<sup>7</sup> Enter total new and/or replaced impervious surface (ft <sup>2</sup> )	2,557,277
<sup>8</sup> <b>Regulated Road or linear underground/overhead project (LUP)</b> creating 5,000 ft <sup>2</sup> or more of newly constructed contiguous impervious surface.	
<sup>9</sup> Enter total new and/or replaced impervious surface (ft <sup>2</sup> )	
<sup>10</sup> <b>Regulated Hydromodification Management Project</b> – Regulated projects that create and/or replace 1 acre or more of impervious surface. A project that does not increase impervious surface area over the pre-project condition is not a hydromodification management project.	X
<sup>11</sup> Enter total new and/or replaced impervious surface (ft <sup>2</sup> )	2,557,277



## Section 3 Regulated Projects

**Section 3 forms are to be completed for all Regulated Projects.**

### Form 3-1 Site Location and Hydrologic Features

Site coordinates:	<sup>1</sup> Latitude	<sup>2</sup> Longitude	<sup>3</sup> Elevation (ft. above sea level)	<sup>4</sup> 85th Percentile, 24 Hour Design Storm Depth (in):
Take GPS measurement at approximate center of site	38°46'28.12"N	121°23'34.76"W	90	0.9

<sup>5</sup> Receiving waters  
Name of stream, lake or other downstream waterbody to which the site runoff eventually drains

Sacramento River via Pleasant Grove Creek South Branch and tributary
--

303(d) listed pollutants of concern  
Refer to State Water Resources Control Board website  
[www.waterboards.ca.gov/water\\_issues/programs/water\\_quality\\_assessment/#impaired](http://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/#impaired)

Curry Creek is listed for: Pyrethroids and Toxicity
---

Is Project going to be phased?  
If yes, ensure that the SWQP evaluates each phase with distinct DMAs, requiring LID BMPs to address runoff at time of completion

Yes
-----

<sup>8</sup>Use this form to show a conceptual schematic depicting DMAs and conveyance features connecting DMAs to the site outlet(s). An example is provided below that can be modified for the proposed project or a drawing clearly showing DMAs and flow routing may be attached.

Example only  
Modify for project specific SWQP  
Use separate sheet if necessary

See Exhibit

Example only  
Modify for project specific SWQP  
Use separate sheet if necessary

See Exhibit



Form 3-2 Site Assessment and Layout Documentation		
	Has this Item been considered in the Site Layout and depicted in the Site Plan?	
	Yes	Not Applicable (Include brief explanation)
Define the development envelope and protected areas, identifying areas that are most suitable for development areas to be left undisturbed.		N/A, site has been previously graded, all areas are similar
Concentrate development on portions of the site with less permeable soils and preserve areas that can promote infiltration.		N/A, all of the site is on Type C soils
Limit overall impervious coverage of the site with paving and roofs.		N/A, conforming to local impervious coverage ordinances
Set back development from creeks, wetlands, and riparian habitats.		N/A, existing draw is too close to provide 500ft setback
Preserve significant trees.		N/A, site is graded from previous use
Conform site layout along natural landforms.	X	
Avoid excessive grading and disturbance of vegetation and soils.		N/A, site has previously been disturbed
Replicate the site's natural drainage patterns.	X	
Detain and retain runoff throughout the site.	X	
<b>Attach a Site Plan that incorporates the applicable considerations above. Ensure that the following items are included in the Site Plan:</b>		
Site Boundary Soil types and areal extents, test pit and infiltration test locations Topographic data with 1 ft. contours Existing natural hydrologic features (depressions, watercourses, wetlands, riparian corridors) Environmentally sensitive areas and areas to be preserved. Proposed locations and footprints of improvements creating new, or replaced, impervious surfaces Potential pollutant sources and locations Entire site divided into separate DMAs with unique identifiers Existing and proposed site drainage network with flow directions and site run-on and discharge locations Proposed design features and surface treatments used to minimize imperviousness and reduce runoff Proposed locations and footprints of treatment and hydromodification management facilities Design features for managing authorized non-stormwater discharges Areas of soil and/or groundwater contamination Existing utilities and easements Maintenance areas		



Form 3-3 Source Control Measures			
Potential Pollutant Generating Activity or Source	Check One		Describe the source control measures to be implemented for each potential pollutant generating activity or source present on the project as listed in Appendix C and in the CASQA Fact Sheets. Include any special features, materials, or methods of construction that will be used.
	Present	Not Applicable	
Accidental spills or leaks	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Interior floor drains	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Parking/storage areas and maintenance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Indoor and structural pest control	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Pools, spas, ponds, decorative fountains, and other water features	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Landscape/outdoor pesticide use	<input checked="" type="checkbox"/>	<input type="checkbox"/>	All manufacturer recommendations and regulations will be followed. Minimum amounts will be used.
Restaurants, grocery stores, and other food service operations	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Refuse areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Industrial Processes	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Outdoor storage of equipment or materials	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Vehicle and equipment cleaning	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Vehicle and equipment repair and maintenance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Fuel dispensing areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Loading docks	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Fire sprinkler test water	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Drain or wash water from boiler drain lines, condensate drain lines, rooftop equipment, drainage sumps, and other sources	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Unauthorized non-storm water discharges	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Building and grounds maintenance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

The source control measures identified in this table shall be designed consistent with recommendations from the CASQA Stormwater BMP Handbook for New Development and Redevelopment<sup>1</sup>, or from another equivalent manual.

<sup>[1]</sup> California Stormwater BMP Handbook New Development and Redevelopment. California Stormwater Quality Association (CASQA). January 2003.



**Form 3-4 Runoff Reduction Calculator for Site Design Measures on Regulated Projects**

<sup>1</sup> DMA ID No.			A			
Site Design Measure	Runoff Reduction Parameters			Runoff Reduction (ft <sup>3</sup> )		Runoff Reduction (ft <sup>3</sup> )
<sup>2</sup> Adjacent/On-Site Stream Setbacks and Buffers	A <sub>imp</sub> (ft <sup>2</sup> )	impervious drainage area	-	-	-	-
	V <sub>85</sub> (in)	runoff volume from 85th percentile, 24-hour storm	0.8		0.8	
<sup>3</sup> Soil Quality Improvement and Maintenance	A <sub>pond</sub> (ft <sup>2</sup> )	ponding area	0	1,883.7	0	-
	D <sub>pond</sub> (ft)	ponding depth	0.0			
	A <sub>sa</sub> (ft <sup>2</sup> )	soil amendment area	5382			
	D <sub>sa</sub> (ft)	depth of amended soil	1.0		1.0	
	n	porosity of amended soil	0.4		0.4	
<sup>4</sup> Tree Planting and Preservation	n <sub>e</sub>	number of new evergreen trees	315	6,952.8		-
	n <sub>d</sub>	number of new deciduous trees	315			
	A <sub>tc</sub> (ft <sup>2</sup> )	canopy area of existing trees to remain on the property				
	V <sub>85</sub> (in)	runoff volume from 85th percentile, 24-hour storm	0.8		0.8	
<sup>5</sup> Rooftop and Impervious Area Disconnection	A <sub>imp</sub> (ft <sup>2</sup> )	impervious drainage area	391,017	26,393.6		-
	V <sub>85</sub> (in)	runoff volume from 85th percentile, 24-hour storm	0.8		0.8	
<sup>6</sup> Porous Pavement	A <sub>res</sub> (ft <sup>2</sup> )	area of gravel storage layer		-	0	-
	D <sub>res</sub> (ft)	depth of gravel storage layer				
	n <sub>agg</sub>	porosity of aggregate				
	C	efficiency factor				
<sup>7</sup> Vegetated Swales	A <sub>imp</sub> (ft <sup>2</sup> )	impervious drainage area	1,259,370	85,007.5		-
	V <sub>85</sub> (in)	runoff volume from 85th percentile, 24-hour storm	0.8		0.8	
<sup>8</sup> Rain Barrels and Cisterns	N	number of rain barrels and/or cisterns		-	0	-
	V <sub>a</sub> (ft <sup>3</sup> )	volume of each rain barrel and/or cistern				
<sup>9</sup> Do all Site Design Measures meet the design requirements outlined in the Fact Sheets?					Yes	<b>X</b>
<sup>10</sup> Total Volume Reduction (ft <sup>3</sup> )			120,238		-	
<sup>11</sup> Effective Treated Impervious Area (ft <sup>2</sup> )			1,603,169		-	

Note: Vegetated swales are not proposed. They are used as a mitigation measure to reflect the treatment for the self-treating land uses such as roadways, commercial, and HDR. Roadways utilize behind the curb bioretention for treatment. Commercial and HDR sites will be analyzed at time of Tentative Map or Improvement Plans for those specific sites. It is not known at this time what measures will be implemented. This is done to best represent the contributory area as a whole including self-treating areas.



**Form 3-5 Computation of Water Quality Design Criteria  
for Stormwater Treatment and Baseline  
Hydromodification Measures**

DMA ID No.	A	
<sup>1</sup> Total impervious area requiring treatment	2,557,277	
<sup>2</sup> Impervious area untreated by Site Design Measures (ft <sup>2</sup> ) <i>Item 1 – Form 3-4 Item 11</i>	954,108	-
<sup>3</sup> Additional pervious area draining to BMP (ft <sup>2</sup> )	1,190,190	
<sup>4</sup> Composite DMA Runoff Coefficient (Rc) <i>Enter area weighted composite runoff coefficient representing entire DMA</i>	0.201	0
<sup>5</sup> Water Quality Volume (WQV) (ft <sup>3</sup> ) <i>WQV = 1/12 * [Item 2 + Item 3] * Item 4] * Unit WQV</i>	23,307	-
<sup>6</sup> Water Quality Flow (WQF) (cfs) <i>WQF = 1/43,200 * [0.2 * (Item 2 + Item 3) * Item 4]</i>	1.992	0.000



### Form 3-6 Volume-Based Infiltrating Bioretention Measures

<sup>1</sup> DMA ID No. <i>If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.</i>	A			
<sup>2</sup> WQV (ft <sup>3</sup> ) Item 5 in Form 3-5 <i>If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.</i>	23307			
<sup>3</sup> Surface Loading Rate Maximum 5.0 in/hr	5			
<sup>4</sup> BMP Surface Area (ft <sup>2</sup> ) <i>Top of BMP</i>	17473			
<sup>5</sup> Infiltration rate of underlying soils (in/hr)	0.07			
<sup>6</sup> Maximum ponding depth (ft) <i>BMP specific, see BMP design details</i>	0.5			
<sup>7</sup> Ponding Depth (ft) <i><math>d_{BMP}</math> = Minimum of (1/12 * Item 5 * 48 hrs) or Item 6</i>	0.8	-	-	-
<sup>8</sup> Infiltrating surface area, $SA_{BMP}$ (ft <sup>2</sup> ) <i>Bottom of BMP</i>	14561			
<sup>9</sup> Planting media depth, $d_{media}$ (ft)	1.5			
<sup>10</sup> Planting media porosity	0.35			
<sup>11</sup> Gravel depth, $d_{media}$ (ft) <i>Only included in certain BMP types</i>	3.5			
<sup>12</sup> Gravel porosity	0.30			
<sup>13</sup> Retention Volume (ft <sup>3</sup> ) <i><math>V_{retention}</math> = Item 8 * [Item 7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (1.5 * (Item 5 / 12))]</i>	34,582	-	-	-
<sup>14</sup> Untreated Volume (ft <sup>3</sup> ) <i><math>V_{untreated}</math> = Item 2 – Item 13 If greater than zero, adjust BMP sizing variables and re-compute retention volume</i>	0	0	0	0
<sup>15</sup> Treated Flow Rate (ft <sup>3</sup> /s) <i><math>Q_{treated}</math> = 1/43,200*(Item 3 * Item 4)</i>	2.0224	0.0000	0.0000	0.0000
<sup>16</sup> Total Treated Flow Rate for Project (ft <sup>3</sup> /s) <i><math>Q_{total}</math> = Sum of Item 15 for all DMAs</i>	2.022			
<sup>17</sup> Is WQV for each DMA treated on-site?	Yes	X	No	



## Section 4

### Regulated Hydromodification Management Projects

#### Form 4-1 Peak Runoff Response Time

(Complete Section 4 forms for Regulated Hydromodification Projects only)

Determine total runoff response time for pre- and post-construction conditions at each project outlet.

Variables	Pre-construction DMAs to Project Outlet				Post-construction DMAs to Project Outlet			
	A				A			
<sup>1</sup> Length of longest overland flow path <i>Not to exceed 100 ft</i>	100				100			
<sup>2</sup> Slope of overland flow path (ft/ft)	0.0080				0.0200			
<sup>3</sup> Manning's roughness coefficient for overland flow surface <i>See Table 5-5 of the Placer County SWMM</i>	0.4000				0.1100			
<sup>4</sup> Overland flow response time (min) $(0.355 * (\text{Item 1} * \text{Item 3})^{0.6}) / (\text{Item 2}^{0.3})$	14	-	-	-	5	-	-	-
<sup>5</sup> Hydrologic Soil Group <i>Refer to Section 3.1.1. or NRCS Web Soil Survey</i>	D				D			
<sup>6</sup> Current Land Cover Type(s) <i>Select from categories shown in Table 5-3 of the SWMM</i>	Grass				Residential			
<sup>7</sup> Pervious Area Condition: <i>Based on the extent of vegetated cover Good &gt;75%; Fair 50-75%; Poor &lt;50% Attach photos of site to support rating</i>	Fair				Good			
<sup>8</sup> Infiltration Rate (in/hr) <i>Refer to Table 5-3 of the SWMM using Items 3, 4, and 5 above or obtain site specific field measurements (See Section 3.1.1)</i>	0.08				0.12			
<sup>9</sup> Length of collector flow (ft)	4,036				3,363			
<sup>10</sup> Cross-sectional area of collector flow facility (ft <sup>2</sup> )	7				20			
<sup>11</sup> Wetted perimeter of collector flow facility (ft)	14				16			
<sup>12</sup> Manning's roughness of collector flow facility	0.0400				0.0150			
<sup>13</sup> Slope of collector flow facility (ft/ft)	0.0051				0.0017			
<sup>14</sup> Channel flow velocity (ft/sec) $V = (1.49 / \text{Item 12}) * (\text{Item 10} / \text{Item 11})^{0.67} * (\text{Item 13})^{0.5}$	1.7	-	-	-	4.8	-	-	-
<sup>15</sup> Collector flow facility response time (min) $T_c = \text{Item 9} / (\text{Item 14} * 60)$	40.1	-	-	-	11.8	-	-	-
<sup>16</sup> Total runoff response time or $T_t$ (min) $T_t = \text{Item 4} + \text{Item 15}$	54.0	-	-	-	16.6	-	-	-



Form 4-2 Hydromodification Target for Peak Runoff								
Variables	Pre-construction DMAs to Project Outlet				Post-construction DMAs to Project Outlet			
	1	2	3	4	1	2	3	4
<sup>1</sup> Drainage Area (ft <sup>2</sup> ) <i>Sum of all outlet level DMAs should equal total project area.</i>	3,747,467				3,747,467			
<sup>2</sup> Impervious Area (ft <sup>2</sup> ) <i>Sum of all outlet level DMAs should equal total project impervious area.</i>	74,949				2,557,277			
<sup>3</sup> Rainfall depth for 2yr storm with duration equal to response time (in) <i>See Placer County SWMM Table 5-A-1 for elevation of site and duration equal to response time</i>	0.44				0.24			
<sup>4</sup> Unit peak runoff (cfs/acre) <i><math>q = 60/\text{Form 4-1 Item 16} * \text{Item 3}</math></i>	0.49	-	-	-	0.87	-	-	-
<sup>5</sup> Infiltration factor (cfs/acre) <i><math>F_i = \text{Form 4-1 Item 8} * (1 + 1 / (1.3 + 0.0005 * \text{Form 3-1 Item 3}))</math></i>	0.14	-	-	-	0.21	-	-	-
<sup>6</sup> Peak runoff from DMAs (cfs) <i><math>Q_p = \text{Item 1} * \text{Item 4} - \text{Item 5} * (\text{Item 1} - \text{Item 2})</math></i>	30.58	-	-	-	69.34	-	-	-
<sup>7</sup> Total Pre-Project Peak Runoff (ft <sup>3</sup> /s) <i><math>Q_{total} = \text{Sum of Item 6 for all Pre-construction DMAs}</math></i>	30.58							
<sup>8</sup> Is the total post-project peak runoff equal to or less than the total pre-project peak runoff? <i>Yes, if Item 7 is greater than or equal to the sum of the Total Treated Flow Rates from Form 3-6 Item 16 and 3-7 Item 12</i>	YES							



## Form 4-3 Detention Volumes for Hydromodification Management

	Post-construction DMAs to Project Outlet			
	A	2	3	4
<sup>1</sup> Land cover and hydrologic condition <i>See NRCD TR-55 Manual Table 2-2 for types</i>	Residential			
<sup>2</sup> Hydrologic Soil Group <i>Refer to Section 3.1.1. or NRCS Web Soil Survey</i>	D	-	-	-
<sup>3</sup> Drainage Area (A) (ft <sup>2</sup> )	3,747,467	-	-	-
<sup>4</sup> Curve Number (CN) <i>Use Items 1 and 2 to select curve number from NRCS TR-55 Manual Table 2-2</i>	92			
<sup>5</sup> Post-development soil storage capacity, S (in): $S = (1000 / \text{Item 4}) - 10$	0.9	-	-	-
<sup>6</sup> Precipitation for 2-yr, 24-hr storm (in) <i>See Placer County SWMM Table 5-A-1 for elevation of site and 24-hr duration depths</i>	1.90			
<sup>7</sup> Post-developed runoff volume for 2-yr – 24-hour storm, $V_{\text{runoff}}$ (ft <sup>3</sup> ): $V_{\text{runoff}} = \text{Item 3} * (1 / 12) * [(\text{Item 6} - 0.2 * \text{Item 5})^2 / (\text{Item 6} + 0.8 * \text{Item 5})]$	358,456	-	-	-
<sup>8</sup> Attenuation Factor, $q_{\text{out/in}}$ (ratio of target outflow rate to peak inflow rate): $q_{\text{out/in}} = \text{Form 4-2 Item 6 Pre-Construction} / \text{Form 4-2 Item 6 Post-Construction}$	0.44	-	-	-
<sup>9</sup> Equalization Factor, $V_s/V_r$ (ratio of storage capacity to runoff volume) <i><math>V_s/V_r</math> obtained using Item 8 and nomograph in Figure 6-1 of NRCS TR-55 Manual for Rainfall Type IA</i>	0.19			
<sup>10</sup> Runoff detention capacity to achieve hydromodification management criteria (ft <sup>3</sup> ) $D_{\text{hydromod}} = \text{Item 7} * \text{Item 9}$	68107	-	-	-
<sup>11</sup> Site Design Measure (SDM) Volume (ft <sup>3</sup> ): <i>Sum of Item 10 in Form 3-4 for all SDMs in this DMA.</i>	120,238			
<sup>12</sup> Bioretention Volume (ft <sup>3</sup> ): <i>Sum of Item 14 in Form 3-6 for all bioretention measures in this DMA.</i>	34582			
<sup>13</sup> Flow-Through Detention Volume (ft <sup>3</sup> ): <i>Sum of Item 10 in Form 3-7 for all flow-through facilities in this DMA.</i>	0			
<sup>14</sup> Supplemental Detention Volume (ft <sup>3</sup> ):				
<sup>15</sup> Combined Detention Volume in this DMA (ft <sup>3</sup> ): <i>Sum of Items 11 through 14</i>	154,820	-	-	-
<sup>16</sup> Is detention capacity to achieve hydromodification management criteria achieved at all project outlets? <i>Yes, if Item 10 is less than or equal to Item 15. If not provide additional storage capacity</i>	Yes	X	No	



### Form 5-1 BMP Inspection and Maintenance

BMP	Inspection Point and Frequency	Maintenance Activity Required
Bioretention Facilities	Inlets and outlets/ Twice a year	Remove debris, sediment, and litter
	Plants/Monthly or as needed	Irrigate, weed control, replace dead plants
	Standing water in excess of 72-hours/Annual or as needed	Remove accumulated sediment and flush drainage including underdrain
	Erosion, holes or voids/Annual or as needed	Repair erosion and stabilize, inspect underdrain and replace soil if needed
Trees	At each tree/as necessary	Irrigate to establish and maintain
	At each tree/annually	Remove fallen leaves and debris
	At each tree/regularly	Prune dead vegetation from trees
	At each tree/as needed	Minimize the use of chemical fertilizers
	At each tree/as necessary	Maintain lawn and turf at least 24-inches from trunk of tree
	At each tree/as necessary	Remove and replace dead trees
Soil Amended Areas	At each amended soil area/annually	Inspect for signs of compaction, waterlogging. Add soil amendments or mechanically aerate as needed.
	At each amended soil area/annually	Inspect for loss of vegetative cover and erosion. Repair eroded areas and replant vegetation as needed.



Shed/ SubShed	Area	Self-treating Area	Percent Impervious Calculator			Percent Impervious Values				
			Land Use Description	Soils Group	Composite % Imperv.	Highway, Street, Parking	Comm., Office	Aptmnts, HDR, Comm. Office	Condo's, MDR	Resdntl. <0.2 du/ac, Recreation
	AC	AC				95%	90%	80%	70%	5%
<b>Ultimate Condition Subsheds</b>										
A02L	0.92	0.92	Santucci Blvd Ultimate Conditions	100	50%	0.46				0.46
A02R	0.88	0.88	Santucci Blvd Ultimate Conditions	100	55%	0.49				0.39
A04L	1.46	1.46	Santucci Blvd Ultimate Conditions	100	70%	1.05				0.41
A04R	1.17	1.17	Santucci Blvd Ultimate Conditions	100	65%	0.78				0.39
A06L	0.66	0.66	Pleasant Grove Blvd Ultimate Conditions	100	65%	0.44				0.22
A06R	1.22	1.22	Pleasant Grove Blvd Ultimate Conditions	100	70%	0.88				0.34
A07L	1.01		Pleasant Grove Blvd Ultimate Conditions	100	61%	0.63				0.38
A07R	1.25		Pleasant Grove Blvd Ultimate Conditions	100	63%	0.80				0.45
A09L	0.89	0.89	Pleasant Grove Blvd Ultimate Conditions	100	44%	0.39				0.50
A09R	0.89	0.89	Pleasant Grove Blvd Ultimate Conditions	100	48%	0.43				0.46
A11L	0.93	0.93	Santucci Blvd Ultimate Conditions	100	52%	0.49				0.44
A11R	0.96	0.96	Santucci Blvd Ultimate Conditions	100	51%	0.49				0.47
A13L	0.94	0.94	Santucci Blvd Ultimate Conditions	100	51%	0.48				0.46
A13R	0.91	0.91	Santucci Blvd Ultimate Conditions	100	51%	0.47				0.44
A14L	0.95	0.95	Santucci Blvd Ultimate Conditions	100	49%	0.46				0.49
A14R	0.90	0.90	Santucci Blvd Ultimate Conditions	100	53%	0.48				0.42
A15L	1.47	1.47	Santucci Blvd Ultimate Conditions	100	53%	0.79				0.68
A15R	1.23	1.23	Santucci Blvd Ultimate Conditions	100	72%	0.91				0.32
A18L	0.92	0.92	Santucci Blvd Ultimate Conditions	100	70%	0.66				0.26
A20L	0.43		Solaire Dr Ultimate Conditions	100	70%	0.31				0.12
A20R	1.48		Solaire/Santucci Ultimate Conditions	100	65%	0.99				0.49
A22R	0.31		Solaire Dr Ultimate Conditions	100	54%	0.17				0.14
W20x	11.04		WB-20 MDR	100	70%				11.04	
W21x	7.45		WB-21 MDR	100	70%				7.45	
W2223x	17.03		WB-22 and WB-23 MDR	100	64%				15.33	1.70
W30.1x	10.44	10.44	WB30 HDR	100	80%			10.44		
W30.2x	2.33	2.33	WB30 HDR	100	80%			2.33		
W31x	3.06	3.06	WB31 HDR	100	80%			3.06		
W32x	4.20	4.20	WB32 HDR	100	80%			4.20		
W41x	8.70		WB41 MDR	100	70%				8.70	
<b>Total</b>	<b>86.03</b>	<b>37.33</b>			<b>68%</b>	<b>13.05</b>	<b>0.00</b>	<b>20.03</b>	<b>42.52</b>	<b>10.43</b>



Amendment to the

**Sierra Vista Specific Plan**

**MASTER DRAINAGE PLAN**

For:

**STORMWATER QUALITY  
MANAGEMENT PLAN**

February 20, 2018

Prepared By:



Civil Engineering Solutions, Inc  
590 E Street  
Lincoln, CA 95648  
(916) 645-5700



**TABLE OF CONTENTS:**

PURPOSE .....	3
DESCRIPTION OF CHANGES: .....	3
Low Impact Development Measures: .....	3
End of Pipe Treatment: .....	6
APPENDIX A – West Placer Template Part 1 .....	10
APPENDIX B – Vegetated Swale Fact Sheets and Specifications	
APPENDIX C – Bioretention Fact Sheets and Specifications	
APPENDIX D – Oversized Exhibit SWQ-140	
APPENDIX C – Bioretention Fact Sheets and Specifications	
APPENDIX D – Oversized Exhibit SWQ-1.....	41
APPENDIX D – Oversized Exhibit SWQ-1 .....	42

**LIST OF FIGURES:**

Figure 1 : Roadway Bioretention Detail .....	5
Figure 2 : Vegetated Swale Outfall with Bypass Detail .....	8
Figure 3 : Bioretention Outfall with Bypass Detail .....	9

**LIST OF TABLES:**

TABLE 1 – LID PLANNED USAGE for SIERRA VISTA SPECIFIC PLAN.....	4
TABLE 2 – Roadway Bioretention Sizing Criteria .....	5
TABLE 3 – Pipe Outfall BMP Sizing per West Placer Templates.....	7



## PURPOSE

The purpose of this document is to update the Stormwater Quality Management Plan for the Sierra Vista Specific Plan for updated project information, and to provide an update to the stormwater Management Plan criteria outlined in the Master Drainage Study.

## DESCRIPTION OF CHANGES:

### ***Low Impact Development Measures:***

The Master Plan outlined the use of Low Impact Development (LID) Measures in the form of RSV's, which acted like a quota system. In order to meet the requirements of the updated MS4 permit, the project will update the LID calculation methodology and system to meet the requirements of the "West Placer Storm Water Quality Design Manual" (Final Draft), which includes a spreadsheet – Template system for calculation.

LID minimum use thresholds are based on the expected amount of usage for LID measures for each land use type contributing to each outfall location. Table 1 identifies the expected LID usage for each development land use type within the specific plan:

The land uses highlighted in green will do their Low Impact Development Measures and stormwater quality treatment to satisfy 100% of the requirements within their development area such that additional end of pipe treatment and additional Low Impact Development Measures will not be necessary for these land uses. These Land uses include: Parks, Open Space, Roadways and Commercial. For the purpose of the "Template Calculations" performed to demonstrate compliance with the West Placer Manual, the land uses in green are assumed to provide LID measures to mitigate 100% of their new impervious surfaces, as shown in Table 1.

Commercial projects go through a separate plan check process that will require they meet the requirements of the permit at their project boundary points of discharge. The Roadway land use designation within the project occurs at Arterial and some Major Collector roadways. The City proposes that a specialized Bioretention inlet design be used at these locations to perform Low Impact Development benefits and stormwater quality treatment to meet the requirements of the MS4 permit and the West Placer Manual's requirements. A detail of the proposed roadway bioretention inlet features is provided in Figure 1. Table 2 outlines the sizing criteria for the roadway bioretention inlets based on calculations put through the West Placer Templates.

The remaining Residential Development types are not expected to be able to provide 100% onsite LID measures to satisfy the West Placer Manual requirements, due space and setback constraints with foundations, joint utility trenches and roadway features. The estimated amount of these measures that will be provided are listed in TABLE 1. The remaining LID mitigation will be needed at the end of pipe. The amounts of remaining treatment needed is detailed in the included "Template Calculations", and summary shown in Table 3.



**TABLE 1 – LID PLANNED USAGE for SIERRA VISTA SPECIFIC PLAN**

LID QUOTA ASSUMPTIONS ( Values below are per acre of Gross Total Development Type)  
FOR IMPERVIOUS AREA REDUCTIONS VIA LID

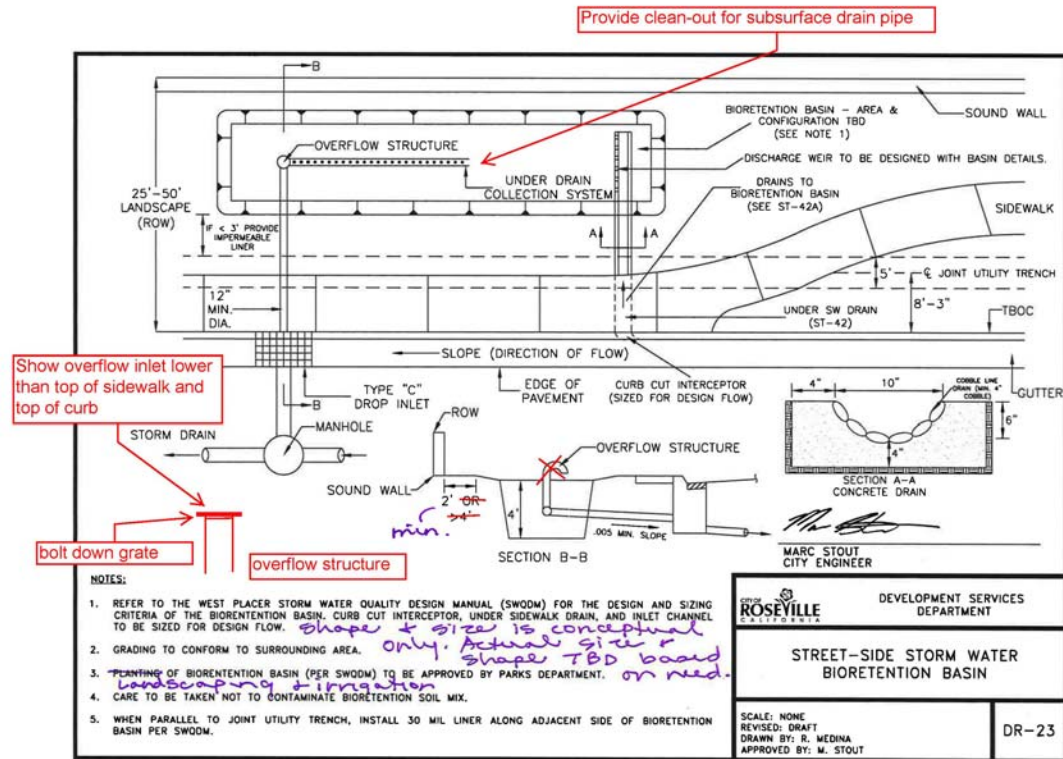
LANDUSE	com	hdr	ldr	mdr	os	p	road
EST Impervious % without LID	70	60	40	50	0	5	85
MAX IMPERVIOUS % AFTER LID	0	17.97	7.57	26.71	0	-1.01	0
EST IMP % REDUCTION	100%	70%	81%	47%	0%	120%	100%
Impervious Area per Acre	30492	26136	17424	21780	0	2178	37026
**Required Imp A Reduction / Acre	30492	18308	14128	10143	0	2616	37027
Est. Added Volume / Acre (ft3)	2058	1764	1176	1470	0	147	2499
Precip (inches)	0.900	0.900	0.900	0.900	0.900	0.900	0.900
SWQ Vol per Acre : C * I (inches)	0.810	0.810	0.810	0.810	0.810	0.810	0.810
STREAM Setbacks	(Aimp)	0	0	0	0	0	0
Soil Quality	Apond (ft2)	0	0	0	0	0	0
	Dpond (ft)	0	0	0	0	0	0
	Area Asa (ft2)	650	0	1000	0	0	0
	Depth Dsa (ft)	1	0	1	0	0	0
	Porosity n	0.35	0	0.35	0	0	0
TREES	# Evergreen	6	4	9	9	0	8
	# Diciduous	6	4	9	9	0	8
IMP A DISCONNECT	Area (ft2)	<u>25160</u>	17000	6000	7200	0	0
POROUS PAVEMENT	Ares (ft2)	0	0	0	0	0	0
	Dres (ft)	0	0	0	0	0	0
	nagg	0	0	0	0	0	0
	C	0	0	0	0	0	0
Vegetated Swales	Aimp (ft2)	0	0	0	0	0	0
Rain Barrels-Storage	Va (ft3)	0	0	0	0	0	0
Estimated Vol Reduction (ft3)	2058.2	1235.8	953.7	684.7	0.0	176.6	2499.3
Est. Imp A Reduction (ft2)	30492	18308	14128	10143	0	2616	37027
Area Red Criteria Met?	YES	YES	YES	YES	YES	YES	YES
Remaining Vol Red. Regional:	0	528	222	785	0	-30	0

*Italicized/underline are modified to represent in system treatment*

*Green are self mitigating or onsite mitigating land use per this plan*

\*\* Impervious Reduction Required to hit LID quotas established here - Additional LID could be performed to reduce end of pipe treatment.



**Figure 1 : Roadway Bioretention Detail****TABLE 2 – Roadway Bioretention Sizing Criteria**

Bioretention Sizing Criteria for Roadway Treatment					
Total Shed Area (ac)	Storage Area (sf)	Infiltration Area (sf)	* Infil Len (ft)	* Infil Wid (ft)	Max Untreated Length (ft)
0.25	16	12	6	2	15.7
0.5	33	25	10	2.5	29.4
0.75	49	37	12.3	3	31.9
1	65	49	14	3.5	39.2
1.25	81	61	15.25	4	44.1
1.5	98	74	18.5	4	49.9
2	130	98	19.6	5	58.9
3	195	146	24.3	6	75.7

(\* for approx 4 to 1 L to V Ratio)

The maximum untreated length (gutter) is an estimate of the portion of the runoff shed which is treated by LID, and could offset a directly connected discharge for runoff removal purposes. However, treatment of this flow may still be required.



***End of Pipe Treatment:***

The West Placer Manual stipulates that all treatment and Low Impact Development mitigation that cannot be accomplished within the development areas needs to be performed at an end of pipe Best Management Practice. The Master Drainage Plan Anticipated the use of Vegetated Swales for the end of pipe treatment. While some vegetated swales will be utilized within the project due to grade limitations, the preferred method of end of pipe treatment will be Bioretention per the West Placer Manual. Bioretention includes a sub-drain infiltration and collection system and a minimum depth of fall to the sub-drain pipe invert of 18 inches. In some areas where this additional grade is not achievable, vegetated swales treatment will be allowed, per the specifications outlined in this document (see appendix B). An example detail for the Vegetated Swale Outfall configuration is shown in Figure 2. The example shown in Figure 2, includes bypass flow. Bypass flow would be required if flood velocities through the grassy swale would exceed 1 feet per second.

Where Bioretention is proposed, the sizing of the bioretention is performed per the West Placer Templates (included in appendix A). An example detail for the bioretention concept is included in Figure 3. This detail includes a Bypass Flow configuration which would be required where flood velocities through the treatment area would exceed 1 fps without bypass flow. Bioretention would be constructed per the specifications outlined in this document (see appendix C).

Table 3 provides sizing per the West Placer Templates for the pipe outfall locations of the Master Plan.

Oversized Exhibit SWQ-1 outlines the proposed storm drainage system alignments, and discharge locations, as well as the land use and watershed areas.

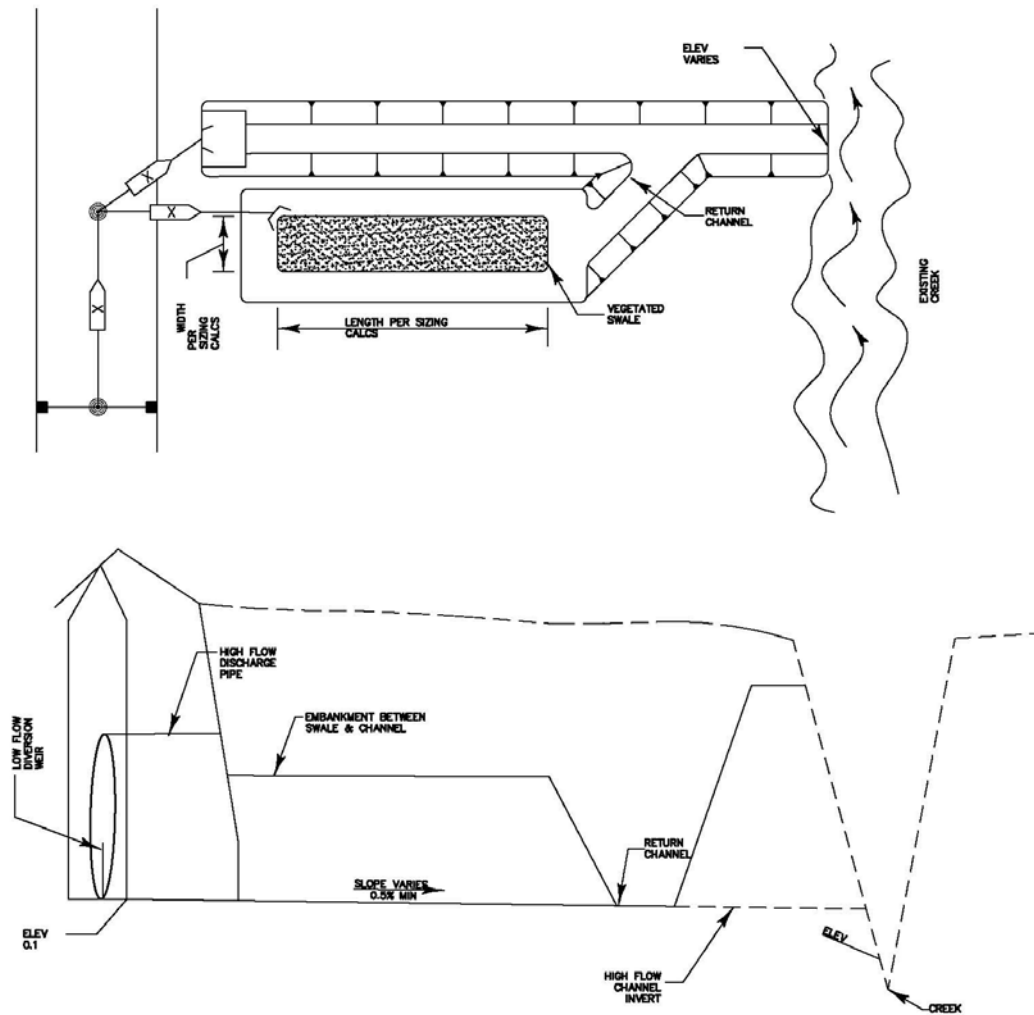


**TABLE 3 – Pipe Outfall BMP Sizing per West Placer Templates**

Outfall	Bio-Infiltration Ponding Surface Area	Bio-Infiltration - Infiltrating Surface	Vegetated Swale (S=0.5%) Width	Vegetated Swale (S=0.5%) Length	BMP Design Flow Rate	BMP Design Water Quality	Ownership
Location	(ft <sup>2</sup> )	Area(ft <sup>2</sup> )	(ft)	(ft)	(cfs)	Volume (ft <sup>3</sup> )	Area
W1	7160	5370	17.5	105.1	0.77	9338.27	SE
U1	150	112.5	0.5	100	0.01	131.88	SE
M1I	4520	3390	8	145.12	0.5	6102.34	SE
MFOUT	5610	4207.5	9.9	146.34	0.6	7325.53	SE
AAOUT	7040	5280	12.3	147.36	0.76	9263.21	SE
N3C1	356	267	0.8	106.76	0.04	469.5	SE
Z1	517	387.75	1.1	115.55	0.05	587.26	SE
X1	1170	877.5	2.3	131.38	0.11	1316.95	SE
V1	10	7.5	0.2	100	0	8.49	SE
TT1	1420	1065	2.7	133.96	0.15	1843.64	AKT
T1A	5850	4387.5	10.3	146.55	0.64	7793.87	NW_OFF
T1C	780	585	1.6	124.41	0.08	1009.98	NW
T1B	380	285	0.8	106.76	0.04	494.47	NW
SS1	8	6	0.2	100	0	7.55	AKT
S1	3000	2250	5.3	142.01	0.32	3908.24	NW
R1	1425	1068.75	2.7	133.96	0.16	1921.17	Fed
QQ1	3650	2737.5	6.5	143.69	0.4	4794.85	AKT
Q1	1550	1162.5	2.9	135.03	0.17	1998.66	Fed
PP1	500	375	1.1	115.55	0.05	559.29	AKT
P1	4550	3412.5	8	145.12	0.51	6095.21	Fed
OO1	700	525	1.4	121.44	0.08	925.22	AKT
NN1	150	112.5	0.5	100	0.01	162.21	AKT
N1k	5115	3836.25	9.1	145.89	0.55	6657.25	Fed
N1J	235	176.25	0.7	102.79	0.02	296.87	Fed
N1I	180	135	0.5	100	0.02	222.65	Fed
N1H	610	457.5	1.3	119.71	0.06	773.98	Fed
N1G	375	281.25	0.8	106.76	0.04	477.11	Fed
N1F	460	345	1	113.03	0.05	583.13	Fed
N1E	1500	1125	2.7	133.96	0.01	148.86	Fed
N1C	640	480	1.4	121.44	0.09	1083.39	Fed
N1B	725	544	1.6	124.41	0.08	1008.69	Fed
N1A	2725	2044	4.9	141.28	0.29	3527.48	Fed
MM1	13	9.75	0.1	100	0	17.12	AKT
M1H	1	0.75	0	#DIV/0!	0	0	NE
M1E	4685	3513.75	8.3	145.35	0.51	6091	NE
M1D	910	682.5	1.8	126.84	0.1	1171.64	NE
M1C	265	198.75	0.6	100	0.03	343.47	NE
M1B	9260	6945	16	148.36	1	12136.41	NE
M1A	1560	1170	3	135.51	0.17	2021.68	NE
LL1	8355	6266.25	14.4	147.99	0.88	10694.37	AKT
L1	5100	3825	8.9	145.76	0.54	6542.29	Fed
JJ1	17250	12937.5	29.5	149.89	1.83	22130.59	AKT
H1B	11300	8475	19.4	148.94	1.22	14719.11	NW
H1A	3300	2475	8.2	102.73	0.38	4589	NW
GG1	80	60	0.2	100	0.01	106.73	SE
DD1	420	315	0.9	110.13	0.05	580.87	SE
CC1	8244	6183	14.3	147.96	0.95	11468.74	SE
BB1	435	326	0.9	110.13	0.05	605.12	SE
B1	5110	3833	9	145.83	0.59	7107.2	Offsite



***Figure 2 : Vegetated Swale Outfall with Bypass Detail***

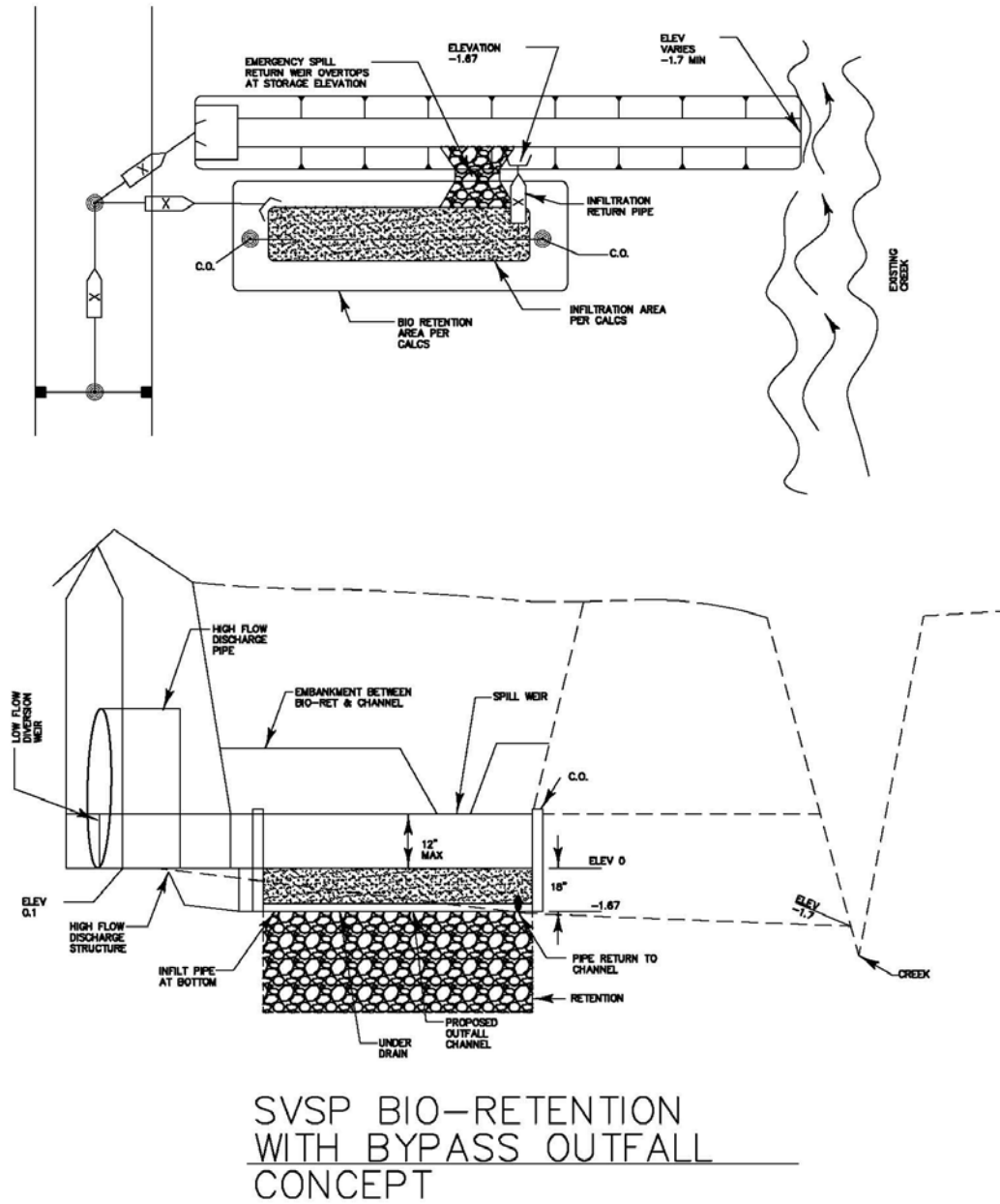


VEGETATED SWALE – WITH BYPASS OPTION

NO SCALE



***Figure 3 : Bioretention Outfall with Bypass Detail***









## **APPENDIX A – West Placer Template Part 1**



# **Post-Construction Storm Water Quality Plan**

**For:**

## **Sierra Vista Specific Plan (Part 1) Placer County**

Where applicable, insert Planning Permit No., Improvement Plan No., Grading Permit No.,  
Building Permit No., Subdivision Number

Specify Lot Numbers if site is a portion of a Land Division (Subdivision or Parcel Map)

**Prepared for:**

Sierra Vista Specific Plan  
Sierra Vista Owners Group  
Insert Company Name  
Insert Address  
Insert City, State, ZIP  
Insert Telephone No.

**Prepared by:**

Civil Engineering Solutions, Inc.  
590 E Street  
Lincoln, CA 95648  
916 645 5700

**Modified for City of Lincoln - January 23, 2017**

**20-Feb-18**

**Approval Date:** \_\_\_\_\_



**LID QUOTA ASSUMPTIONS ( Values below are per acre of Gross Total Development Type)  
FOR IMPERVIOUS AREA REDUCTIONS VIA LID**

LANDUSE	com	hdr	ldr	mdr	os	p	road
EST Impervious % without LID	70	60	40	50	0	5	85
MAX IMPERVIOUS % AFTER LID	0	17.97	7.57	26.71	0	-1.01	0
EST IMP % REDUCTION	100%	70%	81%	47%	0%	120%	100%
Impervious Area per Acre	30492	26136	17424	21780	0	2178	37026
**Required Imp A Reduction / Acre	30492	18308	14128	10143	0	2616	37027
Est. Added Volume / Acre (ft3)	2058	1764	1176	1470	0	147	2499
Precip (inches)	0.900	0.900	0.900	0.900	0.900	0.900	0.900
SWQ Vol per Acre : C * I (inches)	0.810	0.810	0.810	0.810	0.810	0.810	0.810
STREAM Setbacks	(Aimp)	0	0	0	0	0	0
Soil Quality	Apond (ft2)	0	0	0	0	0	0
	Dpond (ft)	0	0	0	0	0	0
	Area Asa (ft2)	650	0	1000	0	0	0
	Depth Dsa (ft)	1	0	1	0	0	0
	Porosity n	0.35	0	0.35	0	0	0
TREES	# Evergreen	6	4	9	9	0	8
	# Dciduous	6	4	9	9	0	8
IMP A DISCONNECT	Area (ft2)	<u>25160</u>	17000	6000	7200	0	0
POROUS PAVEMENT	Ares (ft2)	0	0	0	0	0	0
	Dres (ft)	0	0	0	0	0	0
	nagg	0	0	0	0	0	0
	C	0	0	0	0	0	0
Vegetated Swales	Aimp (ft2)	0	0	0	0	0	0
Rain Barrels-Storage	Va (ft3)	0	0	0	0	0	0
Estimated Vol Reduction (ft3)	2058.2	1235.8	953.7	684.7	0.0	176.6	2499.3
Est. Imp A Reduction (ft2)	30492	18308	14128	10143	0	2616	37027
Area Red Criteria Met?	YES	YES	YES	YES	YES	YES	YES
Remaining Vol Red. Regional:	0	528	222	785	0	-30	0

*Italicized/underline are modified to represent in system treatment*

*Green are self mitigating or onsite mitigating land use per this plan*

\*\* Impervious Reduction Required to hit LID quotas established here - Additional LID could be performed to reduce end of pipe treatment.



Hydgrp=D	Hydgrp		com	hdr	ldr	mdr	os	p	road
		Infilt=>	0.09	0.09	0.09	0.09	0.09	0.09	0.07
		Imperv=>	70	60	40	50	0	5	85
		Imp LID=>	0	17.97	7.57	26.71	0	-1.01	0
shed	Shed Ac								
W1	74.74				64.7				10.1
U1	9.32								9.3
M1I	16.25					16.3			
MFOUT	61.27		15.7		28.4	5.6	8.6		3.1
AAOUT	67.93				62.9				5.0
N3C1	4.86				2.1		0.0	1.7	1.0
Z1	20.19		19.9				0.0	0.3	
X1	46.52		46.5						
V1	0.6								0.6
TT1	16.19				12.1		0.2	0.9	3.0
T1A	37.57				19.6	12.2	0.0	3.2	2.5
T1C	7.85				6.5			0.5	0.8
T1B	3.29				3.2		0.1	0.0	
SS1	0.08						0.1		
S1	17.25					11.1		1.7	4.5
R1	14.34				9.4			5.0	
QQ1	33.85		0.1		32.3		0.0		1.5
Q1	17.44				13.1			1.2	3.2
PP1	19.85		18.5				0.2		1.1
P1	20.98					15.1	0.2	3.8	1.9
OO1	6.91				6.8		0.1	0.0	
NN1	6.12		5.2				0.0		0.9
N1k	62.79				62.8				
N1J	2.8				2.8				
N1I	2.1				2.1				
N1H	7.3				7.3				
N1G	4.5				4.5				
N1F	5.5				5.5				
N1E	1.36				0.9				0.4
N1C	9.9				7.8				2.1
N1A	24.03			8.3	7.3	0.0	0.0	2.6	5.8
MM1	4.22			0.0			0.0	4.2	
M1H	0.13						0.1		
M1E	58.48				56.6		0.1	0.8	1.1
M1D	12.07				10.6		0.0	0.8	0.7
M1C	3.67				3.4		0.0	0.3	
M1B	63.21		10.5	16.3		19.0	0.0	10.7	6.7
M1A	24.55				19.3			4.0	1.3
LL1	120.07		23.0		71.7		3.7	8.0	13.7
L1	61.63				44.2		0.0	1.3	16.2
JJ1	221.13		73.1		134.9			0.0	13.1
H1B	102.41		7.7		55.1	21.9	0.0	7.4	10.3
H1A	28.91				28.8	0.1			0.0
GG1	1.57						0.7	0.4	0.5
DD1	3.8				3.7				0.1
CC1	42.42			24.0		15.0		1.8	1.6
BB1	17.81		16.5						1.3
B1	19.36				0.1	18.5		0.1	0.6



[illegible]



### Section 3    Regulated Projects

**Section 3 forms are to be completed for all Regulated Projects.**

#### Form 3-1 Site Location and Hydrologic Features

Site coordinates:  Take GPS measurement at approximate center of site	1 Latitude	2 Longitude	3 Elevation (ft. above sea level)	4 85th Percentile, 24 Hour Design Storm Depth (in):
	38.74324	-120.55662	60	0.9
5 Receiving waters  <i>Name of stream, lake or other downstream waterbody to which the site runoff eventually drains</i>		Sacramento River, NEMDC (Steelhead Creek)		
6303(d) listed pollutants of concern  <i>Refer to State Water Resources Control Board <a href="http://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/#impaired">www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/#impaired</a></i>		Mercury		
7 Is Project going to be phased? <i>If yes, ensure that the SWQP evaluates each phase with distinct DMAs, requiring LID BMPs to address runoff at time of completion.</i>				Yes - This is for Sierra Vista Specific Plan Level Analysis with Revisions for Some project Tentative Maps

*8 Use this form to show a conceptual schematic depicting DMAs and conveyance features connecting DMAs to the site outlet(s). An example is provided below that can be modified for the proposed project or a drawing clearly showing DMAs and*

**This is the Site Layout for ULTIMATE PVSP CONTRIBUTIONS TO THE P19A SWQ ELEMENTS (D2C and D1M are solely for future offsite items, but need to be constructed with channel improvements)**

SEE SWQ-1 EXHIBIT



## Form 3-2 Site Assessment and Layout Documentation

	Has this Item been considered in the Site Layout and depicted in the Site Plan?	
	Yes	Not Applicable (Include brief explanation)
Define the development envelope and protected areas, identifying areas that are most suitable for development areas to be left undisturbed.	X	
Concentrate development on portions of the site with less permeable soils and preserve areas that can promote infiltration.	X	
Limit overall impervious coverage of the site with paving and roofs.	X	
Set back development from creeks, wetlands, and riparian habitats.	x	
Preserve significant trees.	X	
Conform site layout along natural landforms.	X	
Avoid excessive grading and disturbance of vegetation and soils.	X	
Replicate the site's natural drainage patterns.	X	
Detain and retain runoff throughout the site.	X	

**Attach a Site Plan that incorporates the applicable considerations above. Ensure that the following items are included in the Site Plan:**

Site Boundary  
 Soil types and areal extents, test pit and infiltration test locations  
 Topographic data with 1 ft. contours  
 Existing natural hydrologic features (depressions, watercourses, wetlands, riparian corridors)  
 Environmentally sensitive areas and areas to be preserved.  
 Proposed locations and footprints of improvements creating new, or replaced, impervious surfaces  
 Potential pollutant sources and locations  
 Entire site divided into separate DMAs with unique identifiers  
 Existing and proposed site drainage network with flow directions and site run-on and discharge locations  
 Proposed design features and surface treatments used to minimize imperviousness and reduce runoff  
 Proposed locations and footprints of treatment and hydromodification management facilities  
 Design features for managing authorized non-stormwater discharges  
 Areas of soil and/or groundwater contamination  
 Existing utilities and easements  
 Maintenance areas



Form 3-4 Runoff Reduction Calculator for Site Design Measures on Regulated Projects										
1DMA ID No.			1		2		3		4	
Site Design Measure	Runoff Reduction Parameters			Runoff Reduction (ft3)		Runoff Reduction (ft3)		Runoff Reduction (ft3)		Runoff Reduction (ft3)
2 Adjacent/On-Site Stream Setbacks and Buffers	Aimp (ft2)	impervious drainage area	0	0	0	0	0	0	0	0
	V85 (in)	runoff volume from 85th percentile impervious areas, 24-hour storm (C * i) (C=0.9)	0.810		0.810		0.810		0.810	
3 Soil Quality Improvement and Maintenance	Apond	ponding area	0	22631	0	0	0	0	0	13495
	Dpond	ponding depth	0.0		0		0			
	Asa	soil amendment area	64660		0		0			
	Dsa (ft)	depth of amended soil	1.000		1		1			
	n	porosity of amended soil	0.350		0.350		0.350			
4 Tree Planting and Preservation	ne	number of new evergreen trees	642	14180	56	1234	146	3228	418	9232
	nd	number of new deciduous trees	642		56		146			
	Atc (ft2)	canopy area of existing trees to remain on the property								
	V85 (in)	runoff volume from 85th percentile impervious areas, 24-hour storm (C * i) (C=0.9)	0.810		0.810		0.810			
5 Rooftop and Impervious Area Disconnection	Aimp	impervious drainage area	741415	50046	326806	22059	117000	7898	712333	48082
	V85 (in)	runoff volume from 85th percentile impervious areas, 24-hour storm (C * i) (C=0.9)	0.810		0.810		0.810			
6 Porous Pavement	Ares	area of gravel storage layer	0	0	0	0	0	0	0	0
	Dres (ft)	depth of gravel storage layer	0.0		0		0			
	nagg	porosity of aggregate	0.0		0		0			
	C	efficiency factor	0.0		0		0			
7 Vegetated Swales	Aimp	impervious drainage area	0	0	0	0	0	0	0	0
	V85 (in)	runoff volume from 85th percentile impervious areas, 24-hour storm (C * i) (C=0.9)	0.810		0.810		0.810			
8 Rain Barrels and Cisterns	N	number of rain barrels and/or cisterns	0	0	0	0		0		0
	Va (ft3)	volume of each rain barrel and/or cistern	0		0		0			
9 Do all Site Design Measures meet the design requirements outlined in the Fact Sheets?					Yes	X	No			
10 Total Volume Reduction (ft3)				86856	23294	11126	70810			
11 Effective Treated Impervious Area (ft2)				1286761	345092	164824	1049037			



Form 3-4 Runoff Reduction Calculator for Site Design Measures on Regulated Projects																
DMA ID No.	5		6		7		8		9		10		11		12	
Runoff Reduction Parameters		Runoff Reduction (ft3)		Runoff Reduction (ft3)		Runoff Reduction (ft3)		Runoff Reduction (ft3)		Runoff Reduction (ft3)		Runoff Reduction (ft3)		Runoff Reduction (ft3)		Runoff Reduction (ft3)
Impervious drainage area	0		0		0		0		0		0		0		0	
runoff volume from 85th percentile impervious areas, 24-hour storm (C * I) (C=0.9)	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0
ponding area	0		0		0		0		0		0		0		0	
ponding depth	0		0		0		0		0		0		0		0	
soil amendment area	62940	22029	2100	735	12942	4530	30238	10583	0	0	12080	4228	19630	6871	6530	2286
depth of amended soil	1		1		1		1		1		1		1		1	
porosity of amended soil	0		0		0		0		0		0		0		0	
number of new evergreen trees	596		39		122		279		4		134		327		68	
number of new deciduous trees	596		39		122		279		4		134		327		68	
canopy area of existing trees to remain on the property		13164		858		2684		6161		79		2960		7226		1495
runoff volume from 85th percentile impervious areas, 24-hour storm (C * I) (C=0.9)	0.810		0.810		0.810		0.810		0.810		0.810		0.810		0.810	
Impervious drainage area	552614		48016		500936		1170443		21039		178376		291817		67583	
runoff volume from 85th percentile impervious areas, 24-hour storm (C * I) (C=0.9)	0.810	37301	0.810	3241	0.810	33813	0.810	79005	0.810	1420	0.810	12040	0.810	19698	0.810	4562
area of gravel storage layer	0		0		0		0		0		0		0		0	
depth of gravel storage layer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
porosity of aggregate	0		0		0		0		0		0		0		0	
efficiency factor	0		0		0		0		0		0		0		0	
Impervious drainage area	0		0		0		0		0		0		0		0	
runoff volume from 85th percentile impervious areas, 24-hour storm (C * I) (C=0.9)	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0
number of rain barrels and/or cisterns		0		0		0		0		0		0		0		0
volume of each rain barrel and/or cistern	0		0		0		0		0		0		0		0	
Total Volume Reduction		72495		4834		41027		95749		1500		19229		33794		8342
Effective Treated Impervious Area		1073993		71618		607809		1418505		22216		284871		500652		123583



Form 3-4 Runoff Reduction Calculator for Site Design Measures on Regulated Projects														
DMA ID No.	13	14	15	16	17	18	19	20						
Runoff Reduction Parameters	Runoff Reduction (ft <sup>3</sup> )	Runoff Reduction (ft <sup>3</sup> )	Runoff Reduction (ft <sup>3</sup> )	Runoff Reduction (ft <sup>3</sup> )	Runoff Reduction (ft <sup>3</sup> )	Runoff Reduction (ft <sup>3</sup> )	Runoff Reduction (ft <sup>3</sup> )	Runoff Reduction (ft <sup>3</sup> )						
impervious drainage area	0	0	0	0	0	0	0	0						
runoff volume from 85th percentile impervious areas, 24-hour storm (C * I) (C=0.9)	0.810	0.810	0.810	0.810	0.810	0.810	0.810	0.810						
ponding area	0	0	0	0	0	0	0	0						
ponding depth	0	0	0	0	0	0	0	0						
soil amendment area	3210	1124	0	0	9370	3280	32309	11308						
depth of amended soil	1	1	1	1	1	1	1	1						
porosity of amended soil	0	0	0	0	0	0	0	0						
number of new evergreen trees	29	0	140	124	300	146	118	178						
number of new deciduous trees	29	0	140	124	300	146	118	178						
canopy area of existing trees to remain on the property	639	0	3094	2739	6617	3229	2602	3929						
runoff volume from 85th percentile impervious areas, 24-hour storm (C * I) (C=0.9)	0.810	0.810	0.810	0.810	0.810	0.810	0.810	0.810						
impervious drainage area	19260	1300	235815	56220	247727	188935	505488	174436						
runoff volume from 85th percentile impervious areas, 24-hour storm (C * I) (C=0.9)	0.810	0.810	0.810	0.810	0.810	0.810	0.810	0.810						
area of gravel storage layer	0	0	0	0	0	0	0	0						
depth of gravel storage layer	0	0	0	0	0	0	0	0						
porosity of aggregate	0	0	0	0	0	0	0	0						
efficiency factor	0	0	0	0	0	0	0	0						
impervious drainage area	0	0	0	0	0	0	0	0						
runoff volume from 85th percentile impervious areas, 24-hour storm (C * I) (C=0.9)	0.810	0.810	0.810	0.810	0.810	0.810	0.810	0.810						
number of rain barrels and/or cisterns	0	0	0	0	0	0	0	0						
volume of each rain barrel and/or cistern	0	0	0	0	0	0	0	0						
Total Volume Reduction	3063	0	19012	9813	34647	20560	40938	15704						
Effective Treated Impervious Area	45378	0	281654	145383	513287	304597	606494	232648						



Form 3-4 Runoff Reduction Calculator for Site Design Measures on Regulated Projects																
DMA ID No.	21		22		23		24		25		26		27		28	
		Runoff Reduction (ft3)		Runoff Reduction (ft3)		Runoff Reduction (ft3)		Runoff Reduction (ft3)		Runoff Reduction (ft3)		Runoff Reduction (ft3)		Runoff Reduction (ft3)		Runoff Reduction (ft3)
<b>Runoff Reduction Parameters</b>																
impervious drainage area	0		0		0		0		0		0		0		0	
runoff volume from 85th percentile impervious areas, 24-hour storm (C * I) (C=0.9)	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0
ponding area	0		0		0		0		0		0		0		0	
ponding depth	0		0		0		0		0		0		0		0	
soil amendment area	6820	2387	3361	1176	62790	21977	2800	980	2100	735	7300	2555	4500	1575	5500	1925
depth of amended soil	1		1		1		1		1		1		1		1	
porosity of amended soil	0		0		0		0		0		0		0		0	
number of new evergreen trees	178		37		565		25		19		66		41		50	
number of new deciduous trees	62		37		565		25		19		66		41		50	
canopy area of existing trees to remain on the property		3072		807		12473		556		417		1450		894		1093
runoff volume from 85th percentile impervious areas, 24-hour storm (C * I) (C=0.9)	0.810		0.810		0.810		0.810		0.810		0.810		0.810		0.810	
impervious drainage area	40920		162337		376740		16800		12600		43800		27000		33000	
runoff volume from 85th percentile impervious areas, 24-hour storm (C * I) (C=0.9)	0.810	2762	0.810	10958	0.810	25430	0.810	1134	0.810	851	0.810	2957	0.810	1823	0.810	2228
area of gravel storage layer	0		0		0		0		0		0		0		0	
depth of gravel storage layer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
porosity of aggregate	0		0		0		0		0		0		0		0	
efficiency factor	0		0		0		0		0		0		0		0	
impervious drainage area	0		0		0		0		0		0		0		0	
runoff volume from 85th percentile impervious areas, 24-hour storm (C * I) (C=0.9)	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0
number of rain barrels and/or cisterns																
volume of each rain barrel and/or cistern	0		0		0		0		0		0		0		0	
<b>Total Volume Reduction</b>	<b>8221</b>		<b>12940</b>		<b>59880</b>		<b>2670</b>		<b>2003</b>		<b>6962</b>		<b>4291</b>		<b>5245</b>	
<b>Effective Treated Impervious Area</b>	<b>121799</b>		<b>191710</b>		<b>887109</b>		<b>39559</b>		<b>29669</b>		<b>103136</b>		<b>63577</b>		<b>77705</b>	



Form 3-4 Runoff Reduction Calculator for Site Design Measures on Regulated Projects													
DMA ID No.	29	30	31	32	33	34	35	36					
Runoff Reduction Parameters	Runoff Reduction (ft <sup>3</sup> )	Runoff Reduction (ft <sup>3</sup> )	Runoff Reduction (ft <sup>3</sup> )	Runoff Reduction (ft <sup>3</sup> )	Runoff Reduction (ft <sup>3</sup> )	Runoff Reduction (ft <sup>3</sup> )	Runoff Reduction (ft <sup>3</sup> )	Runoff Reduction (ft <sup>3</sup> )					
impervious drainage area	0	0	0	0	0	0	0	0					
runoff volume from 85th percentile impervious areas, 24-hour storm (C * i) (C=0.9)	0.810	0.810	0.810	0.810	0.810	0.810	0.810	0.810					
ponding area	0	0	0	0	0	0	0	0					
ponding depth	0	0	0	0	0	0	0	0					
soil amendment area	940	329	0	7770	2720	0	7270	2545					
depth of amended soil	1	1	1	1	1	1	1	1					
porosity of amended soil	0	0	0	0	0	0	0	0					
number of new evergreen trees	11	0	83	0	155	33	0	522					
number of new deciduous trees	11	0	83	0	155	33	0	522					
canopy area of existing trees to remain on the property	242	0	1826	0	3413	738	0	11518					
runoff volume from 85th percentile impervious areas, 24-hour storm (C * i) (C=0.9)	0.810	0.810	0.810	0.810	0.810	0.810	0.810	0.810					
impervious drainage area	20367	0	121308	0	388180	340	0	377170					
runoff volume from 85th percentile impervious areas, 24-hour storm (C * i) (C=0.9)	0.810	1375	0.810	0.810	8188	0.810	0.810	26202					
area of gravel storage layer	0	0	0	0	0	0	0	0					
depth of gravel storage layer	0	0	0	0	0	0	0	0					
porosity of aggregate	0	0	0	0	0	0	0	0					
efficiency factor	0	0	0	0	0	0	0	0					
impervious drainage area	0	0	0	0	0	0	0	0					
runoff volume from 85th percentile impervious areas, 24-hour storm (C * i) (C=0.9)	0.810	0.810	0.810	0.810	0.810	0.810	0.810	0.810					
number of rain barrels and/or cisterns	0	0	0	0	0	0	0	0					
volume of each rain barrel and/or cistern	0	0	0	0	0	0	0	0					
Total Volume Reduction	1946	0	12733	0	32159	761	0	56770					
Effective Treated Impervious Area	28832	0	188644	0	476437	11275	0	841031					



Form 3-4 Runoff Reduction Calculator for Site Design Measures on Regulated Projects																
DMA ID No.	37		38		39		40		41		42		43		44	
		Runoff Reduction (ft3)		Runoff Reduction (ft3)		Runoff Reduction (ft3)		Runoff Reduction (ft3)		Runoff Reduction (ft3)		Runoff Reduction (ft3)		Runoff Reduction (ft3)		Runoff Reduction (ft3)
<b>Runoff Reduction Parameters</b>																
impervious drainage area	0		0		0		0		0		0		0		0	
runoff volume from 85th percentile impervious areas, 24-hour storm (C * I) (C=0.9)	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0
paving area	0		0		0		0		0		0		0		0	
paving depth	0		0		0		0		0		0		0		0	
soil amendment area	10550	3693	3380	1183	6812	2384	19250	6738	86604	30311	44150	15453	182412	63844	60122	21043
depth of amended soil	1		1		1		1		1		1		1		1	
porosity of amended soil	0		0		0		0		0		0		0		0	
number of new evergreen trees	105		33		425		213		929		505		1732		860	
number of new deciduous trees	105		33		425		213		929		505		1732		860	
canopy area of existing trees to remain on the property		2328		721		9377		4703		20512		11141		38219		18987
runoff volume from 85th percentile impervious areas, 24-hour storm (C * I) (C=0.9)	0.810		0.810		0.810		0.810		0.810		0.810		0.810		0.810	
impervious drainage area	88897		20280		#####		161085		#####		832602		#####		#####	
runoff volume from 85th percentile impervious areas, 24-hour storm (C * I) (C=0.9)	0.810	6001	0.810	1369	0.810	61691	0.810	10873	0.810	100402	0.810	56201	0.810	209851	0.810	70346
area of gravel storage layer	0		0		0		0		0		0		0		0	
depth of gravel storage layer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
porosity of aggregate	0		0		0		0		0		0		0		0	
efficiency factor	0		0		0		0		0		0		0		0	
impervious drainage area	0		0		0		0		0		0		0		0	
runoff volume from 85th percentile impervious areas, 24-hour storm (C * I) (C=0.9)	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0	0.810	0
number of rain barrels and/or cisterns		0		0		0		0		0		0		0		0
volume of each rain barrel and/or cistern	0		0		0		0		0		0		0		0	
<b>Total Volume Reduction</b>	<b>12022</b>		<b>3273</b>		<b>73452</b>		<b>22313</b>		<b>151225</b>		<b>82794</b>		<b>311914</b>		<b>110375</b>	
<b>Effective Treated Impervious Area</b>	<b>178096</b>		<b>48486</b>		<b>1088179</b>		<b>330567</b>		<b>2240375</b>		<b>1226575</b>		<b>4620951</b>		<b>1635189</b>	



Form 3-4 Runoff Reduction Calculator for Site Design Measures on Regulated Projects										
1DMA ID No.			1	2	3	4				
Site Design Measure	Runoff Reduction Parameters		Runoff Reduction (ft3)	Runoff Reduction (ft3)	Runoff Reduction (ft3)	Runoff Reduction (ft3)				
2 Adjacent/On-Site Stream	Aimp (ft2)	impervious drainage area	0	0	0	0				
Setbacks and Buffers	V85 (in)	runoff volume from 85th percentile impervious areas, 24-hour storm (C * i) (C=0.9)	0.810	0.810	0.810	0.810				
3 Soil Quality Improvement and Maintenance	Apond	ponding area	0	0	0	0				
	Dpond	ponding depth	0.0	0	0	0				
	Asa	soil amendment area	28780	0	3700	1295				
	Dsa (ft)	depth of amended soil	1.000	1	1	1				
	n	porosity of amended soil	0.350	0.350	0.350	0.350				
4 Tree Planting and Preservation	ne	number of new evergreen trees	260	6	34	255				
	nd	number of new deciduous trees	260	6	34	255				
	Atc (ft2)	canopy area of existing trees to remain on the property	5742	137	748	5633				
	V85 (in)	runoff volume from 85th percentile impervious areas, 24-hour storm (C * i) (C=0.9)	0.810	0.810	0.810	0.810				
5 Rooftop and Impervious Area Disconnection	Aimp	impervious drainage area	173895	16130	25707	570907				
	V85 (in)	runoff volume from 85th percentile impervious areas, 24-hour storm (C * i) (C=0.9)	0.810	0.810	0.810	0.810				
6 Porous Pavement	Ares	area of gravel storage layer	0	0	0	0				
	Dres (ft)	depth of gravel storage layer	0.0	0	0	0				
	nagg	porosity of aggregate	0.0	0	0	0				
	C	efficiency factor	0.0	0	0	0				
7 Vegetated Swales	Aimp	impervious drainage area	0	0	0	0				
	V85 (in)	runoff volume from 85th percentile impervious areas, 24-hour storm (C * i) (C=0.9)	0.810	0.810	0.810	0.810				
8 Rain Barrels and Cisterns	N	number of rain barrels and/or cisterns	0	0	0	0				
	Va (ft3)	volume of each rain barrel and/or cistern	0	0	0	0				
9 Do all Site Design Measures meet the design requirements outlined in the Fact Sheets?				Yes	X	No				
10 Total Volume Reduction (ft3)			27553	1226	3778	44169				
11 Effective Treated Impervious Area (ft2)			367377	16342	50379	588924				



[illegible]



DMA ID No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
1 Total impervious area requiring treatment	1499858	345082	353925	1207897	1281426	77776	607684	1418488	22216	324282	706369	#####	55953	0	#####	#####	#####	#####	#####	#####	#####	#####	#####
2 Impervious area untreated by Site Design Measures (P2) Item 1 - Forms 3-4; Item 11	213097	0	189101	158860	207434	6158	0	0	0	39412	205717	21297	10575	0	#####	28705	#####	42576	0	#####	0	0	
3 Additional pervious area draining to BMP (P2)	1755816	60897	353925	1461024	1677605	133925	271793	607923	3920	380954	930180	#####	87360	3485	#####	#####	#####	#####	#####	#####	#####	74880	
4 Composite DMA Runoff Coefficient (Rc) Enter area-weighted composite runoff coefficient representing entire DMA	0.088	0.040	0.207	0.083	0.091	0.062	0.040	0.040	0.040	0.081	0.127	0.085	0.093	0.040	0.154	0.074	0.092	0.081	0.040	0.165	0.094	0.040	
5 Water Quality Volume (WQV) (P3) WQV = 1/12 * (Item 2 + Item 3) * Item 4 * Unit WdW	9338	132	6102	7326	9263	470	587	1317	8	1844	7794	1010	494	8	3908	1921	4795	1999	559	6095	925	162	
6 Water Quality Flow (WQF) (P4) WQF = 1/43,560 * (0.2 * (Item 2 + Item 3) * Item 4)	0.792	0.011	0.517	0.621	0.785	0.040	0.050	0.112	0.001	0.156	0.661	0.086	0.042	0.001	0.331	0.163	0.406	0.169	0.047	0.517	0.078	0.014	

DMA ID No.	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
1 Total impervious area requiring treatment	1094053	48787.2	36590.4	127195	78408	95832	31929.5	0	214250	0	564167	9605	0	1E+06	2E+05	59503	1E+06	4E+05	2E+06	1E+06	5E+06	2E+06
2 Impervious area untreated by Site Design Measures (P2) Item 1 – Form 3-4 Item 11	206944	9228	6921	24059	14831	18127	3098	0	25606	0	87731	0	0	#####	34433	11017	#####	61691	#####	#####	#####	#####
3 Additional pervious area draining to BAP (P2)	1094053	48787	36590	127195	78408	95832	31929	0	214250	0	564167	9605	0	#####	#####	59503	#####	#####	#####	#####	#####	#####
4 Composite DMA Runoff Coefficient (P3) Enter area weighted composite runoff coefficient representing entire DMA	0.09	0.09	0.09	0.09	0.09	0.09	0.08	#DIV/0!	0.08	#DIV/0!	0.10	0.03	0.04	0.09	0.09	0.09	0.13	0.08	0.07	0.08	0.07	0.11
5 Water Quality Volume (WQV) (P3) WQV = 1/12 * (Item 2 + Item 3) * Item 4 (1) Unit WQV	6657	297	223	774	477	583	149	#DIV/0!	1083	#DIV/0!	3527	17	0	6091	1172	343	12136	2022	10694	6542	22131	14719
6 Water Quality Flow (WQF) (P3) WQF = 1/43,560 * (0.2") (Item 2 + Item 3) * Item 4	0.564	0.025	0.019	0.066	0.040	0.049	0.013	#DIV/0!	0.092	#DIV/0!	0.299	0.001	0.000	0.516	0.099	0.029	1.029	0.171	0.906	0.555	1.876	1.248

[illegible]



**Form 3-6 Volume-Based Infiltrating Bioretention Measures**

<b>1DMA ID No.</b> <b>If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.</b>	<b>W1</b>	<b>U1</b>	<b>M1I</b>	<b>MFOUT</b>
2WQV (ft3) Item 5 in Form 3-5  If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.	9338	132	6102	7326
3 Surface Loading Rate Maximum 5.0 in/hr (5in/hr only when subdrains are used, otherwise use native soil rate)	5.00	5.00	5.00	5.00
4BMP Surface Area (ft2)  Top of BMP	6715	95	4390	5270
5Infiltration rate of underlying soils (in/hr)	0.07	0.07	0.07	0.07
6Maximum ponding depth (ft)  BMP specific, see BMP design details	0.5	0.5	0.5	0.5
7Ponding Depth (ft)  dBMP = Minimum of (1/12 * Item 5 * 48 hrs) or Item 6	0.280	0.280	0.280	0.280
8Infiltrating surface area, SABMP (ft2)  Bottom of BMP	5036	71	3293	3953
9Planting media depth, dmedia (ft)	1.5	1.5	1.5	1.5
10Planting media porosity	0.35	0.35	0.35	0.35
11Gravel depth, dmedia (ft)  Only included in certain BMP types	3.5	3.5	3.5	3.5
12Gravel porosity	0.30	0.30	0.30	0.30
13Retention Volume (ft3)  $V_{\text{retention}} = \text{Item 8} * [\text{Item 7} + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (1.5 * (\text{Item 5} / 12))]$	9,342.3	132.2	6,107.6	7,331.9
14Untreated Volume (ft3)  $V_{\text{untreated}} = \text{Item 2} - \text{Item 13}$  If greater than zero, adjust BMP sizing variables and re-compute retention volume	0	0	0	0
15 Treated Flow Rate (ft3/s)  $Q_{\text{treated}} = (\text{Item 3} * \text{Item 4}) / 43,560$	0.7708	0.0109	0.5039	0.6049
15A) Time to Empty in hours: (Must be less than 48 hours)	3.3668	3.3670	3.3668	3.3668
16Total Treated Flow Rate for Project (ft3/s)  $Q_{\text{total}} = \text{Sum of Item 15 for all DMAs}$				
17Is WQV for each DMA treated on-site?	Yes		No	Regional



### Form 3-6 Volume-Based Infiltrating Bioretention Measures

<b>1DMA ID No.</b> <b>If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.</b>	<b>AAOUT</b>	<b>N3C1</b>	<b>Z1</b>	<b>X1</b>
2WQV (ft <sup>3</sup> ) Item 5 in Form 3-5  If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.	9263	470	587	1317
3 Surface Loading Rate Maximum 5.0 in/hr (5in/hr only when subdrains are used, otherwise use native soil rate)	5.00	5.00	5.00	5.00
4BMP Surface Area (ft <sup>2</sup> )  Top of BMP	6660	340	425	950
5Infiltration rate of underlying soils (in/hr)	0.07	0.07	0.07	0.07
6Maximum ponding depth (ft)  BMP specific, see BMP design details	0.5	0.5	0.5	0.5
7Ponding Depth (ft)  dBMP = Minimum of (1/12 * Item 5 * 48 hrs) or Item 6	0.280	0.280	0.280	0.280
8Infiltrating surface area, SABMP (ft <sup>2</sup> )  Bottom of BMP	4995	255	319	713
9Planting media depth, dmedia (ft)	1.5	1.5	1.5	1.5
10Planting media porosity	0.35	0.35	0.35	0.35
11Gravel depth, dmedia (ft)  Only included in certain BMP types	3.5	3.5	3.5	3.5
12Gravel porosity	0.30	0.30	0.30	0.30
13Retention Volume (ft <sup>3</sup> )  $V_{\text{retention}} = \text{Item 8} * [(\text{Item 7} + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (1.5 * (\text{Item 5} / 12))]$	9,265.7	473.0	591.3	1,321.7
14Untreated Volume (ft <sup>3</sup> )  $V_{\text{untreated}} = \text{Item 2} - \text{Item 13}$  If greater than zero, adjust BMP sizing variables and re-compute retention volume	0	0	0	0
15 Treated Flow Rate (ft <sup>3</sup> /s)  $Q_{\text{treated}} = (\text{Item 3} * \text{Item 4}) / 43,560$	0.7645	0.0390	0.0488	0.1090
15A) Time to Empty in hours: (Must be less than 48 hours)	3.3668	3.3669	3.3669	3.3668



**Form 3-6 Volume-Based Infiltrating Bioretention Measures**

<b>1DMA ID No.</b> <b>If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.</b>	<b>V1</b>	<b>TT1</b>	<b>T1A</b>	<b>T1C</b>
2WQV (ft3) Item 5 in Form 3-5  If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.	8	1844	7794	1010
3 Surface Loading Rate Maximum 5.0 in/hr (5in/hr only when subdrains are used, otherwise use native soil rate)	5.00	5.00	5.00	5.00
4BMP Surface Area (ft2)  Top of BMP	7	1325	5605	726
5Infiltration rate of underlying soils (in/hr)	0.07	0.07	0.07	0.07
6Maximum ponding depth (ft)  BMP specific, see BMP design details	0.5	0.5	0.5	0.5
7Ponding Depth (ft)  dBMP = Minimum of (1/12 * Item 5 * 48 hrs) or Item 6	0.280	0.280	0.280	0.280
8Infiltrating surface area, SABMP (ft2)  Bottom of BMP	5	994	4204	545
9Planting media depth, dmedia (ft)	1.5	1.5	1.5	1.5
10Planting media porosity	0.35	0.35	0.35	0.35
11Gravel depth, dmedia (ft)  Only included in certain BMP types	3.5	3.5	3.5	3.5
12Gravel porosity	0.30	0.30	0.30	0.30
13Retention Volume (ft3)  $V_{\text{retention}} = \text{Item 8} * [(\text{Item 7} + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (1.5 * (\text{Item 5} / 12))]$	9.7	1,843.4	7,798.0	1,010.1
14Untreated Volume (ft3)  $V_{\text{untreated}} = \text{Item 2} - \text{Item 13}$  If greater than zero, adjust BMP sizing variables and re-compute retention volume	0	0	0	0
15 Treated Flow Rate (ft3/s)  $Q_{\text{treated}} = (\text{Item 3} * \text{Item 4}) / 43,560$	0.0008	0.1521	0.6434	0.0833
15A) Time to Empty in hours: (Must be less than 48 hours)	3.3699	3.3672	3.3668	3.3669



### Form 3-6 Volume-Based Infiltrating Bioretention Measures

1DMA ID No. If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.	T1B	SS1	S1	R1
2WQV (ft <sup>3</sup> ) Item 5 in Form 3-5 If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.	494	8	3908	1921
3 Surface Loading Rate Maximum 5.0 in/hr (5in/hr only when subdrains are used, otherwise use native soil rate)	5.00	5.00	5.00	5.00
4BMP Surface Area (ft <sup>2</sup> ) Top of BMP	360	7	2810	1385
5Infiltration rate of underlying soils (in/hr)	0.07	0.07	0.07	0.07
6Maximum ponding depth (ft) BMP specific, see BMP design details	0.5	0.5	0.5	0.5
7Ponding Depth (ft) dBMP = Minimum of (1/12 * Item 5 * 48 hrs) or Item 6	0.280	0.280	0.280	0.280
8Infiltrating surface area, SABMP (ft <sup>2</sup> ) Bottom of BMP	270	5	2108	1039
9Planting media depth, dmedia (ft)	1.5	1.5	1.5	1.5
10Planting media porosity	0.35	0.35	0.35	0.35
11Gravel depth, dmedia (ft) Only included in certain BMP types	3.5	3.5	3.5	3.5
12Gravel porosity	0.30	0.30	0.30	0.30
13Retention Volume (ft <sup>3</sup> ) Vretention = Item 8 * [(Item 7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (1.5 * (Item 5 / 12))]	500.9	9.7	3,909.4	1,926.9
14Untreated Volume (ft <sup>3</sup> ) Vuntreated = Item 2 – Item 13 If greater than zero, adjust BMP sizing variables and re-compute retention volume	0	0	0	0
15 Treated Flow Rate (ft <sup>3</sup> /s) Qtreated = (Item 3 * Item 4)/43,560	0.0413	0.0008	0.3225	0.1590
15A) Time to Empty in hours: (Must be less than 48 hours)	3.3669	3.3699	3.3668	3.3668



### Form 3-6 Volume-Based Infiltrating Bioretention Measures

1DMA ID No. If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.	QQ1	Q1	PP1	P1
2WQV (ft3) Item 5 in Form 3-5  If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.	4795	1999	559	6095
3 Surface Loading Rate Maximum 5.0 in/hr (5in/hr only when subdrains are used, otherwise use native soil rate)	5.00	5.00	5.00	5.00
4BMP Surface Area (ft2)  Top of BMP	3450	1440	405	4400
5Infiltration rate of underlying soils (in/hr)	0.07	0.07	0.07	0.07
6Maximum ponding depth (ft)  BMP specific, see BMP design details	0.5	0.5	0.5	0.5
7Ponding Depth (ft)  dBMP = Minimum of (1/12 * Item 5 * 48 hrs) or Item 6	0.280	0.280	0.280	0.280
8Infiltrating surface area, SABMP (ft2)  Bottom of BMP	2588	1080	304	3300
9Planting media depth, dmedia (ft)	1.5	1.5	1.5	1.5
10Planting media porosity	0.35	0.35	0.35	0.35
11Gravel depth, dmedia (ft)  Only included in certain BMP types	3.5	3.5	3.5	3.5
12Gravel porosity	0.30	0.30	0.30	0.30
13Retention Volume (ft3)  $V_{\text{retention}} = \text{Item 8} * [(\text{Item 7} + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (1.5 * (\text{Item 5} / 12))]$	4,799.8	2,003.4	563.5	6,121.5
14Untreated Volume (ft3)  $V_{\text{untreated}} = \text{Item 2} - \text{Item 13}$  If greater than zero, adjust BMP sizing variables and re-compute retention volume	0	0	0	0
15 Treated Flow Rate (ft3/s)  $Q_{\text{treated}} = (\text{Item 3} * \text{Item 4}) / 43,560$	0.3960	0.1653	0.0465	0.5051
15A) Time to Empty in hours: (Must be less than 48 hours)	3.3668	3.3668	3.3669	3.3668



### Form 3-6 Volume-Based Infiltrating Bioretention Measures

<b>1DMA ID No.</b> <b>If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.</b>	<b>OO1</b>	<b>NN1</b>	<b>N1k</b>	<b>N1J</b>
2WQV (ft <sup>3</sup> ) Item 5 in Form 3-5  If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.	925	162	6657	297
3 Surface Loading Rate Maximum 5.0 in/hr (5in/hr only when subdrains are used, otherwise use native soil rate)	5.00	5.00	5.00	5.00
4BMP Surface Area (ft <sup>2</sup> )  Top of BMP	665	120	4800	215
5Infiltration rate of underlying soils (in/hr)	0.07	0.07	0.07	0.07
6Maximum ponding depth (ft)  BMP specific, see BMP design details	0.5	0.5	0.5	0.5
7Ponding Depth (ft)  dBMP = Minimum of (1/12 * Item 5 * 48 hrs) or Item 6	0.280	0.280	0.280	0.280
8Infiltrating surface area, SABMP (ft <sup>2</sup> )  Bottom of BMP	499	90	3600	161
9Planting media depth, dmedia (ft)	1.5	1.5	1.5	1.5
10Planting media porosity	0.35	0.35	0.35	0.35
11Gravel depth, dmedia (ft)  Only included in certain BMP types	3.5	3.5	3.5	3.5
12Gravel porosity	0.30	0.30	0.30	0.30
13Retention Volume (ft <sup>3</sup> )  $V_{\text{retention}} = \text{Item 8} * [(\text{Item 7} + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (1.5 * (\text{Item 5} / 12))]$	925.2	167.0	6,678.0	299.1
14Untreated Volume (ft <sup>3</sup> )  $V_{\text{untreated}} = \text{Item 2} - \text{Item 13}$  If greater than zero, adjust BMP sizing variables and re-compute retention volume	0	0	0	0
15 Treated Flow Rate (ft <sup>3</sup> /s)  $Q_{\text{treated}} = (\text{Item 3} * \text{Item 4}) / 43,560$	0.0763	0.0138	0.5510	0.0247
15A) Time to Empty in hours: (Must be less than 48 hours)	3.3670	3.3670	3.3668	3.3669



### Form 3-6 Volume-Based Infiltrating Bioretention Measures

<b>1DMA ID No.</b> <b>If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.</b>	<b>N1I</b>	<b>N1H</b>	<b>N1G</b>	<b>N1F</b>
2WQV (ft <sup>3</sup> ) Item 5 in Form 3-5  If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.	223	774	477	583
3 Surface Loading Rate Maximum 5.0 in/hr (5in/hr only when subdrains are used, otherwise use native soil rate)	5.00	5.00	5.00	5.00
4BMP Surface Area (ft <sup>2</sup> )  Top of BMP	160	560	350	420
5Infiltration rate of underlying soils (in/hr)	0.07	0.07	0.07	0.07
6Maximum ponding depth (ft)  BMP specific, see BMP design details	0.5	0.5	0.5	0.5
7Ponding Depth (ft)  dBMP = Minimum of (1/12 * Item 5 * 48 hrs) or Item 6	0.280	0.280	0.280	0.280
8Infiltrating surface area, SABMP (ft <sup>2</sup> )  Bottom of BMP	120	420	263	315
9Planting media depth, dmedia (ft)	1.5	1.5	1.5	1.5
10Planting media porosity	0.35	0.35	0.35	0.35
11Gravel depth, dmedia (ft)  Only included in certain BMP types	3.5	3.5	3.5	3.5
12Gravel porosity	0.30	0.30	0.30	0.30
13Retention Volume (ft <sup>3</sup> )  $V_{\text{retention}} = \text{Item 8} * [(\text{Item 7} + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (1.5 * (\text{Item 5} / 12))]$	222.6	779.1	486.9	584.3
14Untreated Volume (ft <sup>3</sup> )  $V_{\text{untreated}} = \text{Item 2} - \text{Item 13}$  If greater than zero, adjust BMP sizing variables and re-compute retention volume	0	0	0	0
15 Treated Flow Rate (ft <sup>3</sup> /s)  $Q_{\text{treated}} = (\text{Item 3} * \text{Item 4}) / 43,560$	0.0184	0.0643	0.0402	0.0482
15A) Time to Empty in hours: (Must be less than 48 hours)	3.3676	3.3669	3.3669	3.3669



### Form 3-6 Volume-Based Infiltrating Bioretention Measures

<b>1DMA ID No.</b> <b>If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.</b>	<b>N1E</b>	<b>0</b>	<b>N1C</b>	<b>0</b>
2WQV (ft <sup>3</sup> ) Item 5 in Form 3-5  If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.	149	#DIV/0!	1083	#DIV/0!
3 Surface Loading Rate Maximum 5.0 in/hr (5in/hr only when subdrains are used, otherwise use native soil rate)	5.00	5.00	5.00	5.00
4BMP Surface Area (ft <sup>2</sup> )  Top of BMP	110	0	780	0
5Infiltration rate of underlying soils (in/hr)	0.07	0.07	0.07	0.07
6Maximum ponding depth (ft)  BMP specific, see BMP design details	0.5	0.5	0.5	0.5
7Ponding Depth (ft)  dBMP = Minimum of (1/12 * Item 5 * 48 hrs) or Item 6	0.280	0.280	0.280	0.280
8Infiltrating surface area, SABMP (ft <sup>2</sup> )  Bottom of BMP	83	0	585	0
9Planting media depth, dmedia (ft)	1.5	1.5	1.5	1.5
10Planting media porosity	0.35	0.35	0.35	0.35
11Gravel depth, dmedia (ft)  Only included in certain BMP types	3.5	3.5	3.5	3.5
12Gravel porosity	0.30	0.30	0.30	0.30
13Retention Volume (ft <sup>3</sup> )  $V_{\text{retention}} = \text{Item 8} * [(\text{Item 7} + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (1.5 * (\text{Item 5} / 12))]$	153.0	0.0	1,085.2	0.0
14Untreated Volume (ft <sup>3</sup> )  $V_{\text{untreated}} = \text{Item 2} - \text{Item 13}$  If greater than zero, adjust BMP sizing variables and re-compute retention volume	0	#DIV/0!	0	#DIV/0!
15 Treated Flow Rate (ft <sup>3</sup> /s)  $Q_{\text{treated}} = (\text{Item 3} * \text{Item 4}) / 43,560$	0.0126	0.0000	0.0895	0.0000
15A) Time to Empty in hours: (Must be less than 48 hours)	3.3670	#DIV/0!	3.3669	#DIV/0!



### Form 3-6 Volume-Based Infiltrating Bioretention Measures

<b>1DMA ID No.</b> <b>If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.</b>	<b>N1A</b>	<b>MM1</b>	<b>M1H</b>	<b>M1E</b>
2WQV (ft <sup>3</sup> ) Item 5 in Form 3-5  If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.	3527	17	0	6091
3 Surface Loading Rate Maximum 5.0 in/hr (5in/hr only when subdrains are used, otherwise use native soil rate)	5.00	5.00	5.00	5.00
4BMP Surface Area (ft <sup>2</sup> )  Top of BMP	2540	12	1	4400
5Infiltration rate of underlying soils (in/hr)	0.07	0.07	0.07	0.07
6Maximum ponding depth (ft)  BMP specific, see BMP design details	0.5	0.5	0.5	0.5
7Ponding Depth (ft)  dBMP = Minimum of (1/12 * Item 5 * 48 hrs) or Item 6	0.280	0.280	0.280	0.280
8Infiltrating surface area, SABMP (ft <sup>2</sup> )  Bottom of BMP	1905	9	1	3300
9Planting media depth, dmedia (ft)	1.5	1.5	1.5	1.5
10Planting media porosity	0.35	0.35	0.35	0.35
11Gravel depth, dmedia (ft)  Only included in certain BMP types	3.5	3.5	3.5	3.5
12Gravel porosity	0.30	0.30	0.30	0.30
13Retention Volume (ft <sup>3</sup> )  $V_{\text{retention}} = \text{Item 8} * [(\text{Item 7} + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (1.5 * (\text{Item 5} / 12))]$	3,533.8	16.7	1.4	6,121.5
14Untreated Volume (ft <sup>3</sup> )  $V_{\text{untreated}} = \text{Item 2} - \text{Item 13}$  If greater than zero, adjust BMP sizing variables and re-compute retention volume	0	0	0	0
15 Treated Flow Rate (ft <sup>3</sup> /s)  $Q_{\text{treated}} = (\text{Item 3} * \text{Item 4}) / 43,560$	0.2916	0.0014	0.0001	0.5051
15A) Time to Empty in hours: (Must be less than 48 hours)	3.3668	3.4523	3.3880	3.3668



### Form 3-6 Volume-Based Infiltrating Bioretention Measures

1DMA ID No. If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.	M1D	M1C	M1B	M1A
2WQV (ft <sup>3</sup> ) Item 5 in Form 3-5  If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.	1172	343	12136	2022
3 Surface Loading Rate Maximum 5.0 in/hr (5 in/hr only when subdrains are used, otherwise use native soil rate)	5.00	5.00	5.00	5.00
4BMP Surface Area (ft <sup>2</sup> )  Top of BMP	850	250	8725	1455
5Infiltration rate of underlying soils (in/hr)	0.07	0.07	0.07	0.07
6Maximum ponding depth (ft)  BMP specific, see BMP design details	0.5	0.5	0.5	0.5
7Ponding Depth (ft)  dBMP = Minimum of (1/12 * Item 5 * 48 hrs) or Item 6	0.280	0.280	0.280	0.280
8Infiltrating surface area, SABMP (ft <sup>2</sup> )  Bottom of BMP	638	188	6544	1091
9Planting media depth, dmedia (ft)	1.5	1.5	1.5	1.5
10Planting media porosity	0.35	0.35	0.35	0.35
11Gravel depth, dmedia (ft)  Only included in certain BMP types	3.5	3.5	3.5	3.5
12Gravel porosity	0.30	0.30	0.30	0.30
13Retention Volume (ft <sup>3</sup> )  Vretention = Item 8 * [(Item 7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (1.5 * (Item 5 / 12))]	1,182.6	347.8	12,138.7	2,024.3
14Untreated Volume (ft <sup>3</sup> )  Vuntreated = Item 2 – Item 13  If greater than zero, adjust BMP sizing variables and re-compute retention volume	0	0	0	0
15 Treated Flow Rate (ft <sup>3</sup> /s)  Qtreated = (Item 3 * Item 4)/43,560	0.0976	0.0287	1.0015	0.1670
15A) Time to Empty in hours: (Must be less than 48 hours)	3.3668	3.3669	3.3668	3.3668



### Form 3-6 Volume-Based Infiltrating Bioretention Measures

<b>1DMA ID No.</b> <b>If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.</b>	<b>LL1</b>	<b>L1</b>	<b>JJ1</b>	<b>H1B</b>
2WQV (ft <sup>3</sup> ) Item 5 in Form 3-5  If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.	10694	6542	22131	14719
3 Surface Loading Rate Maximum 5.0 in/hr (5in/hr only when subdrains are used, otherwise use native soil rate)	5.00	5.00	5.00	5.00
4BMP Surface Area (ft <sup>2</sup> )  Top of BMP	7700	4705	15910	10600
5Infiltration rate of underlying soils (in/hr)	0.07	0.07	0.07	0.07
6Maximum ponding depth (ft)  BMP specific, see BMP design details	0.5	0.5	0.5	0.5
7Ponding Depth (ft)  dBMP = Minimum of (1/12 * Item 5 * 48 hrs) or Item 6	0.280	0.280	0.280	0.280
8Infiltrating surface area, SABMP (ft <sup>2</sup> )  Bottom of BMP	5775	3529	11933	7950
9Planting media depth, dmedia (ft)	1.5	1.5	1.5	1.5
10Planting media porosity	0.35	0.35	0.35	0.35
11Gravel depth, dmedia (ft)  Only included in certain BMP types	3.5	3.5	3.5	3.5
12Gravel porosity	0.30	0.30	0.30	0.30
13Retention Volume (ft <sup>3</sup> )  $V_{\text{retention}} = \text{Item 8} * [(\text{Item 7} + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (1.5 * (\text{Item 5} / 12))]$	10,712.6	6,545.8	22,134.8	14,747.3
14Untreated Volume (ft <sup>3</sup> )  $V_{\text{untreated}} = \text{Item 2} - \text{Item 13}$  If greater than zero, adjust BMP sizing variables and re-compute retention volume	0	0	0	0
15 Treated Flow Rate (ft <sup>3</sup> /s)  $Q_{\text{treated}} = (\text{Item 3} * \text{Item 4}) / 43,560$	0.8838	0.5401	1.8262	1.2167
15A) Time to Empty in hours: (Must be less than 48 hours)	3.3668	3.3668	3.3668	3.3668



**Form 3-6 Volume-Based Infiltrating Bioretention Measures**

<b>1DMA ID No.</b> <b>If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.</b>	<b>H1A</b>	<b>GG1</b>	<b>DD1</b>	<b>CC1</b>
2WQV (ft3) Item 5 in Form 3-5  If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.	4589	107	581	11469
3 Surface Loading Rate Maximum 5.0 in/hr (5in/hr only when subdrains are used, otherwise use native soil rate)	5.00	5.00	5.00	5.00
4BMP Surface Area (ft2)  Top of BMP	3300	77	420	8244
5Infiltration rate of underlying soils (in/hr)	0.07	0.07	0.07	0.07
6Maximum ponding depth (ft)  BMP specific, see BMP design details	0.5	0.5	0.5	0.5
7Ponding Depth (ft)  dBMP = Minimum of (1/12 * Item 5 * 48 hrs) or Item 6	0.280	0.280	0.280	0.280
8Infiltrating surface area, SABMP (ft2)  Bottom of BMP	2475	58	315	6183
9Planting media depth, dmedia (ft)	1.5	1.5	1.5	1.5
10Planting media porosity	0.35	0.35	0.35	0.35
11Gravel depth, dmedia (ft)  Only included in certain BMP types	3.5	3.5	3.5	3.5
12Gravel porosity	0.30	0.30	0.30	0.30
13Retention Volume (ft3)  $V_{\text{retention}} = \text{Item 8} * [\text{Item 7} + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (1.5 * (\text{Item 5} / 12))]$	4,591.1	107.1	584.3	11,469.5
14Untreated Volume (ft3)  $V_{\text{untreated}} = \text{Item 2} - \text{Item 13}$  If greater than zero, adjust BMP sizing variables and re-compute retention volume	0	0	0	0
15 Treated Flow Rate (ft3/s)  $Q_{\text{treated}} = (\text{Item 3} * \text{Item 4}) / 43,560$	0.3788	0.0088	0.0482	0.9463
15A) Time to Empty in hours: (Must be less than 48 hours)	3.3668	3.3671	3.3669	3.3668
16Total Treated Flow Rate for Project (ft3/s)  $Q_{\text{total}} = \text{Sum of Item 15 for all DMAs}$				
17Is WQV for each DMA treated on-site?	Yes		No	Regional



**Form 3-6 Volume-Based Infiltrating Bioretention Measures**

<b>1DMA ID No.</b> <b>If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.</b>	<b>BB1</b>	<b>B1</b>	<b>0</b>	<b>0</b>
2WQV (ft <sup>3</sup> ) Item 5 in Form 3-5  If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.	605	7107	#DIV/0!	#DIV/0!
3 Surface Loading Rate Maximum 5.0 in/hr (5in/hr only when subdrains are used, otherwise use native soil rate)	5.00	5.00	5.00	5.00
4BMP Surface Area (ft <sup>2</sup> )  Top of BMP	435	5110	2905	6700
5Infiltration rate of underlying soils (in/hr)	0.07	0.07	0.07	0.07
6Maximum ponding depth (ft)  BMP specific, see BMP design details	0.5	0.5	0.5	0.5
7Ponding Depth (ft)  dBMP = Minimum of (1/12 * Item 5 * 48 hrs) or Item 6	0.280	0.280	0.280	0.280
8Infiltrating surface area, SABMP (ft <sup>2</sup> )  Bottom of BMP	326	3833	2179	5025
9Planting media depth, dmedia (ft)	1.5	1.5	1.5	1.5
10Planting media porosity	0.35	0.35	0.35	0.35
11Gravel depth, dmedia (ft)  Only included in certain BMP types	3.5	3.5	3.5	3.5
12Gravel porosity	0.30	0.30	0.30	0.30
13Retention Volume (ft <sup>3</sup> )  $V_{\text{retention}} = \text{Item 8} * [(\text{Item 7} + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (1.5 * (\text{Item 5} / 12))]$	605.2	7,109.3	4,041.6	9,321.4
14Untreated Volume (ft <sup>3</sup> )  $V_{\text{untreated}} = \text{Item 2} - \text{Item 13}$  If greater than zero, adjust BMP sizing variables and re-compute retention volume	0	0	#DIV/0!	#DIV/0!
15 Treated Flow Rate (ft <sup>3</sup> /s)  $Q_{\text{treated}} = (\text{Item 3} * \text{Item 4}) / 43,560$	0.0499	0.5865	0.3334	0.7691
15A) Time to Empty in hours: (Must be less than 48 hours)	3.3669	3.3668	#DIV/0!	#DIV/0!



**Form 4.2B: Hydrograph Modification Results below:**

7i Input a NAME of each POINT OF CONNECTION (POC)	Hydro0mod is demonstrated in the Master Plan	
Source of Hydrograph Modification Peak Flows (ex. Form 3-6 or HEC-RAS)	HEC-RAS	
7A Summarize the Total 2-year Pre-Project Peak Runof (ft <sup>3</sup> /s)	211.62	
7B Total 2-year Post-Project Peak Runof (ft <sup>3</sup> /s)	174.87	
8 Is the total post-project peak runoff equal to or less than the total pre-project peak runoff? Yes, if Item 7B is less than item 7A.	YES	NOT COMPLETE
You Can Paste in a Graphic of Hydrographs Comparison if Unsteady State Method is Used or provide additional description here if needed.		



## **APPENDIX B – Vegetated Swale Fact Sheets and Specifications**



# VEGETATED SWALE

## Fact Sheet SDM-6

Also known as: Bioretention Swale, Treatment Swale, and Grassed Swale

### DESCRIPTION

Vegetated swales are essentially bioretention cells that are configured as linear channels, but are typically not designed with an engineered soil matrix and underlying gravel layer below the vegetation layer to accommodate additional treatment, storage, and infiltration. They function as a soil and plant-based filtration and infiltration feature that removes pollutants through a variety of natural physical, biological, and chemical treatment processes. Vegetated swales are open, shallow channels with vegetation covering the side slopes and bottom that collect and slowly convey stormwater runoff to downstream discharge points. They are designed to treat runoff through vegetation filtration, biological uptake, evapotranspiration, and/or infiltration into the underlying soils. They trap particulate pollutants (suspended solids and trace metals), promote infiltration, and reduce the flow velocity of storm water runoff.



Grassed swale. Photo Source: EPA

Vegetated swales can serve as part of a storm water drainage system and can replace curbs, gutters and storm sewer systems. They are best suited to capture runoff from small impervious areas and should not be implemented in areas with highly contaminated runoff. They can be used as part of treatment train approach and are effective at providing pretreatment for other BMPs.

### ADVANTAGES

- Reduces peak flow rates and total runoff volumes.
- Provides effective pretreatment for downstream BMPs by trapping, filtering, and infiltrating particulates and associated pollutants.
- Can serve as a cost-effective alternative to traditional curb and gutter.
- Can be integrated into landscape design to improve aesthetic appeal.

### LIMITATIONS

- Can be difficult to avoid channelization, which may cause erosion and limit infiltration potential.
- Not suitable for steep slopes.
- May not be appropriate for industrial sites or locations where spills may occur.
- Best suited for small drainage areas with low flow rates.
- A thick vegetative cover is needed for these features to function properly.

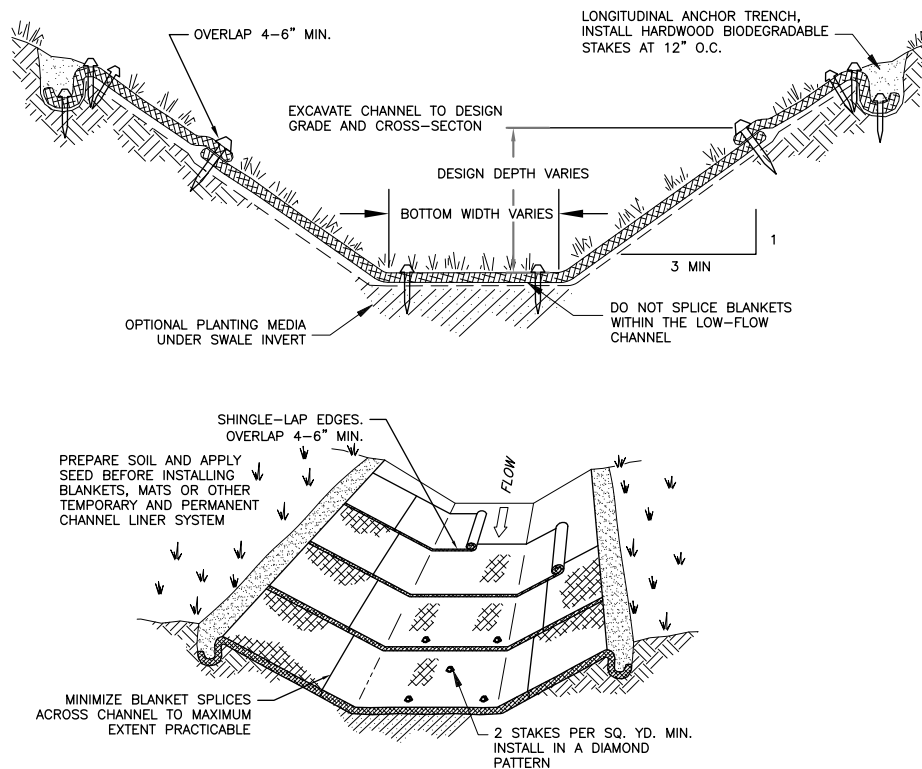
### KEY DESIGN FEATURES

In order to receive runoff volume reduction credits, vegetated swales must be designed in accordance with Treatment Control BMP 30 (TC-30) from the California Stormwater BMP Handbook, New Development and Redevelopment. Key design elements are summarized below:



# VEGETATED SWALE

## Fact Sheet SDM-6



VEGETATED SWALE TYPICAL INSTALLATION

- Maximum flow velocity from the design storm event shall not exceed 1.0 foot per second.
- Vegetated swales should be designed so that the water level does not exceed 2/3rds the height of the grass or 4 inches, whichever is less, at the design treatment rate.
- Longitudinal slopes between 0.5% and 2.5% are recommended.
- Provide sufficient length to achieve a desired treatment contact time of 10 minutes. Regardless of contact time, the swale should not be less than 100 feet in length.
- Implement check dams for longitudinal slopes > 2.5% as a means to reduce slopes and promote infiltration. Space as required to maintain maximum longitudinal bottom slope < 2.5%.
- Implement entrance/outlet energy dissipation measures to limit erosion and promote retention.
- Do not compact soils beneath vegetated swales.
- Trapezoidal channels are normally recommended but other configurations, such as parabolic, can also provide substantial water quality improvement and may be easier to mow than designs with sharp breaks in slope.
- Swales constructed in cut are preferred, or in fill areas that are far enough from an adjacent slope to minimize the potential for gopher damage. Do not use side slopes constructed of fill, which are prone to structural damage by gophers and other burrowing animals.
- A diverse selection of low growing, plants that thrive under the specific site, climatic, and watering conditions should be specified. Vegetation whose growing season corresponds to the wet season are preferred. Drought tolerant vegetation should be considered especially for swales that are not part of a regularly irrigated landscaped area.
- The width of the swale should be determined using Manning's Equation, at the peak of the design storm, and a value of 0.25 for Manning's n.



# VEGETATED SWALE

## Fact Sheet SDM-6

- If flow is to be introduced through curb cuts, place pavement slightly above the elevation of the the vegetated areas. Curb cuts should be at least 12 inches wide to prevent clogging.
- Swales must be vegetated in order to provide adequate treatment and reduction of runoff. It is important to maximize water contact with vegetation and the soil surface. For general purposes, select fine, close-growing, water-resistant grasses. Refer to the Placer County Landscape Design Guidelines for more information.
- If possible, divert runoff (other than necessary irrigation) during the period of vegetation establishment. Where runoff diversion is not possible, cover graded and seeded areas with suitable erosion control materials. Diverted runoff must be managed and retained onsite to avoid violation of the Phase II MS4 Permit.
- Swales used as primary stormwater conveyance facilities (i.e. without high flow bypass) must be designed according to requirements in the Placer County Stormwater Management Manual. These swales will not qualify for volume reduction credits unless the design criteria specified above are also satisfied.

### SIZING DESIGN GOALS AND REQUIREMENTS

The Post-Construction Storm Water Quality Plan (SWQP) Form 3-4 should be used to calculate the retention volume ( $V_{ret}$ ) associated with vegetated swales. This value is then used to calculate the area of impervious surface treated, and determine if other site design measures are necessary to capture the 85<sup>th</sup> percentile, 24-hour design storm for Regulated Projects. The equation for determining  $V_{ret}$  is as follows:

$$V_{ret} = A_{imp} * V_{85} * (1/12)$$

Where:

- $V_{ret}$  = stormwater retention volume (ft<sup>3</sup>);
- $A_{imp}$  = impervious area draining to vegetated swale (ft<sup>2</sup>); and
- $V_{85}$  = Runoff volume from the 85<sup>th</sup> percentile, 24-hour design storm (in)

### RUNOFF REDUCTION CREDIT REQUIREMENTS

- Vegetated swales must be designed in accordance with Treatment Control BMP 30 (TC-30 - Vegetated Swale) from the California Stormwater BMP Handbook, New Development and Redevelopment (available at [www.cabmphandbooks.com](http://www.cabmphandbooks.com)).
- The maximum flow velocity for runoff from the design storm event must be less than or equal to 1.0 foot per second.

### INSPECTION AND MAINTENANCE REQUIREMENTS

A maintenance plan shall be provided with the SWQP. The maintenance plan shall include recommended maintenance practices, state the parties responsible for maintenance and upkeep, specify the funding source for ongoing maintenance, and provide a site specific inspection checklist. At a minimum, maintenance shall include the following:

- Inspect on a semi-annual basis to assess slope integrity, soil moisture, vegetative health, soil stability, compaction, erosion, ponding, and sedimentation.
- Mow at least once per year, but do not cut grass shorter than the design flow depth because the effectiveness of the vegetation in reducing flow velocity and pollutant removal may be reduced. Grass cuttings should be removed from the swale and composted.
- Remove accumulated sediment when it is 3" deep or higher than the turf to minimize potential concentrated flows and sediment resuspension.
- Irrigate only as necessary to prevent vegetation from dying.
- Integrated pest management should be used for pest control. The designer should ideally select vegetation that does not require fertilizers.



# VEGETATED SWALE

---

## Fact Sheet SDM-6

- Reseed periodically to maintain dense turf.
- Remove trash or obstructions that cause standing water.
- Prevent off-street parking or other activities that can cause rutting or soil compaction.

## REFERENCES

California Department of Transportation (Caltrans). 2010. Treatment BMP Technology Report. CTSW-RT-09-239.06. Available online at: <http://www.dot.ca.gov/hq/env/stormwater/pdf/CTSW-RT-09-239-06.pdf>

California Stormwater Quality Association (CASQA). 2003. California Stormwater BMP Handbook – New Development and Redevelopment. BMP Factsheet TC-30: Vegetated Swale. Available online at: <http://www.cabmphandbooks.com/Documents/Development/TC-30.pdf>

County of San Diego. 2007. Low Impact Development Handbook. Available online at: <http://www.sdcountry.ca.gov/dplu/docs/LID-Handbook.pdf>

Placer County Planning Services Division. 2013. Placer County Landscape Design Guidelines. Available online at: <http://www.placer.ca.gov/~media/cdr/Planning/documents/DesignGuides/Landscape%20Design%20Guidelines.pdf>

U.S. Environmental Protection Agency, Post-Construction Stormwater Management in New Development and Redevelopment. BMP Fact Sheets. Available online at: <http://water.epa.gov/polwaste/npdes/swbmp/PostConstruction-Stormwater-Management-in-New-Development-and-Redevelopment.cfm>







## **APPENDIX C – Bioretention Fact Sheets and Specifications**



# BIORETENTION

## Fact Sheet TR-1

Bioretention facilities, also known as rain gardens and stormwater planters, are planted depressions that slow, treat, and infiltrate stormwater to improve water quality and manage hydromodification. They can be located in a variety of settings such as along roadsides or incorporated into a site's landscaping but should be designed by a qualified professional. Bioretention cells receive runoff from roofs and other impervious surfaces and provide treatment through settling, filtration, and biological processes as stormwater ponds and percolates through planting soil media and into a subsurface gravel storage bed. Runoff volume is reduced by evapotranspiration and, if conditions are suitable, by infiltration into the underlying soils and groundwater. Bioretention facilities are effective at removing a variety of pollutants including trash, sediment, metals, nutrients, bacteria and hydrocarbons. Bioretention areas are usually designed to allow shallow ponding, with an overflow outlet to prevent flooding during heavy storms. The overflow can be directed to a storm drain system or to another BMP.

Two general types of bioretention facilities are allowable in the Permit including infiltrating bioretention and flow-through planters. Flow-through planters are used in locations not suitable for infiltration and include impermeable liners and an underdrain pipe to collect the treated water and discharge it to the municipal storm drain or other appropriate location.



Roadside bioretention. Source: sitephocus.com

### ADVANTAGES

- Protects and improves water quality by removing pollutants from stormwater runoff.
- Reduces surface runoff volumes and attenuates peak flows.
- Wide range of scales and site applicability.
- Attractive and relatively easy and inexpensive to install and maintain.
- Improves air quality and reduces heat island effects.
- Increases groundwater recharge.
- Creates habitat and increases biodiversity.

### LIMITATIONS

- Infiltration of stormwater can negatively impact structural foundations and increase other geological hazards. Locations shall be approved by a licensed Geotechnical Engineer.
- High groundwater can slow infiltration rates or even seep into bioretention cells and discharge as surface water. An average 10 ft. separation, and a minimum of 5 ft., between the bottom of the BMP and groundwater is recommended.
- Contaminants in soil and groundwater can be mobilized by infiltrating water.
- Existing infrastructure such as underground utilities and drainage infrastructure may constrain bioretention design.
- Vegetation requires maintenance and can look overgrown or weedy; seasonally it may appear dead.

### KEY DESIGN FEATURES

The design of bioretention facilities involves many considerations and planning activities should be started at the earliest possible stage of a project. It is critical that the facilities achieve the required performance standards while also protecting public health and safety, infrastructure and property. Bioretention design should begin during the site assessment and layout phase when determining building and parking locations and footprints and before the



# BIORETENTION

## Fact Sheet TR-1

site grading plan is prepared. For infiltration type planters, consult a licensed geotechnical engineer about site suitability.

The key design features and considerations for bioretention facilities include the following:

1. **Topography:** In appropriate conditions and with careful design, bioretention facilities can be located on slopes by incorporating check dams, terracing, or other methods to pond the water. Infiltration on slopes can create, or increase, the potential for downgradient seepage, landslides, and other geotechnical hazards. Infiltration is generally not recommended on slopes exceeding 10 percent.
  2. **Adjacent structures:** Where bioretention facilities are located next to structures such as curb and gutter, sidewalks, buildings, additional structural support may be required between the adjacent road or parking surface and bioretention soil media. Vertical cutoff walls or impervious liners should be considered to keep stormwater from migrating into structural fill or road base materials. In expansive (C, D) soils, locate stormwater planters far enough from structures to avoid damage to foundations (as determined by a structural or geotechnical engineer). 10 feet is a typical rule-of-thumb.
- Subsurface utilities should not be located within the bioretention facility and utility trenches should be isolated from the infiltrating areas to prevent the formation of preferential flow paths along trenches, migration of backfill materials, and flooding of utility vaults.
3. **Inlet design:** Inlets can include a variety of structures and configurations including curb cuts, open channels, and pipes. The design must provide the width and geometry needed to direct flows into the facility and its elevation must provide adequate hydraulic head for filtration and storage volume. To prevent stormwater runoff from eroding the soil surface as it enters the facility, a concrete splash pad or rock energy dissipater (3"-5" -size rounded rock, 6" depth) should be placed at the inlets.
  4. **Overflow:** Provisions to bypass flows that exceed the design ponding depth must be included in bioretention designs. Overflow systems should be located near the entrance of the bioretention facility to prevent scouring of the system and mobilization of the mulch layer. Overflow provisions shall not impact structures. Overflow structures may consist of a raised overflow structure connected via pipe to an approved discharge point, or a surface conveyance route (e.g., curb cuts, open channel, or pipe). Overflow structures must be sized to convey peak flood flows, per Placer County SWMM requirements, and include provisions for clogging. Elevations must be set to provide storage of the required water quality volume.
  5. **Surface ponding:** A minimum design depth of 6 inches is required for surface ponding to provide additional stormwater storage capacity, with a maximum depth of 12 inches. Ensure that the design does not allow ponding to persist for longer than 72 hours for vector control.



LID vegetated swale parking lot. Shellito Indoor Pool, Roseville. Photo: Greg Bates



# BIORETENTION

---

## Fact Sheet TR-1

6. Aggregate layer: A minimum 12-inch thick layer of ¾-inch washed aggregate below the planting media increases the facility's water storage capacity and promotes positive drainage through the underdrain system. A 3-inch layer of smaller aggregate (washed pea gravel) between the planting media and ¾-inch aggregate layer can omit the need for filter fabric, which is known to cause clogging.
7. Bioretention soil media: A minimum 18-inch thick mixture of 60-70 percent sand meeting the specifications of the American Society for Testing and Materials (ASTM) C33 and 30-40 percent compost may be used to provide filtration of runoff while supporting healthy plant growth. It may be possible in some cases to use native soil or to amend the native soil so that it is suitable. Use of native soil will depend on the evaluation of the criteria in "Section 3 - Site Assessment" as well as consideration of structural needs and may require evaluation by a licensed Geotechnical Engineer.
8. Mulch: If the area will be mulched, initial excavation depth must anticipate the total combined media depth, to avoid having to reduce soil depth during construction to accommodate mulch at final grades. If mulch is used as a top dressing avoid wood chips or other material that will float and potentially clog overflow structures. Mulch should not be installed just before or during the rainy season.
9. Underdrain: An underdrain system should be included with the discharge elevation at the top of the aggregate layer to convey runoff not infiltrated into the native soil to the stormwater system or other appropriate discharge point. The underdrain may be eliminated in areas of high groundwater, rapidly infiltrating soils or where connection of the underdrain to a surface discharge point or to a subsurface storm drain are infeasible. The perforations in the underdrain must be directed down or else water flowing through the planting media into the gravel layer will immediately be collected and discharged through the underdrain. Maintenance access and cleanout ports should be provided so that underdrain system can be routinely inspected and cleaned as needed.
10. Liners: Facilities with documented high concentrations of pollutants in underlying soil or groundwater, facilities located where infiltration could contribute to a geotechnical hazard, and facilities located on elevated plazas or other structures may incorporate an impervious liner and may locate the underdrain discharge at the bottom of the subsurface aggregate layer.
11. Plants: A list of native plant species for the Sacramento Valley is provided in the table below. Use a variety of trees, shrubs and herbaceous plant materials. Native grass meadows are especially effective at controlling and treating storm water over a large area. Choose moisture-tolerant plants for the bottom of a bioretention swale or basin. Choose plants that can tolerate both fluctuating water conditions and drought conditions for the side edges. Guidance on planting and general landscape design is provided in the Placer County Landscape Design Guidelines (Placer County Planning Services Division, 2013).
12. Pre-treatment: Runoff from industrial sites or locations where spills may occur or areas with excessive erosion or sediment sources should be pre-treated to address pollutants of concern prior to discharging into bioretention systems.
13. Underlying soils: Soils beneath the facility must be protected from compaction during construction activities. If soils have been compacted previously they should be ripped as deeply as necessary to loosen the soils and re-establish natural infiltration rates.



# BIORETENTION

## Fact Sheet TR-1

Sacramento Valley Native Plant List. Provided by the California Native Plant Society, Sacramento Valley Chapter, July 2015.

Botanic name	Common name	Height	Dry	Med Water	Wet	Full Sun	Part Shade	Shade	Deciduous/ Evergreen
ANNUAL PLANTS									
<i>Collinsia heterophylla</i>	Chinese Houses	1-2'		X			X		D
<i>Eschscholzia californica</i>	California Poppy	1-1.5'	X	X		X			D
<i>Gilia capitata</i>	Globe gilia	0.5-1'	X	X		X	X		D
GRASSES & GRASS-LIKE PLANTS									
<i>Bouteloua gracilis</i>	Blue gramma grass	1.5-2'	X			X			D
<i>Deschampsia caespitosa</i>	Tufted hair grass	1-2'		X	X		X		E
<i>Elymus glaucus</i>	Blue wildrye	1'	X	X		X			E
<i>Elymus triticoides</i>	Creeping wildrye	1-3'	X	X		X	X		D
<i>Festuca californica</i>	Serpentine blue California fescue	2-3'	X	X		X	X		E
<i>Festuca idahoensis</i>	Blue Idaho fescue	1'	X	X		X	X		E
<i>Festuca idahoensis</i>	'Siskiyou Blue'	2'		X		X	X		E
<i>Leymus condensatus</i>	'Canyon Prince'	4'	X	X		X	X		E
<i>Leymus triticoides</i>	( <i>Elymus triticoides</i> )	1.5-3'	X	X		X	X		E
<i>Melica californica</i>	Creeping wild rye	1-3'	X			X	X		D
<i>Muhlenbergia rigens</i>	California melic	5'	X	X		X	X		E
<i>Sporobolus airoides</i>	Deer grass	2'		X	X	X	X		D
<i>Stipa cernua</i>	Alkali sacaton	2'	X			X	X		D
<i>Stipa lepida</i>	Nodding needlegrass	2-3"	X			X	X		D
<i>Stipa pulchra</i>	Foothill needlegrass	2'	X				X		D
<i>Carex barbara</i>	Purple needlegrass	1-3'		X	X	X	X	X	E
<i>Carex pansa</i>	Santa Barbara sedge	0.5'	X			X	X		E
<i>Carex praegracilis</i>	California meadow sedge	1-2'	X	X		X	X		E
<i>Juncus balticus</i>	Clustered field sedge	1-4'		X		X	X		E
<i>Juncus effusus</i>	Baltic rush or wire rush	1.5-2'		X	X		X		E
<i>Juncus effusus var. brunneus</i>	Common rush	3-4'		X	X	X	X		E
<i>Juncus effusus var. pacificus</i>	Common rush	2-3'		X		X	X		E
<i>Juncus patens</i>	California gray rush	1.5-2.5'	X	X		X	X		E
<i>Juncus patens</i>	'Carman's Gray'	1-2'		X	X	X	X		E
<i>Scirpus robustus</i>	Carman's California gray rush	5-15'		X	X	X	X		E
<i>Xerophyllum tenax</i>	Alkali bull rush	2-4'		X		X			D
	Bear grass								
PERENNIAL PLANTS									
<i>Achillea millefolium</i>	Common Yarrow	1-3'	X	X		X	X		E
<i>Achillea millefolium</i>	'Island Pink'	2'	X	X			X		
<i>Acmispon glaber</i>	(syn. <i>Lotus scoparius</i> )	3'	X			X			E
<i>Aquilegia exima</i>	Deerweed	2'	X	X			X	X	D
<i>Aquilegia formosa</i>	Serpentine columbine	1.5-3'		X	X		X	X	D
<i>Artemisia douglasiana</i>	Western columbine	3-5'	X	X	X	X	X		E
<i>Asarum caudatum</i>	California mugwort	1'		X	X		X	X	E
<i>Asclepias cordifolia</i>	Wild ginger	1-3'	X	X		X	X		D
<i>Asclepias fascicularis</i>	Purple Milkweed	2-3'		X		X	X		D
	Narrowleaf milkweed								



# BIORETENTION

## Fact Sheet TR-1

Sacramento Valley Native Plant List. Provided by the California Native Plant Society, Sacramento Valley Chapter, July 2015.

Botanic name	Common name	PERENNIAL PLANTS CONT.							Shade	Deciduous/ Evergreen
<i>Asclepias speciosa</i>	Showy milkweed	3-6'		X				X		D
<i>Carex tumulicola</i>	Foothill Sedge	1.5'	X					X	X	E
<i>Dudleya cymosa</i>	Dudleya, Liveforever	3-6"		X				X	X	E
<i>Epilobium canum</i>	California fuchsia	1-1.5'	X							D
<i>Epilobium canum</i> 'Carman's Grey'	Carman's grey California fuchsia	2'	X					X		D
<i>Epilobium canum</i> 'Catalina'	Tall California fuchsia	1.5-3'	X					X	X	D
<i>Epilobium septentrionalis</i> 'Select	Select Mattole California fuchsia	0.25-0.5'						X	X	D
<i>Equisetum scirpoides</i>	Dwarf scouring rush	0.5'					X	X		E
<i>Erigeron glaucus</i> 'Wayne Roderick'	Seaside Daisy	0.5'					X	X	X	E
<i>Erigeron karvinskianus</i>	Mexican daisy, Santa Barbara daisy	1-1.5'					X	X		E
<i>Eriodictyon californicum</i>	Yerba Santa	3-6'	X				X	X		E
<i>Eriogonum gracile</i>	Wild buckwheat/ Slender	14-16"	X				X	X	X	D
<i>Eriogonum grande var rubescens</i>	Red-Flowered buckwheat	1-3'	X					X		E
<i>Eriogonum umbellatum var. polyanthum</i>	Sulfur buckwheat	0.5-1'	X					X		E
<i>Eriogonum ursinum</i>	Bear Valley buckwheat	0.25-1'	X			X		X		E
<i>Eriophyllum lanatum</i>	Woolly sunflower	1-2'	X					X	X	E
<i>Fragaria vesca</i>	Wild strawberry	4-6"				X		X	E	E
<i>Grindelia stricta venulosa</i>	Coastal gum plant	1-2'	X					X		E
<i>Helenium bigelovii</i>	Bigelow's sneezeweed	2-3'						X		D
<i>Heuchera</i> 'Canyon Quartet'	Canyon quartet alum root	1-2'	X					X	X	E
<i>Heuchera</i> 'Lillian's Pink'	Lillian's pink alum root	1-2'	X					X	X	E
<i>Heuchera maxima</i>	Island alum root	2-3'	X					X	X	E
<i>Heuchera micrantha</i>	Crevice alum root	1-2'	X					X	X	E
<i>Heuchera</i> 'Rosada'	Rosada alum root	2-3	X					X	X	E
<i>Hibiscus lasiocarpus</i>	Hibiscus	4-6'				X		X		D
<i>Iris douglasiana</i>	Douglas iris	1-2'	X					X		E
<i>Iris Pacific Coast Hybrid</i> 'Canyon	White Pacific Coast hybrid iris	1-2'	X					X		E
<i>Iris Pacific Coast Hybrid</i> 'Dorothea's	Burgundy Pacific Coast hybrid iris	1-2'	X					X		E
<i>Iris Pacific Coast Hybrid</i> 'Lavender'	Lavender Pacific Coast hybrid iris	1-2'	X					X	X	E
<i>Iris Pacific Coast Hybrid</i> 'Purple and	Purple and white Pacific Coast hybrid iris	1-2'	X					X	X	E
<i>Iris Pacific Coast Hybrid</i> 'Yellow'	Yellow Pacific Coast hybrid iris	1-2'	X					X	X	E
<i>Iris Pacific Coast Iris mixed</i>	Mixed colors Pacific Coast hybrid iris	1-2'	X					X	X	E
<i>Lilium pardalinum</i>	Leopard lily	3-8'						X		D
<i>Linum lewisii</i>	Blue Flax	2-3'	X					X	X	D
<i>Lupinus polyphyllus</i>	Streamside lupine	1-3'					X	X		D
<i>Mentzelia laevicaulis</i>	Blazing star	2-3'	X					X		D
<i>Mimulus aurantiacus</i>	Sticky monkeyflower	3-5'	X					X	X	E
<i>Mimulus aurantiacus</i> 'Verity',	Bush monkeyflower	1-4'					X	X	X	E
<i>Mimulus cardinalis</i>	Scarlet Monkeyflower	1 1/2-3'					X	X	X	D
<i>Monardella odoratissima</i>	Mountain pennyroyal, coyote mint	0.3-2'	X					X		E



# BIORETENTION

## Fact Sheet TR-1

Sacramento Valley Native Plant List. Provided by the California Native Plant Society, Sacramento Valley Chapter, July 2015.

Botanic name	Common name	Height	Dry	Med Water	Wet	Full Sun	Part Shade	Shade	Deciduous/ Evergreen
PERENNIAL PLANTS CONT.									
<i>Penstemon azureus</i>	Azure penstemon	0.5-1.5'	X	X		X	X		D
<i>Penstemon heterophyllus</i>	Foothill penstemon	1-3'	X	X		X	X		E
<i>Penstemon heterophyllus</i> 'Margarita BOP'	Margarita BOP foothill penstemon	1.5-2'	X	X		X	X		E
<i>Penstemon spectabilis</i>	Showy penstemon	3-4.5'	X			X	X		E
<i>Phacelia imbricate</i>	Rock Phacelia, Pine Bee Flower	1-2'	X			X			D
<i>Phyla nodiflora</i>	Lippia	2-4"		X			X		D
<i>Potentilla glandulosa</i>	Sticky cinquefoil	1-2'		X		X	X		D
<i>Rubus leucodermis</i>	Western raspberry	3-4'		X			X		D
<i>Rubus parviflorus</i>	Thimbleberry	3-6'		X			X	X	D
<i>Salvia</i> 'Bee's Bliss'	Bee's bliss Sonoma sage	1-1.5'	X	X		X	X		E
<i>Salvia sonomensis</i>	Creeping Sage	1'	X			X	X		E
<i>Scrophularia californica</i>	California figwort, Bee Plant	4-6'		X			X		D
<i>Sedum obtusatum</i>	Sierra sedum	0.5'	X	X			X		E
<i>Sisyrinchium bellum</i>	Blue-eyed grass	1'		X	X	X			D
<i>Solidago californica</i>	California goldenrod	1'		X	X	X	X		D
<i>Solidago Californica</i> 'Cascade Creek'	Cascade Creek California goldenrod	3-4'	X			X	X		D
<i>Symphotrichum chilense</i>	California aster	2'	X	X	X	X	X		D
<i>Whipplea modesta</i>	Western whippiea	0.25-0.75'		X			X		D
<i>Woodwardia fimbriata</i>	Western chain fern	4-6'		X			X	X	E
<i>Wyethia angustifolia</i>	Narrowleaf mule's ears	20"	X	X		X	X		D
<i>Wyethia mollis</i>	Mountain mule's ears	0.5-2'	X	X			X		D
SHRUBS									
<i>Arctostaphylos bakeri</i> 'Louis	Pink manzanita	5-6'	X	X		X	X		E
<i>Arctostaphylos densiflora</i> 'Howard	McMinn's manzanita	5-8'	X	X		X	X		E
<i>Arctostaphylos densiflora</i> 'Sentinel'	Sentinel manzanita	6-8'	X	X		X	X		E
<i>Arctostaphylos edmundsii</i> 'Carmel Sur'	Carmel Sur manzanita	1-1.5'	X	X		X	X		E
<i>Arctostaphylos</i> 'Emerald Carpet'	Emerald carpet manzanita	1'	X	X		X	X		E
<i>Arctostaphylos glauca</i>	Bigberry manzanita	15'	X	X		X	X		E
<i>Arctostaphylos hookeri</i> 'Wayside'	Wayside Monterey manzanita	4'	X	X		X	X		E
<i>Arctostaphylos</i> 'John Dourley'	John Dourley manzanita	2-4'	X	X		X	X		E
<i>Arctostaphylos manzanita</i> 'Dr. Hurd'	Dr. Hurd's manzanita	10-12'	X	X		X	X		E
<i>Arctostaphylos uva-ursi</i> 'Green	Green Supreme bearberry	1'	X	X		X	X		E
<i>Arctostaphylos uva-ursi</i> 'Massachusetts'	Massachusetts bearberry	1'	X	X		X	X		E
<i>Arctostaphylos uva-ursi</i> 'Pacific Mist'	Pacific Mist bearberry	2-3'	X	X		X	X		E
<i>Arctostaphylos uva-ursi</i> 'Point Reyes'	Pt. Reyes bearberry	1'	X	X		X	X		E
<i>Arctostaphylos uva-ursi</i> 'Radiant'	Radiant bearberry	1'	X	X		X	X		E
<i>Arctostaphylos viscida</i>	Whiteleaf manzanita	4-12'	X			X			E
<i>Atriplex lentiformis</i>	Quail bush	3-10'	X			X			D
<i>Baccharis pilularis</i>	Coyote brush	4-8'	X			X			E
<i>Baccharis pilularis</i> 'Pigeon Point'	Pigeon Point coyote brush	1.5-3'	X	X		X			E



# BIORETENTION

## Fact Sheet TR-1

Sacramento Valley Native Plant List. Provided by the California Native Plant Society, Sacramento Valley Chapter, July 2015.

<i>Botanic name</i>	Common name	SHRUBS CONT.							Part Shade	Shade	Deciduous/ Evergreen
<i>Calycanthus occidentalis</i>	Western Spicebush	8-15'		X	X			X	X		D
<i>Carpenteria californica</i>	California bush anemone	4-8'		X				X	X		E
<i>Carpenteria californica</i> 'Elizabeth'	Dr. McClintock's bush anemone	3-5'		X	X			X	X		E
<i>Ceanothus</i> 'Blue Jeans'	Blue jeans wild lilac	7-9		X			X				E
<i>Ceanothus</i> 'Centennial'	Centennial wild lilac	2'		X			X				E
<i>Ceanothus</i> 'Concha'	Concha wild lilac	6-7'		X			X				E
<i>Ceanothus cuneatus</i>	Buck brush	5-10'		X			X				E
<i>Ceanothus</i> 'Dark Star'	Dark Star wild lilac	5-6'		X			X				E
<i>Ceanothus gloriosus</i>	Pt. Reyes wild lilac	1-1.5'		X			X				E
<i>Ceanothus gloriosus</i> 'Anchor Bay'	Anchor Bay wild lilac	1-1.5'		X			X				E
<i>Ceanothus gloriosus</i> var. <i>exaltatus</i>	Emily Brown's hallelujah bush	1-2		X			X		X		E
<i>Ceanothus griseus</i> 'Louis Edmunds'	Louis Edmunds wild lilac	5-6'		X			X				E
<i>Ceanothus griseus</i> var. <i>horizon</i> . 'Yankee Point'	Yankee Point wild lilac	2-3'		X			X				E
<i>Ceanothus griseus</i> var. <i>horizontalis</i>	Carmel creeper wild lilac	1.5-2.5'		X			X				E
<i>Ceanothus integrimus</i>	Deerbrush wild lilac	3-7'		X			X		X		D
<i>Ceanothus</i> 'Joan Mirov'	Joan Mirov wild lilac	3-6'		X			X		X		E
<i>Ceanothus</i> 'Joyce Coulter'	Joyce Coulter wild lilac	2-5'		X			X				E
<i>Ceanothus</i> 'Julia Phelps'	Julia Phelps wild lilac	5-7'		X			X				E
<i>Ceanothus maritimus</i> 'Point Sierra'	Pt. Sierra wild lilac	2-3'		X			X				E
<i>Ceanothus maritimus</i> 'Valley Violet'	Valley Violet wild lilac	2-3		X			X		X		E
<i>Ceanothus</i> 'Owlswood Blue'	Owlswood blue island wild lilac	10'		X			X		X		E
<i>Ceanothus prostratus</i>	Squaw carpet	1'		X			X		X		E
<i>Ceanothus</i> 'Ray Hartman'	Ray Hartman wild lilac	12-20'		X			X				E
<i>Ceanothus thyrsifolius</i> repens 'Louis Edmunds'	Louis Edmunds prostrate blue blossom	0.5-2'		X			X		X		E
<i>Ceanothus thyrsiflorus</i>	Blue blossom	5-15'		X			X				E
<i>Ceanothus thyrsiflorus</i> 'Skylark'	Skylark compact blue blossom	3-6'		X			X				E
<i>Ceanothus thyrsiflorus</i> 'Snow Flurry'	Snow flurry wild lilac	6-10'		X			X				E
<i>Cercocarpus betuloides</i>	Mountain Mahogany, Birchleaf Mountain Mahogany	10-15'		X			X		X		E
<i>Cercocarpus betuloides</i> var. <i>blanchene</i>	Island mountain mahogany	10-12'		X			X				E
<i>Cornus stolonifera</i> (syn. <i>C. sericea</i> )	redtwig or western dogwood	7-9'					X		X		D
<i>Cornus stolonifera</i> 'Peter's Choice'	redtwig or western dogwood	7-9'					X		X		D
<i>Eriogonum fasciculatum</i> (E. f. var. <i>foliosum</i> )	California buckwheat	1-3		X			X				E
<i>Eriogonum giganteum</i>	St. Catherine's lace	3-4'		X			X				E
<i>Frangula tomentella</i>	Hoary coffeeberry	6-10'		X			X		X		E
<i>Fremontodendron</i> 'Ken Taylor'	Ken Taylor flannel bush	4-6'		X			X				E
<i>Fremontodendron</i> 'Pacific Sunset'	Pacific Sunset flannel bush	12-15'		X			X				E
<i>Fremontodendron</i> 'San Gabriel'	San Gabriel flannel bush	15-20'		X			X				E
<i>Garrya elliptica</i> 'Evie'	Evie coast silktassel	8-15'		X			X				E
<i>Garrya elliptica</i> 'James Roof'	James Roof coast silktassel	8-15'		X			X				E
<i>Heteromeles arbutifolia</i>	Toyon	8-15'		X			X		X		E



# BIORETENTION

## Fact Sheet TR-1

Sacramento Valley Native Plant List. Provided by the California Native Plant Society, Sacramento Valley Chapter, July 2015.

Botanic name	Common name	Height	Dry	Med Water	Wet	Full Sun	Part Shade	Shade	Deciduous/ Evergreen
<i>Heteromeles arbutifolia</i> 'Davis Gold'	Yellow berry toyon	8-15'	X			X	X		E
<i>Isomeris arborea</i>	Bladderpod	3-4'	X			X	X		E
<i>Lupinus arboreus</i>	Silver Bush lupine	3-5'	X			X	X		E
<i>Lupinus arboreus</i>	Yellow flowered bush lupine	4-5'	X	X		X			E
<i>Mahonia aquifolium</i>	Oregon grape	3-6'	X	X		X	X		E
<i>Mahonia aquifolium compacta</i>	Compact Oregon grape	2-4'	X	X		X	X	X	E
<i>Philadelphus lewisii</i> 'Goose Creek'	Double flowered wild philadelphus	4-8'		X	X		X		D
<i>Prunus andersonii</i>	Desert peach	3-6'	X			X			D
<i>Rhamnus californica</i>	Coffeetree	3-15'	X			X	X		E
<i>Rhamnus californica</i> 'Mound San	Mound San Bruno coffeetree	4-6'	X			X	X	X	E
<i>Rhamnus californica</i> 'Eve Case'	Eve Case coffeetree	4-8'	X			X	X		E
<i>Rhamnus californica</i> ssp. <i>tomentella</i>	Coffeetree	6-15'	X	X		X	X		E
<i>Rhamnus ilicifolia</i>	Holly-leaf Redberry	5-15'	X	X		X	X		E
<i>Rhamnus purshiana</i>	Cascara sagrada	10-15'	X	X		X	X		E
<i>Rhus integrifolia</i>	Lemonade berry	3-10'	X			X			E
<i>Rhus ovata</i>	Sugar bush	4-10'	X			X			E
<i>Ribes aureum</i> var. <i>aureum</i>	Western golden currant (mountain)	3-6'	X	X	X	X	X		D
<i>Ribes aureum</i> var. <i>gracillimum</i>	Golden currant	3-6'	X	X	X	X	X		D
<i>Ribes californicum</i>	Hillside gooseberry	3'		X			X		D
<i>Ribes malvaceum</i>	Chaparral flowering currant	3-4'	X				X		D
<i>Ribes sanguineum</i>	Winter currant	3-6'	X	X		X	X		D
<i>Ribes sanguineum</i> var. <i>glutinosum</i>	Flowering currant	3-5'	X	X		X	X		D
<i>Ribes sanguineum</i> var. <i>glutinosum</i>	Claremont flowering currant	3-6'	X	X			X	X	D
<i>Ribes sanguineum</i> 'White Icicle'	White icicle flowering currant	6-8'	X	X			X	X	D
<i>Ribes speciosum</i>	Fuchsia flowering gooseberry	3-6'	X	X		X	X		D
<i>Ribes viburnifolium</i>	Evergreen currant	2-3'	X	X			X	X	E
<i>Rosa californica</i>	California wild rose	3'		X			X	X	D
<i>Salvia apiana</i>	White sage	3-5'	X	X		X			E
<i>Salvia clevelandii</i>	Cleveland's sage	3-5'	X			X			E
<i>Salvia clevelandii</i> 'Allen Chickering'	Allen Chickering Cleveland's sage	3-5'	X			X			E
<i>Salvia clevelandii</i> 'Whirly Blue'	Whirly blue Cleveland's sage	3-5'	X			X	X		E
<i>Salvia clevelandii</i> 'Winnifred Gilman'	Winnifred Gilman Cleveland's sage	3'	X			X			E
<i>Salvia leucophylla</i>	Purple sage	3-7'	X			X			E
<i>Salvia mellifera</i>	Black sage	3-6'	X			X	X		E
<i>Salvia mellifera</i> 'Terra Seca'	Terra seca black sage	2'	X			X	X		E
<i>Sambucus caerulea</i>	Blue elderberry	6-9'		X		X	X		D
<i>Sambucus mexicana</i>	Mexican elderberry	6-12'	X	X		X	X		D
<i>Spiraea douglasii</i>	Western spiraea	4-5'	X	X		X			D
<i>Styrax redivivus</i> <i>officinalis</i>	Snow drop bush	5-7'	X	X			X		D
<i>Symphoricarpos albus</i>	Snowberry	6-12'		X	X		X	X	D
<i>Trichostema lanatum</i>	Woolly bluecurls	3-4'	X			X			E



# BIORETENTION

## Fact Sheet TR-1

Sacramento Valley Native Plant List. Provided by the California Native Plant Society, Sacramento Valley Chapter, July 2015.

Botanic name	Common name	SHRUBS CONT.	Height	Dry	Med Water	Wet	Full Sun	Part Shade	Shade	Deciduous/ Evergreen
<i>Viguera parishii</i>	Desert golden eye	SHRUBS/TREES	1-3'	X			X	X		D
<i>Cephalanthus occidentalis</i>	Buttonbush (buttonwillow)		3-15'		X	X	X	X		D
<i>Cercis occidentalis</i>	Western redbud		15-25'	X	X		X	X		D
<i>Myrica californica</i>	Pacific wax myrtle		10-30'		X		X			E
<i>Prunus lyonii</i> (P. ilicifolia ssp. lyonii)	Catalina cherry		15-20'	X	X		X			E
<i>Salix exigua</i> (Salix hindsiana)	Coyote willow		6-20'		X		X	X		D
<i>Salix laevigata</i>	Red willow		10-25'		X		X	X		D
<i>Salix lasiolepis</i>	Arroyo willow		10-20'		X		X			D
<i>Umbellularia californica</i>	California bay		6-50'		X			X		E
TREES										
<i>Acer circinatum</i>	Vine maple		5-35'		X	X	X	X		D
<i>Acer macrophyllum</i>	Big-leaf maple		30-50'		X	X	X	X		D
<i>Aesculus californica</i>	California buckeye		10-30'	X	X		X	X		D
<i>Arbutus menziesii</i>	Madrone		20-50'	X	X		X	X		E
<i>Calocedrus deodurens</i>	Incense cedar		50-90'	X	X		X			E
<i>Cornus nuttallii</i>	mountain dogwood		20-50'		X	X		X		D
<i>Cupressus sargentii</i>	Sargent cypress		10-40'	X				X		E
<i>Fraxinus latifolia</i>	Oregon ash		30-40'		X	X	X	X		D
<i>Juglans californica</i> var. hindsii	Northern California black walnut		30-60'	X	X		X			D
<i>Pinus attenuata</i>	Knobcone pine		20-40"	X	X					E
<i>Pinus jeffreyi</i>	Jeffrey pine		60-120'	X						E
<i>Pinus lambertiana</i>	Sugar		60-200'	X						E
<i>Pinus ponderosa</i>	Ponderosa pine		80-100'	X						E
<i>Pinus sabiniana</i>	Foothill pine		40-80'	X						E
<i>Platanus racemosa</i>	California sycamore		40-60'		X		X			D
<i>Quercus agrifolia</i>	Coast live oak		20-70'	X			X			E
<i>Quercus berberidifolia</i>	Scrub oak		6-15'	X			X			E
<i>Quercus douglasii</i>	Blue oak		30-50'	X	X		X	X		D
<i>Quercus durata</i>	Leather Oak		10'	X			X			E
<i>Quercus kelloggii</i>	Black oak		30-80'	X			X			D
<i>Quercus lobata</i>	Valley oak		50-70'	X			X			D
<i>Quercus wislizenii</i>	Interior live oak		30-80'	X	X		X			E
VINES										
<i>Aristolochia californica</i>	California pipe vine		10-40'	X	X		X	X		D
<i>Clematis ligusticifolia</i>	Western clematis		4-30'		X	X	X	X		D
<i>Clematis</i> sp.	Virgin's Bower		10-30'	X	X			X		D
<i>Lonicera hispidula</i>	Pink Honeysuckle		8-12'	x	x			x		D
<i>Vitis californica</i>	California wild grape		10-20'	X	X			X		D



# BIORETENTION

---

## Fact Sheet TR-1

### SIZING DESIGN GOALS AND REQUIREMENTS

The Post-Construction Storm Water Quality Plan (SWQP) Form 3-5 should be used to calculate the Water Quality Volume (WQV) of bioretention areas for Regulated Projects. This value is then used to iteratively determine the necessary bioretention area sizing to capture the remainder of the 85<sup>th</sup> percentile, 24-hour design storm not retained by Site Design Measures. The equation for determining the WQV is as follows:

$$\text{WQV} = \text{Unit WQV} * A_{\text{imp}} * R_c$$

Where:

WQV	= Water Quality Volume (ft <sup>3</sup> );
Unit WQV	= design storm based on elevation and drawdown time
$A_{\text{imp}}$	= impervious drainage area untreated by Site Design Measures (ft <sup>2</sup> ); and
$R_c$	= Runoff Coefficient (default 0.9).

Sites with documented high concentrations of pollutants in underlying soil or groundwater, sites located where infiltration could contribute to a geotechnical hazard, and sites located on elevated plazas or other structures may incorporate an impervious liner and may locate the underdrain discharge at the bottom of the gravel layer to create a “Flow-Through Planter.” These Flow-Through Planters must be sized according to Water Quality Flow (WQF) using Form 3-5 and Form 3-7 of the SWQP. The equation for determining the WQF for Flow-Through Planters is as follows:

$$\text{WQF} = A_{\text{imp}} * P_F / 43,200$$

Where:

WQF	= Water Quality Flow (cfs);
$A_{\text{imp}}$	= impervious drainage area untreated by Site Design Measures (ft <sup>2</sup> ); and
$P_F$	= flow based design storm intensity (0.2 inch/hr).

### CONSTRUCTION PHASE CONSIDERATIONS

#### *Protection and Excavation*

Protecting bioretention areas during all phases of construction is a top priority. In project specifications, and during pre-bid and pre-construction meetings, communicate requirements and expectations to the contractor. From the start of construction, areas should be fenced to define limits and keep heavy equipment out. Erosion and sediment control measures should be placed so that construction sediment and wastes cannot enter the facility. Excavation activities should avoid compacting the facility base and sidewalls and should not take place during wet weather. Inlets should be blocked until construction sediment sources are removed and plants are sufficiently established to hold up to stormwater flows. Plant establishment times will depend on plant species. Storm water directed away from bioretention areas during plant establishment must be managed using temporary BMPs.

#### *Structures and Materials*

Structures such as curbs, inlets, checkdams, bypass and underdrain systems and containment walls are critical to facility function. During construction, verify that the elevations of these elements match the design drawings. For example, the raised overflow structures used in bioretention facilities may look like a plan error to contractors not



# BIORETENTION

## Fact Sheet TR-1

experienced with LID. Clearly communicating design objectives will help avoid uninformed field adjustments.

The bioretention soil mix and aggregate layers are also key components to achieving the desired performance. During pre-bid and pre-construction meetings, explain the characteristics and purpose of these materials to contractors and follow up by thoroughly reviewing construction material submittals.

### INSPECTION AND MAINTENANCE REQUIREMENTS

A maintenance plan shall be provided with the Final SWQP. The maintenance plan shall include recommended maintenance practices, state the parties responsible for maintenance and upkeep, specify the funding source for ongoing maintenance, with provisions for full replacement when necessary, and provide site specific inspection checklist.

At a minimum the following inspections and maintenance activities should be conducted on an annual basis or more frequently if necessary:

Maintenance Indicator	Required Maintenance Activity
Is litter, excess sediment or debris present in the upstream drainage or in the bioretention facility?	Remove litter, sediment/debris. Inspect the areas upstream of the bioretention facility to make sure the tributary area is properly stabilized.
Is standing water present in the facility for longer than 72 hours after a storm?	Remove any accumulated sediment and flush drainage system including underdrain. Remove and replace top few inches of soil. Remove and replace all soil, re-grade and re-plant.
Are dead plants, weeds present?	Remove dead vegetation and replace as necessary. Pull weeds and trim excess plant growth.
Is erosion occurring within the facility or drainage system?	Repair erosion and stabilize to prevent recurrence
Are holes or voids present in the facility?	Inspect underdrain and replace soil if needed.
Are unwanted rodents or other pests present?	Implement environmentally friendly pest control practices. Do not use pesticides or herbicides in the bioretention facility.

### REFERENCES

City of Salinas Department of Engineering and Transportation. 2014. Stormwater Standard Plans (SWSPs). Available online at: <http://www.ci.salinas.ca.us/services/engineering/engineering.cfm>

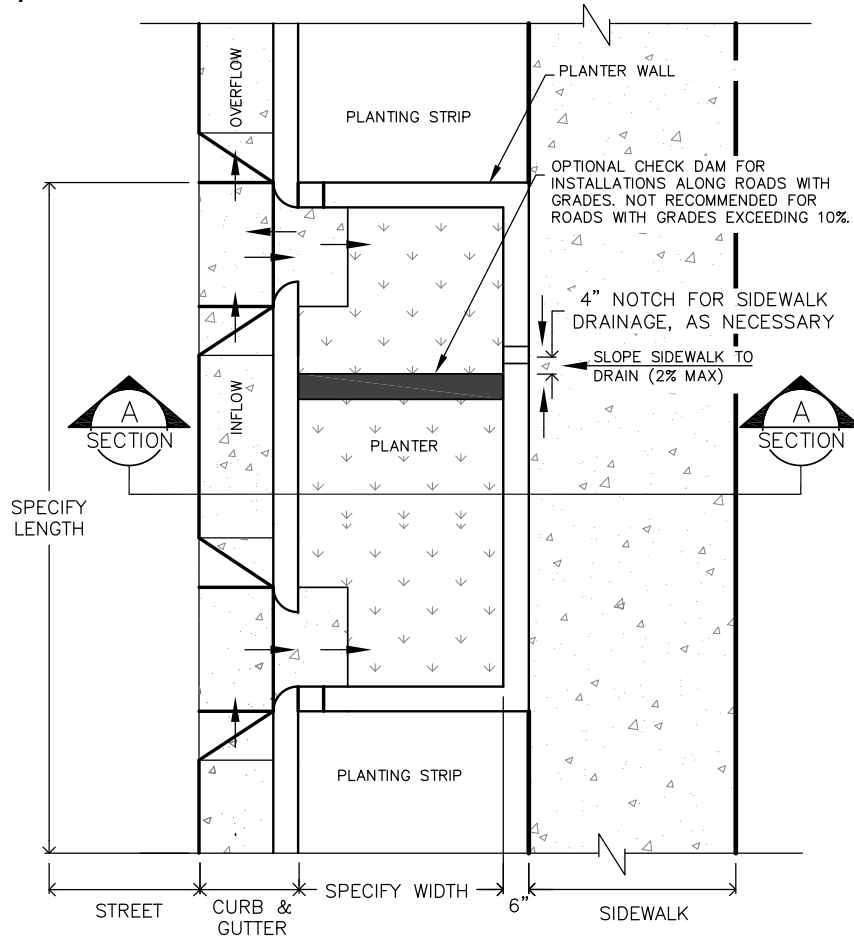
Placer County Planning Services Division. 2013. Placer County Landscape Design Guidelines. Available online at: <http://www.placer.ca.gov/~media/cdr/Planning/documents/DesignGuides/Landscape%20Design%20Guidelines.pdf>



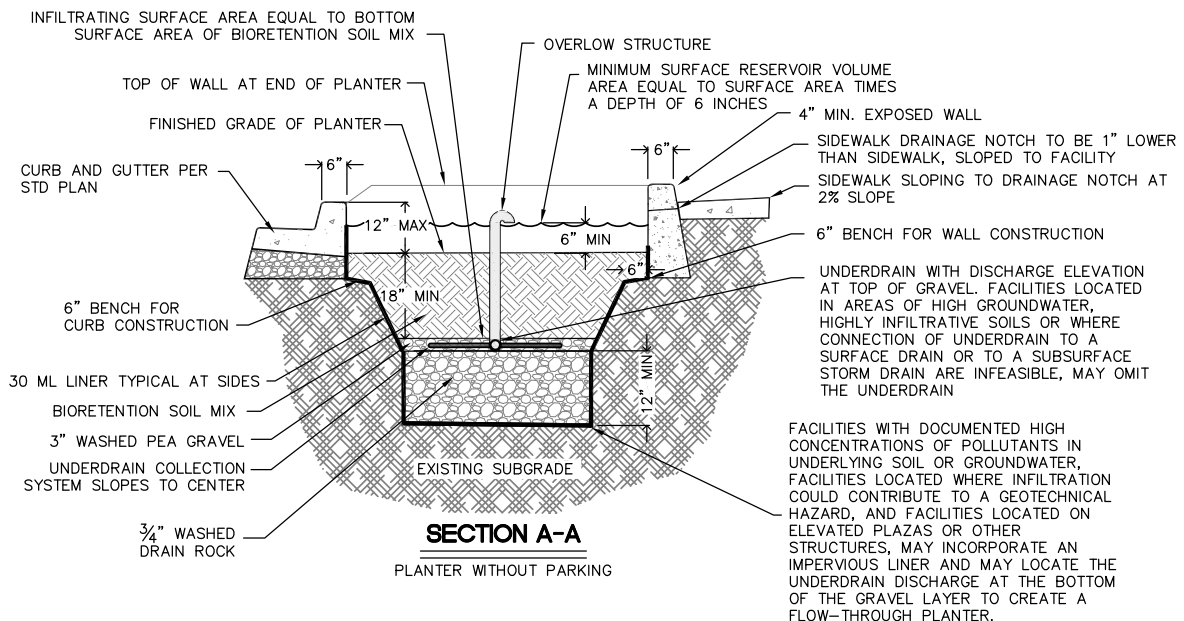
# BIORETENTION FACILITIES

## Fact Sheet TR-1

## DESIGN DETAILS



**PLAN VIEW**



**SECTION A-A**

PLANTER WITHOUT PARKING

## IN STREET BIORETENTION - WITHOUT PARKING

### Plan & Section Views

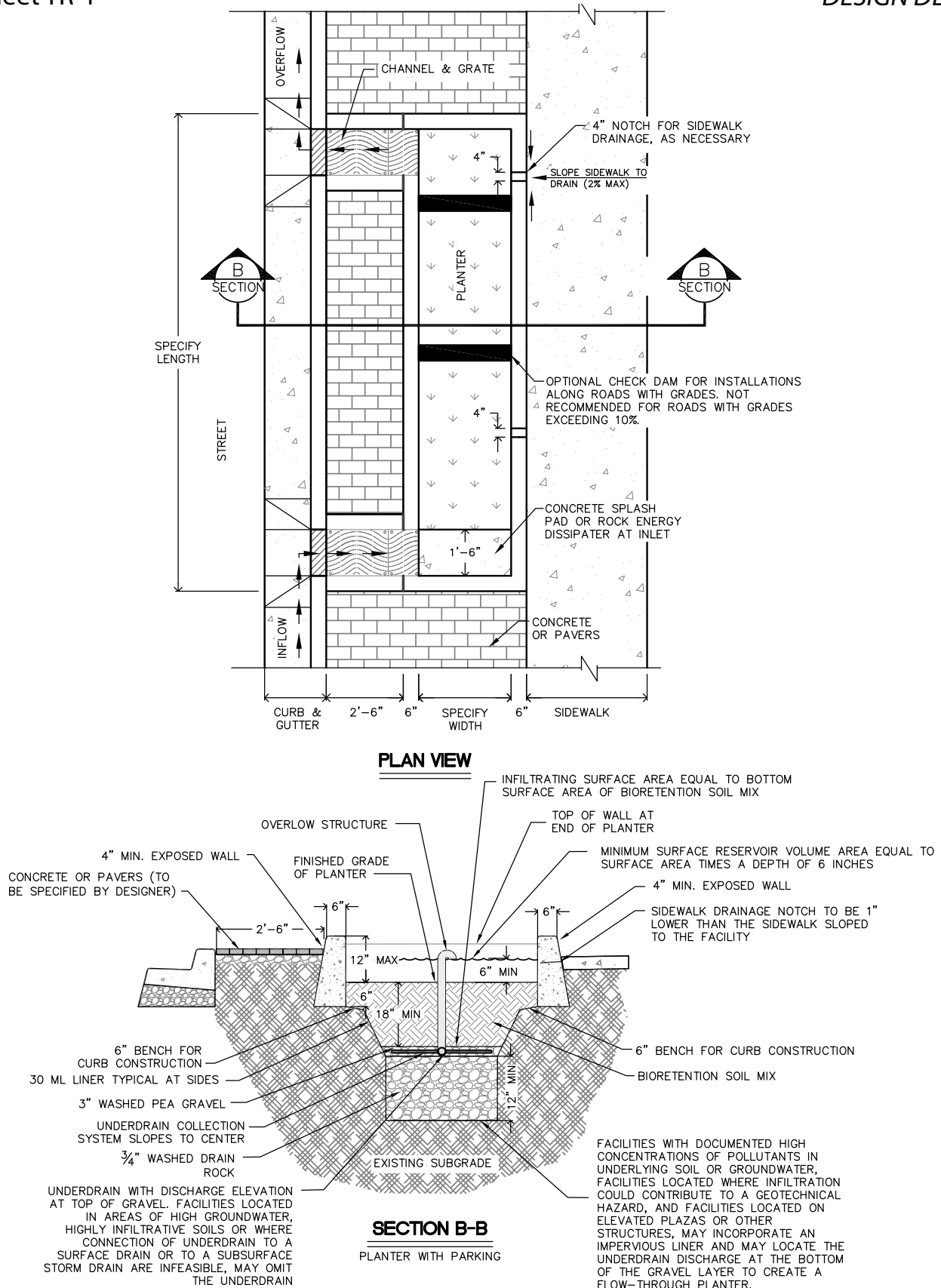
DRAWING NOT TO SCALE  
Source: Adapted from City of Salinas



# BIORETENTION FACILITIES

Fact Sheet TR-1

DESIGN DETAILS



## IN STREET BIORETENTION - WITH PARKING

### Plan and Section Views

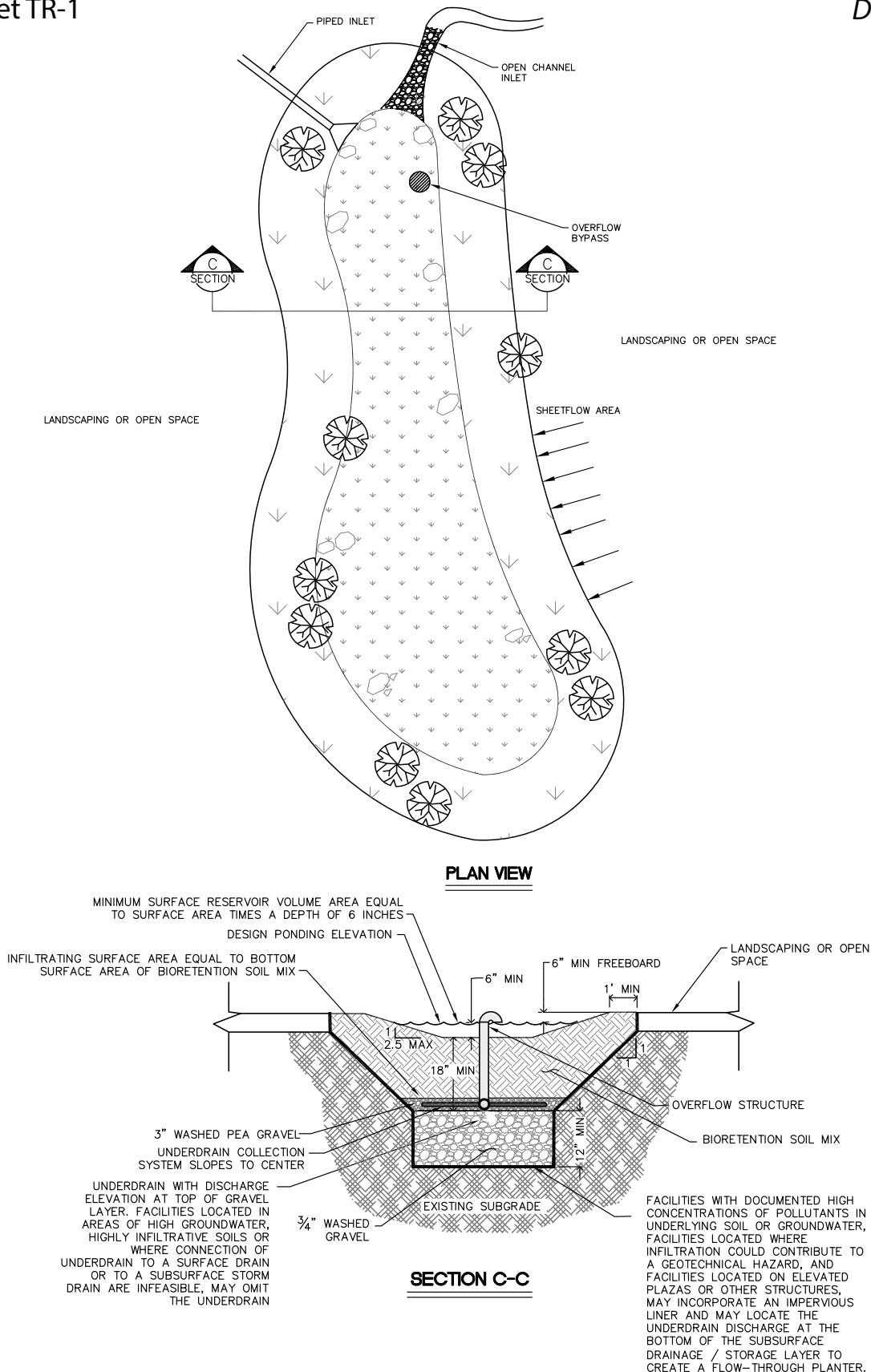
DRAWING NOT TO SCALE  
Source: Adapted from City of Salinas



# BIORETENTION FACILITIES

Fact Sheet TR-1

DESIGN DETAILS



## BIORETENTION IN LANDSCAPE OR OPEN SPACE AREAS

### Plan and Section Views

DRAWING NOT TO SCALE  
Source: Adapted from City of Salinas







# MEDIA FILTER

## Fact Sheet TR-2

### DESCRIPTION

Storm water media filters are typically two-chambered including a pretreatment settling basin and a filter consisting of sand, gravel, or other adsorptive filtering media. As storm water flows into the first chamber, large particles settle out, and then finer particles and other pollutants are removed as stormwater flows through the filtering media in the second chamber. There are a number of design variations including the Austin sand filter, Delaware sand filter, multi-chambered treatment train (MCTT), and manufactured storm water filters. Treated storm water is collected in an effluent chamber or underdrain, and subsequently discharged to a storm water conveyance system or other appropriate location.

Manufactured storm water filters are typically underground systems that utilize membranes of various materials or cartridges filled with different types of media to filter stormwater runoff. For cartridge systems, the media used can be inert, such as sand, or adsorptive, such as peat or manufactured media. The effectiveness of these systems depends on the type of membrane or media being implemented, the filter loading rate, and the characteristics of the influent storm water. For some systems, the water chemistry will also determine the effectiveness of the filter in removing dissolved constituents.



Photo Source: Portland BES

### ADVANTAGES

- Protects and improves water quality by removing pollutants from storm runoff.
- Customizable sizing (small footprint).
- Customizable filter media to target key site pollutants.
- May be located underground.
- Does not require irrigation.

### LIMITATIONS

- Minimal reduction in runoff volume in comparison to other systems that promote infiltration, evaporation, or evapotranspiration.
- Designs that maintain permanent standing water may create vector concerns
- Confined space training may be required for maintenance on vault systems.
- Failure to maintain media filter may result in clogging and system failure.
- Significant head loss through filters may limit use on flat sites.
- High installation and maintenance costs.

### KEY DESIGN FEATURES

Media filters may only be implemented for Regulated Projects that demonstrate use of bioretention facilities to be infeasible. Regulated Projects implementing media filters must meet the following requirements:

1. Projects creating or replacing an acre or less of impervious area, and located in a designated pedestrian-oriented commercial district (i.e., smart growth projects), and having at least 85% of the entire project site covered by permanent structures;
2. Facilities receiving runoff solely from existing (pre-project) impervious areas; and



# MEDIA FILTER

## Fact Sheet TR-2

3. Historic sites, structures or landscapes that cannot alter their original configuration in order to maintain their historic integrity.

The performance of any media filter is governed primarily by the following factors which should be carefully evaluated when designing the facility:

- Hydraulic Loading Rate – The application rate of untreated water to the surface of the filter media usually expressed as a flow rate per filter surface area (i.e. gpm/ft<sup>2</sup>);
- Filter Media Gradation – A finer media gradation reduces hydraulic conductivity and increases the capture efficiency for fine particulate pollutants. Finer media also has a greater surface area which increases sorption rates for chemically active media. A more homogenous media gradation increases voids volume in a media bed. Finer media is more susceptible to surface clogging.
- Residence Time - Residence time is a function of media gradation, hydraulic loading rate and the media bed depth and configuration. A longer residence time generally improves pollutant removal performance.
- Media Chemical Properties – Filter media can be inert (i.e. sand) or can be selected to target specific pollutants of concern (i.e. activated carbon for trace organics). Chemically active options may be organic, mineral or synthetic or a combination of types. Media should be selected with consideration of the type and load of pollutants requiring removal.
- Pretreatment – Integrate adequate pretreatment facilities into media filter designs to reduce sediment loading and maintenance frequency. The level of pretreatment required is dependent on the tributary drainage area, but typical pretreatment consists of a sedimentation chambers, hydrodynamic separator, vegetated buffer strips, and vegetated swales.
- Hydraulic Head – Different media filters types have varying hydraulic head requirements that must be considered during design. Certain media filter configurations may not be suitable for flat sites.

## SIZING DESIGN GOALS AND REQUIREMENTS

The Post-Construction Storm Water Quality Plan (SWQP) Form 3-5 should be used to calculate the Water Quality Flow (WQF) of media filters for Regulated Projects. This value is then used in Form 3-7 to iteratively determine the necessary media filter sizing to capture the remainder of the 85<sup>th</sup> percentile, 24-hour design storm not retained by Site Design Measures. The equation for determining the WQF for media filters is as follows:

$$WQF = A_{imp} * P_F / 43,200$$

Where:

- WQF = Water Quality Flow (cfs);
- A<sub>imp</sub> = impervious drainage area untreated by Site Design Measures (ft<sup>2</sup>); and
- P<sub>F</sub> = flow based design storm intensity (0.2 inch/hr).

## CONSTRUCTION PHASE CONSIDERATIONS

- Divert flow around the sand filter to protect it from sediment loads during construction. If sediment does enter the facility during construction, the sediment will require removal after the tributary area has been stabilized. Diverted flow must be managed using temporary BMPs.



# MEDIA FILTER

## Fact Sheet TR-2

- Where underdrains are used, ensure that the minimum slope of the pipe is 0.5 (1/2) percent.
- Ensure that the inverts of notches, orifices, or weirs dividing chambers correspond with design elevations to ensure proper function.
- The surface of bed filters should be completely level to promote uniform filtration.
- If precast concrete lids are used, provide lifting rings or threaded sockets to allow easy removal with standard lifting equipment.
- Once construction is complete, stabilize the entire tributary area to the media filter before allowing runoff to enter the unit.

## MAINTENANCE CONSIDERATIONS

Media filters may exhibit decreased effectiveness after a single year of operation, depending on the activities occurring in the drainage area and filter loading. They clog easily when subjected to high sediment loads, and sediment reducing pretreatment practices placed upstream of the filter should be maintained properly to reduce sediment loads into the filter.

Maintenance efforts will need to focus on basic housekeeping practices such as removal of sediment and debris accumulations to prevent clogs and/or ponds of standing water. To minimize the potential for clogging, frequent maintenance and inspection practices are required. Waste sand, gravel, membranes, or filter media must be disposed of properly and in accordance with all applicable laws.

Media filters can become a nuisance due to mosquito or midge breeding if not properly designed and maintained. Installations should dewater completely (recommended 96 hour or less residence time) to prevent creating mosquito and other vector habitats.

## AVAILABLE VENDOR PRODUCTS

The names of vendor products listed below are for informational purposes only. Their appearance here is not an endorsement of the products or manufacturers by Placer County.

- BayFilter™
- Fabco Filter Cartridges
- Jellyfish®
- Media Filtration System (MFS)
- Perk Filter™
- Puristorm™
- Up-Flo™
- StormFilter®
- VortFilter™



Photo Source: Contech®

## REFERENCES

California Department of Transportation (Caltrans). 2010. Treatment BMP Technology Report. CTSW-RT-09-239.06. Available online at: <http://www.dot.ca.gov/hq/env/stormwater/pdf/CTSW-RT-09-239-06.pdf>

California Stormwater Quality Association (CASQA). 2003. California Stormwater BMP Handbook – New Development and Redevelopment. BMP Fact Sheet TC-40: Media Filter and BMP Fact Sheet MP-40: Media Filter. Available online at: <https://www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook>



# MEDIA FILTER

---

## Fact Sheet TR-2

Low Impact Development Center, Inc. 2010. Low Impact Development Manual for Southern California: Technical Guidance and Site Planning Strategies. Available online at: <https://www.casqa.org/sites/default/files/downloads/socallid-manual-final-040910.pdf>

Sacramento County, et al. 2014. Stormwater Quality Design Manual for the Sacramento Region. Available online at: [http://www.beriverfriendly.net/docs/files/Master%20Stormwater%20Quality%20Manual%202014\\_FINAL\\_W%20APPEND\\_W%20COVER.pdf](http://www.beriverfriendly.net/docs/files/Master%20Stormwater%20Quality%20Manual%202014_FINAL_W%20APPEND_W%20COVER.pdf)



## **APPENDIX D – Oversized Exhibit SWQ-1**



# Environmental Noise Assessment

## Westbrook Parcel WB-41 Residential Development

Roseville, California

BAC Job # 2021-128

Prepared For:

Westpark SV 400, LLC

Attn: Ryan O'Keefe  
1420 Rocky Ridge Drive, Suite 265  
Roseville, CA 95661

Prepared By:

**Bollard Acoustical Consultants, Inc.**



Dario Gotchet, Senior Consultant

August 25, 2021





## Introduction

The Westbrook Parcel WB-41 Residential Development (project) is located south of Pleasant Grove Boulevard, between Santucci Boulevard and Daylight Drive in Roseville, California. The project is located within the Sierra Vista Specific Plan (SVSP). The project area and tentative subdivision map are provided as Figures 1 and 2, respectively.

Due to the proximity of the proposed residential uses to Pleasant Grove Boulevard and Santucci Boulevard, BAC was retained by the project applicant to prepare this assessment. Specifically, the purposes of this assessment are to quantify noise levels associated with traffic on those roadways, and to compare those levels against the applicable City of Roseville and Sierra Vista Specific Plan noise criteria for new residential uses.

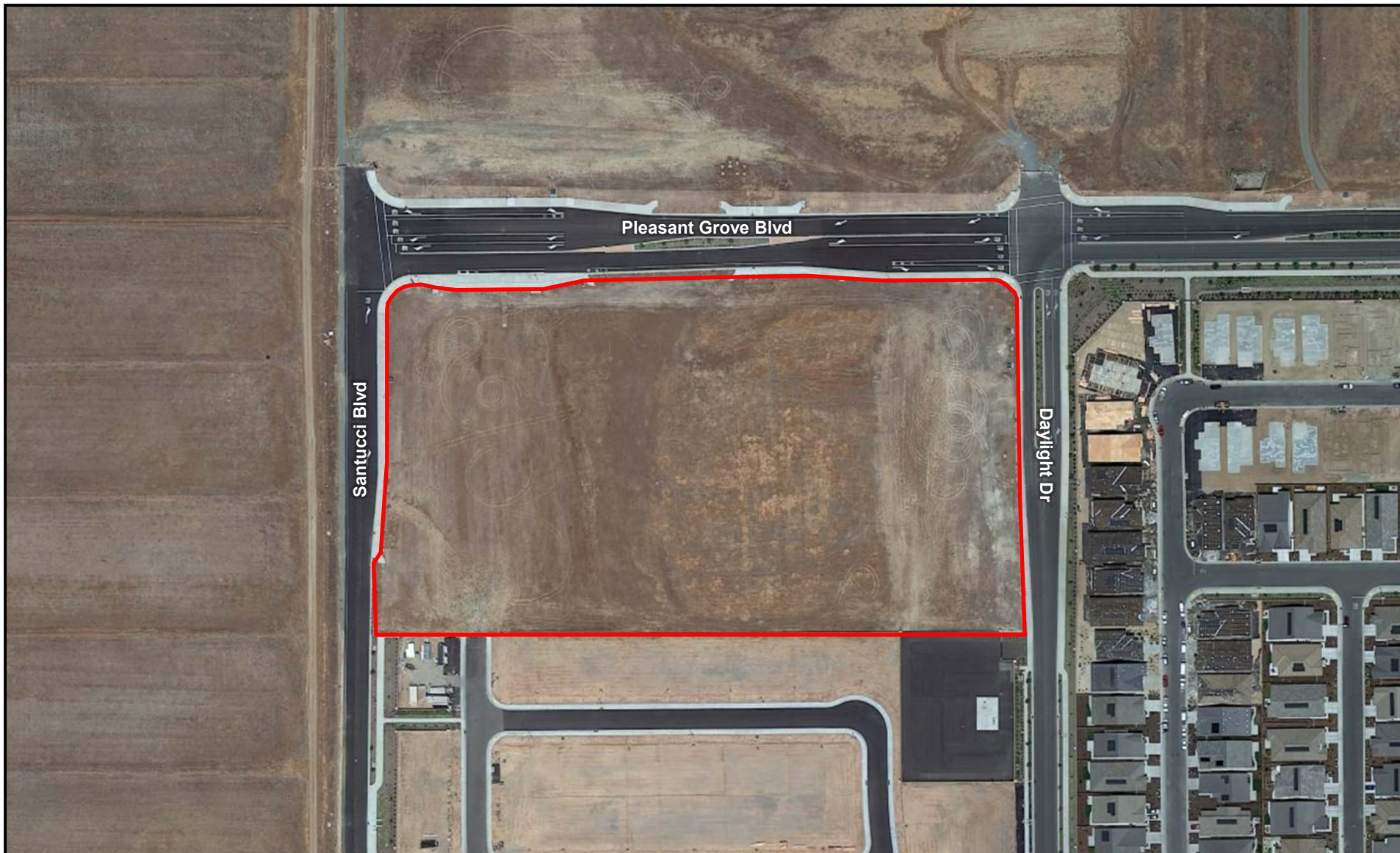
## Noise Fundamentals and Terminology

Noise is often described as unwanted sound. Sound is defined as any pressure variation in air that the human ear can detect. If the pressure variations occur frequently enough (at least 20 times per second), they can be heard, and thus are called sound. Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB. Another useful aspect of the decibel scale is that changes in levels (dB) correspond closely to human perception of relative loudness. Appendix A contains definitions of Acoustical Terminology. Figure 3 shows common noise levels associated with various sources.

The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by weighing the frequency response of a sound level meter by means of the standardized A-weighting network. There is a strong correlation between A-weighted sound levels (expressed as dBA) and community response to noise. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels in decibels.

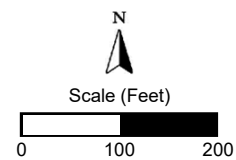
Community noise is commonly described in terms of the “ambient” noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level ( $L_{eq}$ ) over a given time period (usually one hour). The  $L_{eq}$  is the foundation of the Day-Night Average Level noise descriptor,  $L_{dn}$  or DNL, and shows very good correlation with community response to noise.





**Legend**

— Project Area Boundary (Approximate)



Westbrook Parcel WB-41  
Roseville, California

Project Area

Figure 1

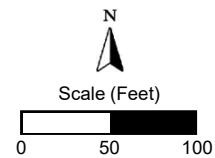






### Legend

- Project Area Boundary
- Masonry Walls



Westbrook Parcel WB-41  
Roseville, California

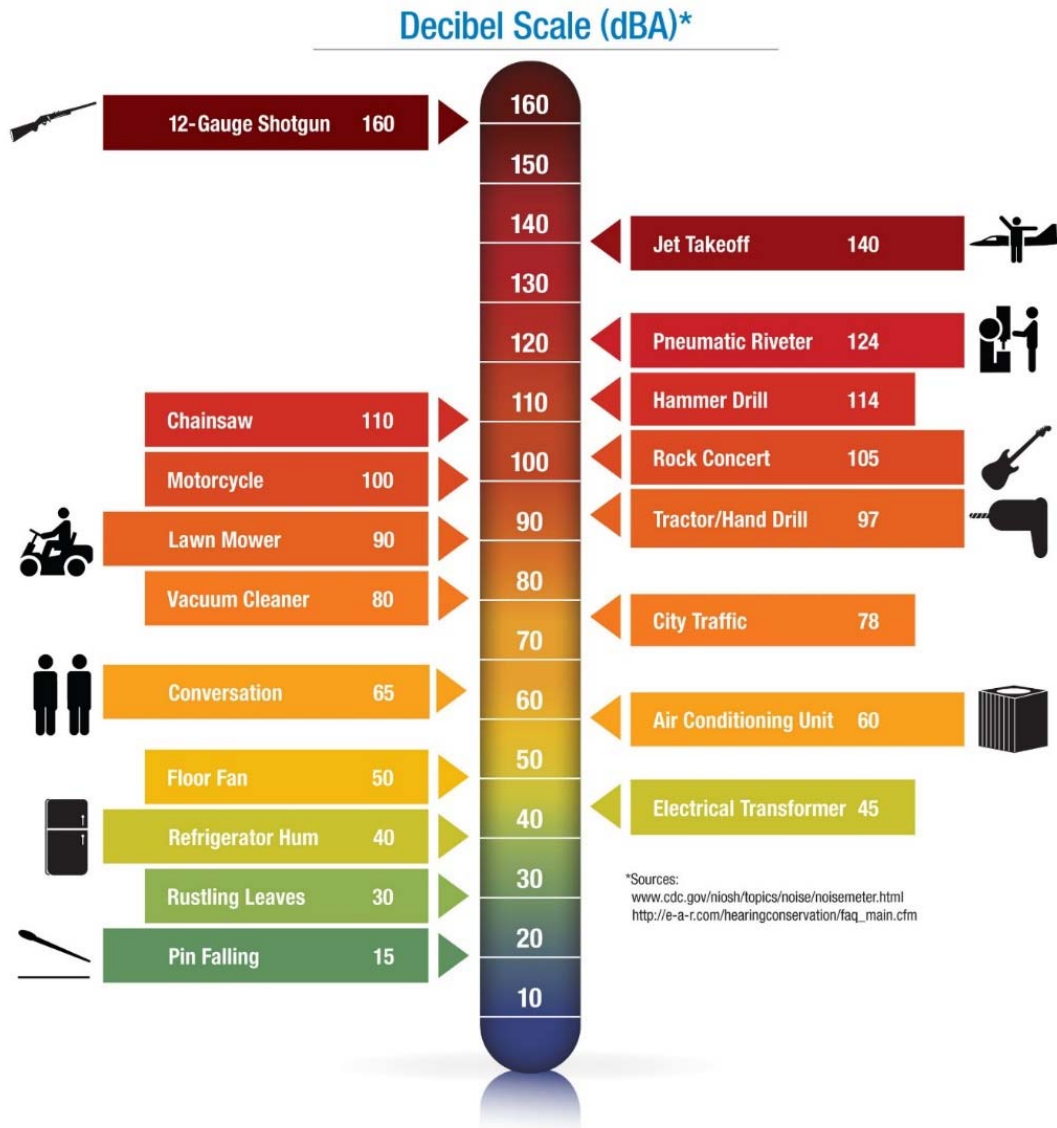
Tentative Subdivision Map

Figure 2





**Figure 3**  
**Typical A-Weighted Sound Levels of Common Noise Sources**



The Day-Night Average Level (DNL) is based upon the average noise level over a 24-hour day, with a +10-decibel weighting applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because DNL represents a 24-hour average, it tends to disguise short-term variations in the noise environment. DNL-based noise standards are commonly used to assess noise impacts associated with traffic, railroad, and aircraft noise sources.



## Criteria for Acceptable Noise Exposure

### City of Roseville General Plan 2035

The Noise Element of the Roseville General Plan 2035 contains goals and policies intended to protect city residents from the harmful and annoying effects of exposure to excessive noise. The General Plan policies which would be applicable to this project are reproduced below:

#### Transportation Noise Sources

**Policy 1** Allow the development of new noise-sensitive land uses (which include but are not limited to residential, schools, and hospitals) only in areas exposed to existing or projected levels of noise from transportation noise sources which satisfy the levels specified in Table 1. Noise mitigation measures may be required to reduce noise in outdoor activity areas and interior spaces to the levels specified in Table 1.

Recognizing that in increasingly urban areas it is difficult to maintain suburban noise standards, and in order to facilitate the City's goals to encourage reinvestment and economic development in the Riverside and Downtown Specific Plan areas, the City may elect to allow new noise-sensitive land uses on a case by case basis in proximity to transportation sources. Noise mitigation, including an acoustical analysis, would be required to reduce interior space noise levels to the standards specified in Table 1. Exterior noise levels would require mitigation to the extent feasible using building orientation, construction, and design features; however ultimately, noise levels may exceed the noise standards identified in Table 1.

**Policy 2** Require new roadway improvement projects to be mitigated so as not to exceed the noise levels specified in Table 1 at outdoor activity areas or interior spaces of existing noise-sensitive land uses.

**Policy 3** Evaluate new transportation projects, such as light and heavy rail, using the standards contained in Table 1. However, noise from these projects may be allowed to exceed the standards contained in Table 1 if the City Council finds that there are special overriding circumstances.

**Policy 4** Require an acoustical analysis where:

- a. Noise sensitive land uses are proposed in areas exposed to existing or projected noise levels exceeding the levels specified in Table 1;
- b. Proposed transportation noise source projects are likely to produce noise levels exceeding the levels specified in Table 1 at existing or planned noise-sensitive uses.



An acoustical analysis shall be required as part of the environmental review process so that noise mitigation may be considered in the project design.

**Table 1**  
**Maximum Allowable Noise Exposure - Transportation Noise Sources**  
**City of Roseville General Plan Noise Element**

Land Use	Outdoor Activity Areas <sup>1</sup>	Interior Spaces	
	DNL/CNEL, dB	DNL/CNEL, dB	Leq, dB <sup>2</sup>
Residential	60 <sup>3</sup>	45	--
Transient lodging	60 <sup>3</sup>	45	--
Hospitals, nursing homes	60 <sup>3</sup>	45	--
Theaters, auditoriums, music halls	--	--	35
Churches, meeting halls	60 <sup>3</sup>	--	40
Office buildings	65	--	45
Schools, libraries, museums	--	--	45
Playgrounds, neighborhood parks	70	--	--
<sup>1</sup> Outdoor activity areas for residential developments are considered to be the backyard patios or decks of single-family dwelling, and the patios or common areas where people generally congregate for multi-family development. Outdoor activity areas for non-residential developments are considered to be those common areas where people generally congregate, including pedestrian plazas, seating areas and outside lunch facilities. Where the location of outdoor activity areas is unknown, the exterior noise level standard shall be applied to the property line of the receiving land use. <sup>2</sup> As determined for a typical worst-case hour during periods of use. <sup>3</sup> Where it is not possible to reduce noise in outdoor activity areas to 60 dB Ldn/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 75 dB Ldn/CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table. <b>Note:</b> Where a proposed use is not specifically listed on this table, the use shall comply with the noise exposure standards for the nearest similar use as determined by the Planning Department. Commercial and industrial uses have not been listed because such uses are not considered to be particularly sensitive to noise exposure. -- = not applicable DNL = Day-Night Average Sound Level CNEL = Community Noise Equivalent Level dB = Decibels Leq = Noise Equivalent Level Source: City of Roseville General Plan Noise Element			

## Sierra Vista Specific Plan Final EIR

The Sierra Vista Specific Plan (SVSP) Final EIR (May 2010) contains mitigation measures intended to protect future city residents from the harmful and annoying effects of exposure to excessive noise. The transportation noise related mitigation measures of the specific plan are reproduced below:

### WMM 4.5-8 On-site Traffic Noise Attenuation (Impact 4.6-6 SVSP and Urban Reserve)

The project developer shall demonstrate through an acoustical study that residences along roadways will be subject to noise levels consistent with the



City's standards. The standards could be achieved through a combination of setbacks, sound walls or other barriers, building orientation or other measures. An acoustical analysis shall be required to demonstrate that these measures will result in acceptable noise levels.

**WMM 4.5-10    *On-site Traffic Noise Policies (Impact 4.6-6 and 4.6-8 Urban Reserve)***

Specific Plans and/or other development proposals in the Remainder Area Urban Reserve shall include policies and/or conditions that require that residential development adjacent to roadways will be subject to traffic noise levels that fall within City standards. The standards could be achieved through a combination of setbacks, sound walls or other barriers, building orientation or other measures. An acoustical analysis shall be required to demonstrate that these measures will result in acceptable noise levels.

**MM 4.6- 4:        *Traffic Noise Attenuation (Impact 4.6-6 and 4.6-8 SVSP)***

**MM 4.6-4(a):** Masonry walls and/or landscaped berms shall be constructed along the major project-area roadways adjacent to proposed residential uses if acoustical studies warrant sound attenuation, otherwise standard wood fencing is acceptable. Draft EIR Table 4.6-10 data shall be consulted to determine appropriate barrier heights. If the assumptions shown in Table 4.6-10 vary considerably, a detailed analysis of exterior and interior mitigation measures should be conducted when tentative maps become available.

**MM 4.6-4(b):** In areas requiring sound attenuation, noise barrier walls shall be constructed of concrete panels, concrete masonry units, earthen berms, or any combination of these materials. Wood is not recommended for construction due to eventual warping and degradation of acoustical performance.

**MM 4.6-4(c):** Tentative map applications for residential uses located along Fiddymont Road would be required to include an analysis of interior noise levels. The report shall be conducted by a qualified acoustical engineer and shall specify the measures required to achieve compliance with the City of Roseville 45 dB DNL interior noise level standard.

## Evaluation of Future Traffic Noise Environment at Project Site

### Traffic Noise Prediction Methodology

The Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA-RD-77-108) was used to predict traffic noise levels at project subdivisions. The model is based upon the CALVENO noise emission factors for automobiles, medium trucks, and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site. The FHWA Model was developed to predict hourly



$L_{eq}$  values for free-flowing traffic conditions and is considered to be accurate within 1.5 dB in most situations.

### Predicted Future Exterior Traffic Noise Levels

The FHWA Model was used with future traffic data to predict future Pleasant Grove Boulevard and Santucci Boulevard traffic noise levels at the project site. Future daily traffic (ADT) volumes for the roadways were calculated using data obtained from the Sierra Vista Specific Plan Traffic Impact Analysis prepared by DKS Associates (2009). Specifically, the future average daily traffic (ADT) volumes for the roadways were conservatively estimated by applying a factor of 5 to the sum of AM and PM peak hour conditions (Cumulative Plus Project). A complete listing of FHWA Model inputs and predicted future traffic noise levels at the project site are contained in Appendix B and are summarized in Table 2.

**Table 2**  
**Predicted Future Exterior Traffic Noise Levels at the Project Site**

Roadway	Location Description	Predicted DNL (dB) <sup>1,2</sup>
Pleasant Grove Boulevard	Nearest backyards	63
	Nearest first-floor facades	62
	Nearest upper-floor facades	64
Santucci Boulevard	Nearest backyards	66
	Nearest first-floor facades	66
	Nearest upper-floor facades	68
<sup>1</sup> A complete listing of FHWA Model inputs and results are provided in Appendix B. <sup>2</sup> Predicted traffic noise levels at upper-floor building facades include consideration of reduced ground absorption of sound at elevated positions. Source: Bollard Acoustical Consultants, Inc. (2021)		

### Exterior Traffic Noise Compliance Evaluation

As indicated in Table 2, future Pleasant Grove Boulevard and Santucci Boulevard traffic noise levels at the proposed outdoor activity areas (backyards) nearest to the roadways are predicted to exceed the City of Roseville General Plan exterior noise level standard of 60 dB DNL. However, the project site plans indicate that masonry walls (Proto II system construction) are proposed to be constructed along Pleasant Grove Boulevard and Santucci Boulevard at the locations shown on Figure 2. The results presented in Table 3 below contain predicted future traffic noise levels at proposed ground level locations with consideration of the noise attenuation that would be provided by the proposed masonry walls. Barrier effectiveness worksheets for the walls are provided in Appendix C. Because elevated upper-floor building facades of the residences constructed adjacent to the roadways would not receive shielding from the masonry walls, barrier analyses were not conducted for those locations.

It should be noted that, although the project site plans show the locations of the masonry walls, information pertaining to the overall heights of said walls is not included. For the purposes of this analysis, it was assumed that the masonry walls will have a minimum height of 6-feet.



**Table 3**  
**Predicted Future Exterior Traffic Noise Levels at Project Site with 6-Foot-Tall Masonry Walls**

Roadway	Location Description	Predicted DNL (dB) <sup>1</sup>
Pleasant Grove Boulevard	Nearest backyards	57
	Nearest first-floor facades	56
	Nearest upper-floor facades	64
Santucci Boulevard	Nearest backyards	60
	Nearest first-floor facades	60
	Nearest upper-floor facades	68
<sup>1</sup> Predicted noise levels at ground level locations include consideration of shielding provided by 6-foot-tall masonry walls at the locations shown on Figure 2. Barrier insertion loss calculation worksheets are provided in Appendix C. Source: Bollard Acoustical Consultants, Inc. (2021)		

The Table 3 data indicate that future Pleasant Grove Boulevard and Santucci Boulevard traffic noise levels at the proposed outdoor activity areas (backyards) nearest to the roadways are predicted to satisfy the City of Roseville General Plan exterior noise level standard of 60 dB DNL, including consideration of the shielding provided by masonry walls having a minimum height of 6-feet at the locations illustrated in Figure 2. Thus, provided that masonry walls having a minimum height of 6-feet are constructed at the locations shown in Figure 2, no further consideration of exterior Pleasant Grove Boulevard or Santucci Boulevard traffic noise mitigation measures would be warranted for the project. It should be noted that the 6-foot wall height required for compliance indicated above is relative to adjacent residential lot or roadway elevation, whichever is greater.

### Interior Traffic Noise Compliance Evaluation

As indicated in Table 3, future Pleasant Grove Boulevard and Santucci Boulevard traffic noise levels at the first-floor building facades nearest to the roadways are predicted to range from 56 to 60 dB DNL, including consideration of the shielding that would be provided by the masonry walls. Due to reduced ground absorption at elevated positions and lack of screening by the walls, future traffic noise levels at the upper-floor facades of those residences are predicted to range from 64 to 68 dB DNL. To satisfy the City of Roseville General Plan 45 dB DNL interior noise level standard, minimum noise reductions of 15 dB and 23 dB would be required of the first- and upper-floor building facades (respectively) of the residences constructed adjacent to the roadways.

Standard residential construction (stucco siding, STC-27 windows, door weather-stripping, exterior wall insulation, composition plywood roof), typically results in an exterior to interior noise reduction of at least 25 dB with windows closed and approximately 15 dB with windows open. This level of noise reduction would be adequate to reduce future Pleasant Grove Boulevard and Santucci Boulevard traffic noise levels within all floors of residences in this development to 45 dB DNL or less, which would satisfy the General Plan 45 dB DNL interior noise level standard for residential uses. Nonetheless, mechanical ventilation (air conditioning) should be provided



for all residences within this development to allow the occupants to close doors and windows as desired for additional acoustical isolation.

## Conclusions & Recommendations

The Westbrook Parcel WB-41 Residential Development is predicted to be exposed to future Pleasant Grove Boulevard and Santucci Boulevard traffic noise exposure in compliance with the applicable City of Roseville General Plan 60 dB DNL exterior noise level standard for residential uses provided that the project design includes the construction of masonry walls having a minimum height of 6-feet at the locations shown on Figure 2 (as proposed). The minimum masonry wall height of 6-feet required for compliance is relative to adjacent residential lot or roadway elevation, whichever is greater.

In addition, standard residential construction (stucco siding, STC-27 windows, door weather-stripping, exterior wall insulation, composition plywood roof) would be adequate to reduce future Pleasant Grove Boulevard and Santucci Boulevard traffic noise levels within all floors of residences in this development to 45 dB DNL or less, which would satisfy the applicable City of Roseville General Plan 45 dB DNL interior noise level standard for residential uses. Nonetheless, mechanical ventilation (air conditioning) should be provided for all residences within this development to allow the occupants to close doors and windows as desired for additional acoustical isolation.

These conclusions are based on the future traffic data cited in Appendix B, the project site plan shown on Figure 2, and on noise reduction data for standard residential dwellings and for typical STC rated window data. Deviations from the above-mentioned resources could cause future traffic noise levels to differ from those predicted in this assessment. In addition, Bollard Acoustical Consultants, Inc. is not responsible for degradation in acoustic performance of the residential construction due to poor construction practices, failure to comply with applicable building code requirements, or for failure to adhere to the minimum building practices cited in this report.

This concludes BAC's traffic noise assessment for the proposed Westbrook Parcel WB-41 Residential Development in Roseville, California. Please contact BAC at (916) 663-0500 or [darioq@bacnoise.com](mailto:darioq@bacnoise.com) with any questions regarding this assessment.



## Appendix A

### Acoustical Terminology

<b>Acoustics</b>	The science of sound.
<b>Ambient Noise</b>	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
<b>Attenuation</b>	The reduction of an acoustic signal.
<b>A-Weighting</b>	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
<b>Decibel or dB</b>	Fundamental unit of sound. A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
<b>CNEL</b>	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
<b>Frequency</b>	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
<b>IIC</b>	Impact Insulation Class (IIC): A single-number representation of a floor/ceiling partition's impact generated noise insulation performance. The field-measured version of this number is the FIIC.
<b>Ldn</b>	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
<b>Leq</b>	Equivalent or energy-averaged sound level.
<b>Lmax</b>	The highest root-mean-square (RMS) sound level measured over a given period of time.
<b>Loudness</b>	A subjective term for the sensation of the magnitude of sound.
<b>Masking</b>	The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.
<b>Noise</b>	Unwanted sound.
<b>Peak Noise</b>	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the "Maximum" level, which is the highest RMS level.
<b>RT<sub>60</sub></b>	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
<b>STC</b>	Sound Transmission Class (STC): A single-number representation of a partition's noise insulation performance. This number is based on laboratory-measured, 16-band (1/3-octave) transmission loss (TL) data of the subject partition. The field-measured version of this number is the FSTC.





**Appendix B-1**  
**FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)**  
**Noise Prediction Worksheet**

**Project Information:**

Job Number: 2021-128  
Project Name: Westbrook Parcel WB-41 Residential Development  
Roadway Name: Pleasant Grove Boulevard

**Traffic Data:**

Year: Future  
Average Daily Traffic Volume: 8,905  
Percent Daytime Traffic: 85  
Percent Nighttime Traffic: 15  
Percent Medium Trucks (2 axle): 1  
Percent Heavy Trucks (3+ axle): 1  
Assumed Vehicle Speed (mph): 45  
Intervening Ground Type (hard/soft): **Soft**

**Traffic Noise Levels:**

Location	Description	Distance	Offset (dB)	----- DNL, dB -----			
				Autos	Medium Trucks	Heavy Trucks	Total
1	Nearest backyards	85		62	50	55	63
2	Nearest first-floor facades	95		61	50	54	62
3	Nearest upper-floor facades	95	2	63	52	56	64

**Traffic Noise Contours (No Calibration Offset):**

DNL Contour (dB)	Distance from Centerline (ft)
75	14
70	29
65	63
60	136

**Notes:**

1. Future average daily traffic volume (ADT) calculated from data obtained from the Sierra Vista Specific Plan Traffic Impact Analysis prepared by DKS Associates (2009). Specifically, future (Cumulative Plus Project) roadway ADT was conservatively estimated by applying a factor of 5 to the sum of AM and PM peak hour conditions.
2. An offset of +2 dB was applied at upper-floor facades due to reduced ground absorption of sound at elevated positions.



**Appendix B-2**  
**FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)**  
**Noise Prediction Worksheet**

**Project Information:**

Job Number: 2021-128  
Project Name: Westbrook Parcel WB-41 Residential Development  
Roadway Name: Santucci Boulevard

**Traffic Data:**

Year: Future  
Average Daily Traffic Volume: 25,895  
Percent Daytime Traffic: 85  
Percent Nighttime Traffic: 15  
Percent Medium Trucks (2 axle): 1  
Percent Heavy Trucks (3+ axle): 1  
Assumed Vehicle Speed (mph): 45  
Intervening Ground Type (hard/soft): **Soft**

**Traffic Noise Levels:**

Location	Description	Distance	Offset (dB)	----- DNL, dB -----			
				Autos	Medium Trucks	Heavy Trucks	Total
1	Nearest backyards	105		65	54	58	66
2	Nearest first-floor facades	115		65	53	58	66
3	Nearest upper-floor facades	115	2	67	55	60	68

**Traffic Noise Contours (No Calibration Offset):**

DNL Contour (dB)	Distance from Centerline (ft)
75	28
70	60
65	129
60	278

**Notes:**

1. Future average daily traffic volume (ADT) calculated from data obtained from the Sierra Vista Specific Plan Traffic Impact Analysis prepared by DKS Associates (2009). Specifically, future (Cumulative Plus Project) roadway ADT was conservatively estimated by applying a factor of 5 to the sum of AM and PM peak hour conditions.
2. An offset of +2 dB was applied at upper-floor facades due to reduced ground absorption of sound at elevated positions.



**Appendix C-1**  
**FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)**  
**Noise Barrier Effectiveness Prediction Worksheet**

**Project Information:** Job Number: 2021-128  
Project Name: Westbrook Parcel WB-41 Residential Development  
Roadway Name: Pleasant Grove Boulevard

**Noise Level Data:** Year: Future  
Auto DNL (dB): 62  
Medium Truck DNL (dB): 50  
Heavy Truck DNL (dB): 55

**Site Geometry:** Receiver Description: Nearest backyards  
Centerline to Barrier Distance ( $C_1$ ): 75  
Barrier to Receiver Distance ( $C_2$ ): 10  
Automobile Elevation: 0  
Medium Truck Elevation: 2  
Heavy Truck Elevation: 8  
Pad/Ground Elevation at Receiver: 0  
Receiver Elevation: 5  
Base of Barrier Elevation: 0  
Starting Barrier Height: 6

**Barrier Effectiveness:**

Top of Barrier Elevation (ft)	Barrier Height (ft)	----- DNL, dB -----				Barrier Breaks Line of Sight to...		
		Autos	Medium Trucks	Heavy Trucks	Total	Autos?	Medium Trucks?	Heavy Trucks?
6	6	56	44	50	<b>57</b>	Yes	Yes	Yes
7	7	54	43	49	<b>56</b>	Yes	Yes	Yes
8	8	53	41	47	<b>54</b>	Yes	Yes	Yes
9	9	52	40	46	<b>53</b>	Yes	Yes	Yes
10	10	51	39	44	<b>52</b>	Yes	Yes	Yes
11	11	49	38	43	<b>51</b>	Yes	Yes	Yes
12	12	49	37	42	<b>50</b>	Yes	Yes	Yes
13	13	48	36	42	<b>49</b>	Yes	Yes	Yes
14	14	47	36	41	<b>49</b>	Yes	Yes	Yes

**Notes:** 1. Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s).



**Appendix C-2**  
**FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)**  
**Noise Barrier Effectiveness Prediction Worksheet**

**Project Information:**

Job Number: 2021-128  
 Project Name: Westbrook Parcel WB-41 Residential Development  
 Roadway Name: Pleasant Grove Boulevard

**Noise Level Data:**

Year: Future  
 Auto DNL (dB): 61  
 Medium Truck DNL (dB): 50  
 Heavy Truck DNL (dB): 54

**Site Geometry:**

Receiver Description: Nearest first-floor facades  
 Centerline to Barrier Distance ( $C_1$ ): 75  
 Barrier to Receiver Distance ( $C_2$ ): 20  
 Automobile Elevation: 0  
 Medium Truck Elevation: 2  
 Heavy Truck Elevation: 8  
 Pad/Ground Elevation at Receiver: 0  
 Receiver Elevation: 5  
 Base of Barrier Elevation: 0  
 Starting Barrier Height: 6

**Barrier Effectiveness:**

Top of Barrier Elevation (ft)	Barrier Height (ft)	----- DNL, dB -----				Barrier Breaks Line of Sight to...		
		Autos	Medium Trucks	Heavy Trucks	Total	Autos?	Medium Trucks?	Heavy Trucks?
6	6	55	44	49	<b>56</b>	Yes	Yes	Yes
7	7	54	43	49	<b>55</b>	Yes	Yes	Yes
8	8	53	42	48	<b>54</b>	Yes	Yes	Yes
9	9	52	41	46	<b>53</b>	Yes	Yes	Yes
10	10	51	39	45	<b>52</b>	Yes	Yes	Yes
11	11	50	39	44	<b>51</b>	Yes	Yes	Yes
12	12	49	38	43	<b>51</b>	Yes	Yes	Yes
13	13	48	37	43	<b>50</b>	Yes	Yes	Yes
14	14	48	36	42	<b>49</b>	Yes	Yes	Yes

**Notes:** 1. Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s).



**Appendix C-3**  
**FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)**  
**Noise Barrier Effectiveness Prediction Worksheet**

**Project Information:**

Job Number: 2021-128  
 Project Name: Westbrook Parcel WB-41 Residential Development  
 Roadway Name: Santucci Boulevard

**Noise Level Data:**

Year: Future  
 Auto DNL (dB): 65  
 Medium Truck DNL (dB): 54  
 Heavy Truck DNL (dB): 58

**Site Geometry:**

Receiver Description: Nearest backyards  
 Centerline to Barrier Distance ( $C_1$ ): 95  
 Barrier to Receiver Distance ( $C_2$ ): 10  
 Automobile Elevation: 0  
 Medium Truck Elevation: 2  
 Heavy Truck Elevation: 8  
 Pad/Ground Elevation at Receiver: 0  
 Receiver Elevation: 5  
 Base of Barrier Elevation: 0  
 Starting Barrier Height: 6

**Barrier Effectiveness:**

Top of Barrier Elevation (ft)	Barrier Height (ft)	----- DNL, dB -----				Barrier Breaks Line of Sight to...		
		Autos	Medium Trucks	Heavy Trucks	Total	Autos?	Medium Trucks?	Heavy Trucks?
6	6	59	48	53	<b>60</b>	Yes	Yes	Yes
7	7	58	46	52	<b>59</b>	Yes	Yes	Yes
8	8	56	45	50	<b>57</b>	Yes	Yes	Yes
9	9	55	44	49	<b>56</b>	Yes	Yes	Yes
10	10	54	43	48	<b>55</b>	Yes	Yes	Yes
11	11	53	42	47	<b>54</b>	Yes	Yes	Yes
12	12	52	40	46	<b>53</b>	Yes	Yes	Yes
13	13	51	40	45	<b>52</b>	Yes	Yes	Yes
14	14	51	39	44	<b>52</b>	Yes	Yes	Yes

**Notes:** 1. Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s).



**Appendix C-4**  
**FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)**  
**Noise Barrier Effectiveness Prediction Worksheet**

**Project Information:**

Job Number: 2021-128  
 Project Name: Westbrook Parcel WB-41 Residential Development  
 Roadway Name: Santucci Boulevard

**Noise Level Data:**

Year: Future  
 Auto DNL (dB): 65  
 Medium Truck DNL (dB): 53  
 Heavy Truck DNL (dB): 58

**Site Geometry:**

Receiver Description: Nearest first-floor facades  
 Centerline to Barrier Distance ( $C_1$ ): 95  
 Barrier to Receiver Distance ( $C_2$ ): 20  
 Automobile Elevation: 0  
 Medium Truck Elevation: 2  
 Heavy Truck Elevation: 8  
 Pad/Ground Elevation at Receiver: 0  
 Receiver Elevation: 5  
 Base of Barrier Elevation: 0  
 Starting Barrier Height: 6

**Barrier Effectiveness:**

Top of Barrier Elevation (ft)	Barrier Height (ft)	----- DNL, dB -----				Barrier Breaks Line of Sight to...		
		Autos	Medium Trucks	Heavy Trucks	Total	Autos?	Medium Trucks?	Heavy Trucks?
6	6	59	47	53	<b>60</b>	Yes	Yes	Yes
7	7	58	46	52	<b>59</b>	Yes	Yes	Yes
8	8	57	45	51	<b>58</b>	Yes	Yes	Yes
9	9	56	44	50	<b>57</b>	Yes	Yes	Yes
10	10	54	43	49	<b>56</b>	Yes	Yes	Yes
11	11	54	42	48	<b>55</b>	Yes	Yes	Yes
12	12	53	42	47	<b>54</b>	Yes	Yes	Yes
13	13	52	41	46	<b>53</b>	Yes	Yes	Yes
14	14	51	40	45	<b>53</b>	Yes	Yes	Yes

**Notes:** 1. Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s).





## TECHNICAL MEMORANDUM

Date: July 30, 2021

To: Jack Varozza, PE – City of Roseville

From: John Gard, PE – Fehr & Peers

Subject: *Transportation Evaluation of Proposed Rezone of Sierra Vista Specific Plan Parcel WB-41*

RS21-4077

This memorandum presents the assumptions, analysis methods, and results of our evaluation of the proposed rezone of Parcel WB-41 in the Sierra Vista Specific Plan (SVSP). The analysis focuses on how conditions would change under cumulative (2035) conditions because the surrounding area is mostly undeveloped. A baseline analysis would therefore not be meaningful.

### Proposed Land Use Changes

The project site is situated in the southeast corner of the Pleasant Grove Boulevard/Santucci Boulevard intersection. The proposed project would rezone the 10.1-acre Parcel WB-41 from community commercial to medium density residential. Refer to Figure 1 for project location and Figure 2 for project site plan for the proposed medium density residential.

The *Sierra Vista Specific Plan* (2010) indicates that community commercial parcels could be constructed with a floor-to-area ratio (FAR) of up to 0.4. However, experience on other retail parcels in the City suggests a 0.25 FAR is a more reasonable yield. Accordingly, it is assumed the existing zoning would yield 110,000 square feet of retail space.

According to the project site plan (*Tentative Subdivision Map for Sierra Vista Specific Plan Parcel WB-41*, MacKay & Soms, April 2021) the proposed rezone would yield 63 single-family detached dwelling units.

### Trip Generation Comparison

We compared the trip generation of Parcel 41 based on its existing and proposed zoning using trip generation rates from the City of Roseville 2035 travel demand model<sup>1</sup>. **Table 1** shows the results, and indicates that the proposed rezoning would result in substantially fewer trips generated by the property. This suggests that traffic volumes in the vicinity of the project would be reduced during peak hours and on a daily basis as a result of the land use change.

---

<sup>1</sup> Trip rates from the City's model were used for this comparison because subsequent analysis of changes in external travel (i.e., at the specific plan boundary) also rely on the City's travel demand model and rates.



## Transportation Evaluation of Proposed Rezone of Sierra Vista Specific Plan Parcel WB-41

Table 1 Trip Generation Comparison – Existing vs. Proposed Zoning							
Land Use	Amount	Trip Rate <sup>1</sup>			Trips		
		AM Peak Hour	PM Peak Hour	Daily	AM Peak Hour	PM Peak Hour	Daily
Existing Zoning							
Retail	110 ksf	0.72	2.67	35	79	294	3,850
Proposed Zoning							
Single-Family Residential	63 du's	0.67	0.78	9	42	49	567
Difference					-37	-245	-3,283
Notes:							
1. Daily and PM peak hour trip rates from the City of Roseville travel demand model. AM peak hour rate estimated by calculating the difference in trip rates from the City's model (for PM peak hour and daily) versus the <i>Trip Generation Manual</i> (ITE, 2017) and applying this factor to ITE's AM peak hour rate.							
ksf = thousand square feet. du's = dwelling units.							
Source: Fehr & Peers, 2021.							

**External Trip Generation Comparison**

The proposed land use change would reduce the overall amount of retail in the SVSP. An analysis was performed to determine whether the reduction in retail would cause a greater amount of Specific Plan trips to be external to the Plan.

The analysis was performed using the City's 2035 travel demand model. Trips generated by the Specific Plan were tracked as either remaining internal or being external to the plan. The results are shown in **Table 2** and indicate that the proposed rezone would result in fewer external AM and PM peak hour and daily trips generated by the Specific Plan when compared to the existing zoning.

<b>Table 2</b> <b>SVSP External Trip Generation Comparison – 2035 With Existing vs. Proposed Zoning</b>			
Scenario	External Trips		
	AM Peak Hour	PM Peak Hour	Daily
2035 with Existing Zoning	7,493	8,996	114,281
2035 with Proposed Zoning	7,439	8,877	112,615
<b>Difference</b>	<b>-54</b>	<b>-119</b>	<b>-1,666</b>
Source: City of Roseville travel demand model output.			



*Transportation Evaluation of Proposed Rezone of Sierra Vista Specific Plan Parcel WB-41***Vehicle Miles Traveled (VMT)**

VMT was calculated using the City of Roseville 2035 travel demand model on a Citywide basis (i.e., travel generated by all land uses within the city) and for the SVSP only. The model was run with the existing and proposed rezoning. The results are shown in **Table 3** and indicate that the rezone would decrease in total VMT both for the SVSP only and for the City as a whole.

<b>Table 3</b>		
<b>VMT Comparison – 2035 With Existing vs. Proposed Zoning</b>		
	City of Roseville Total VMT	Sierra Vista Specific Plan Total VMT
2035 with Existing Zoning	9,728,939	837,375
2035 with Proposed Zoning	9,711,358	825,776
<b><i>Difference</i></b>	<b><i>-17,581</i></b>	<b><i>-11,599</i></b>
Notes:		
1. Source: City of Roseville travel demand model output.		

When compared to the existing zoning, the proposed rezone would generate fewer site trips, fewer trips entering/exiting the SVSP area, and less VMT. Thus, there would be no adverse effects to the roadway network caused by the rezone.

We hope this information is helpful. Please with any questions or comments.







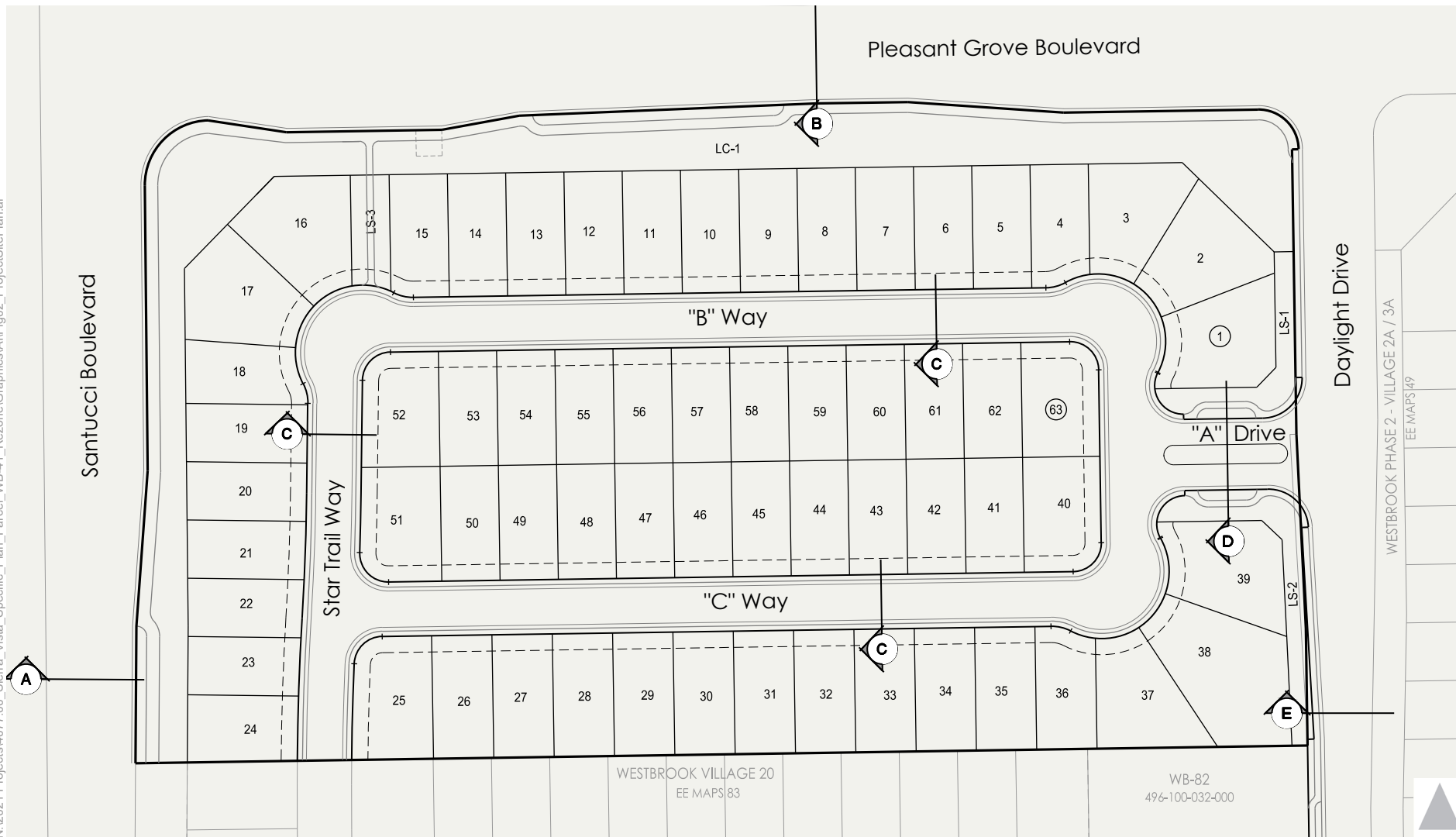


Figure 2  
Project Site Plan



**SB18**  
**Tribal Consultation Notice**

---

August 5, 2021

To: Anna Starkey, Cultural Regulatory Specialist  
United Auburn Indian Community  
10720 Indian Hill Road  
Auburn, CA 95603

Don Ryberg, Chairperson  
Tsi Akim Maidu  
P.O. Box 510  
Browns Valley, CA 95918

Grayson Coney, Cultural Director  
Tsi Akim Maidu  
P.O. Box 510  
Browns Valley, CA 95918

Regina Cuellar, Chairperson  
Shingle Springs Band of Miwok Indians  
P.O. Box 1340  
Shingle Springs, CA 95682

Pamela Cubbler, Treasurer  
Colfax-Todds Valley Consolidated Tribe  
P.O. Box 4884  
Auburn, CA 95604

Clyde Prout, Chairman  
Colfax-Todds Valley Consolidated Tribe  
P.O. Box 4884  
Auburn, CA 95604

Darrel Cruz, Cultural Resources Department, THPO  
Washoe Tribe of Nevada & California  
919 Hwy 395 South  
Gardnerville, NV 89410

**Subject: Tribal Consultation Pursuant to SB 18 for Project #PL21-0161: SVSP PCL WB-41  
– Rezone in the City of Roseville**

---

The City of Roseville is processing an application for the above-referenced project, located in the northwestern portion of the City of Roseville. Recognizing the importance of tribal participation in the local planning process, the City is requesting your review of the project to determine if formal consultation is appropriate pursuant to Government Code Section 65352.3 (SB 18). Pursuant to Government Code Section 65352.3(a)(2) you have 90 days from receipt of this letter to respond.

The project description is attached to this letter.

The City looks forward to hearing from you. Should you have any questions, please send your written response by letter or by email to:

Mackenzie Harrison  
311 Vernon Street  
Roseville, CA 95678  
[msharrison@roseville.ca.us](mailto:msharrison@roseville.ca.us)



## **Project Description:**

The project site is an undeveloped 10.11-acre parcel (APN 496-100-030-000) located on Parcel WB-41 of the Sierra Vista Specific Plan (SVSP), which was approved on May 5, 2010. The address of the property is 3301 Pleasant Grove Boulevard. The Environmental Impact Report (EIR) for the SVSP included an evaluation of the Cultural and Paleontological Resources within the project area. The proposed project will not result in any additional ground disturbance that was not considered in the EIR for the SVSP. The site has an existing General Plan land use designation and zoning designation of Community Commercial (CC). The site is adjacent to vacant High Density Residential (HDR) parcels to the north across Pleasant Grove Boulevard, a Low Density Residential (LDR) parcel currently under construction to the east across Daylight Drive, a lift station and a LDR parcel to the south, and agricultural land to the west beyond City limits across Santucci Boulevard.

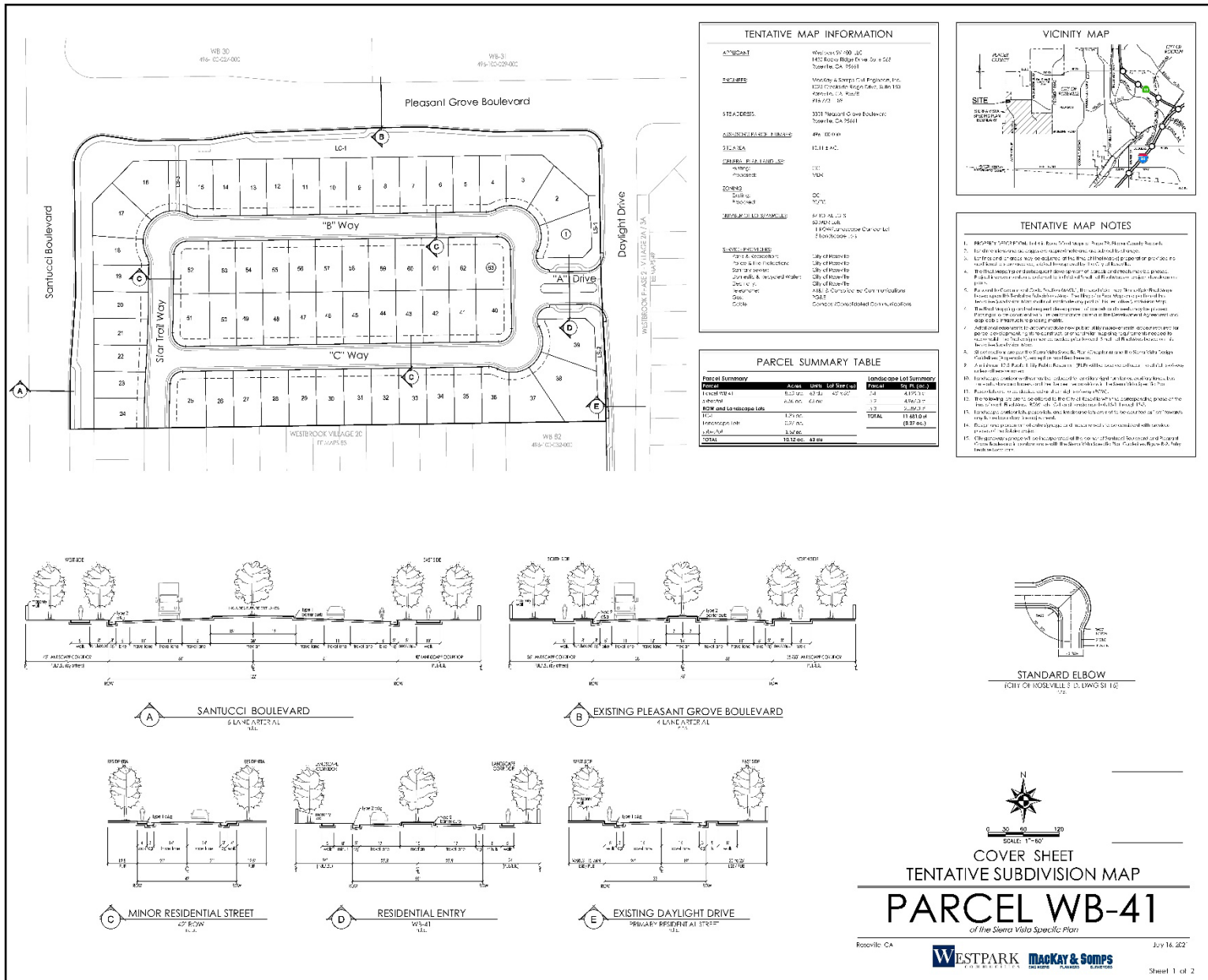
The proposed project is a 63-unit single-family residential subdivision. The project entitlements include a General Plan Amendment and Specific Plan Amendment for Parcel WB-41 to modify the land use from CC to Medium Density Residential (MDR), a Rezone from CC to Small Lot Residential with Modified Development Standards (RS/DS), and Tentative Subdivision Map to create 63 single-family residential lots on WB-41. A Development Agreement Amendment (DAA) is included to update unit allocations and reflect the land use change.

### **Aerial View of Project Site**





## Proposed Tentative Subdivision Map





**SB18**  
**Tribal Consultation Notice**

---

August 17, 2021

To: Anna Starkey, Cultural Regulatory Specialist  
United Auburn Indian Community  
10720 Indian Hill Road  
Auburn, CA 95603

Grayson Coney, Cultural Director  
Tsi Akim Maidu  
P.O. Box 510  
Browns Valley, CA 95918

Pamela Cubbler, Treasurer  
Colfax-Todds Valley Consolidated Tribe  
P.O. Box 4884  
Auburn, CA 95604

Jesus Tarango, Chairperson  
Wilton Rancheria  
9728 Ken Street  
Elk Grove, CA 95624

Darrel Cruz, Cultural Resources Department, THPO  
Washoe Tribe of Nevada & California  
919 Hwy 395 South  
Gardnerville, NV 89410

Don Ryberg, Chairperson  
Tsi Akim Maidu  
P.O. Box 510  
Browns Valley, CA 95918

Regina Cuellar, Chairperson  
Shingle Springs Band of Miwok Indians  
P.O. Box 1340  
Shingle Springs, CA 95682

Clyde Prout, Chairman  
Colfax-Todds Valley Consolidated Tribe  
P.O. Box 4884  
Auburn, CA 95604

Steven Hutchason, THPO  
Wilton Rancheria  
9728 Kent Street  
Elk Grove, CA 95624

Dahlton Brown, Director of Admin.  
9728 Kent Street  
Elk Grove, CA 95624

**Subject: Tribal Consultation Pursuant to SB 18 for Project #PL21-0161: SVSP PCL WB-41  
– Rezone in the City of Roseville**

---

The City of Roseville is processing an application for the above-referenced project, located in the northwestern portion of the City of Roseville. Recognizing the importance of tribal participation in the local planning process, the City is requesting your review of the project to determine if formal consultation is appropriate pursuant to Government Code Section 65352.3 (SB 18). Pursuant to Government Code Section 65352.3(a)(2) you have 90 days from receipt of this letter to respond.

The project description is attached to this letter.

The City looks forward to hearing from you. Should you have any questions, please send your written response by letter or by email to:

Mackenzie Harrison  
311 Vernon Street  
Roseville, CA 95678  
[msharrison@roseville.ca.us](mailto:msharrison@roseville.ca.us)



## **Project Description:**

The project site is an undeveloped 10.11-acre parcel (APN 496-100-030-000) located on Parcel WB-41 of the Sierra Vista Specific Plan (SVSP), which was approved on May 5, 2010. The address of the property is 3301 Pleasant Grove Boulevard. The Environmental Impact Report (EIR) for the SVSP included an evaluation of the Cultural and Paleontological Resources within the project area. The proposed project will not result in any additional ground disturbance that was not considered in the EIR for the SVSP. The site has an existing General Plan land use designation and zoning designation of Community Commercial (CC). The site is adjacent to vacant High Density Residential (HDR) parcels to the north across Pleasant Grove Boulevard, a Low Density Residential (LDR) parcel currently under construction to the east across Daylight Drive, a lift station and a LDR parcel to the south, and agricultural land to the west beyond City limits across Santucci Boulevard.

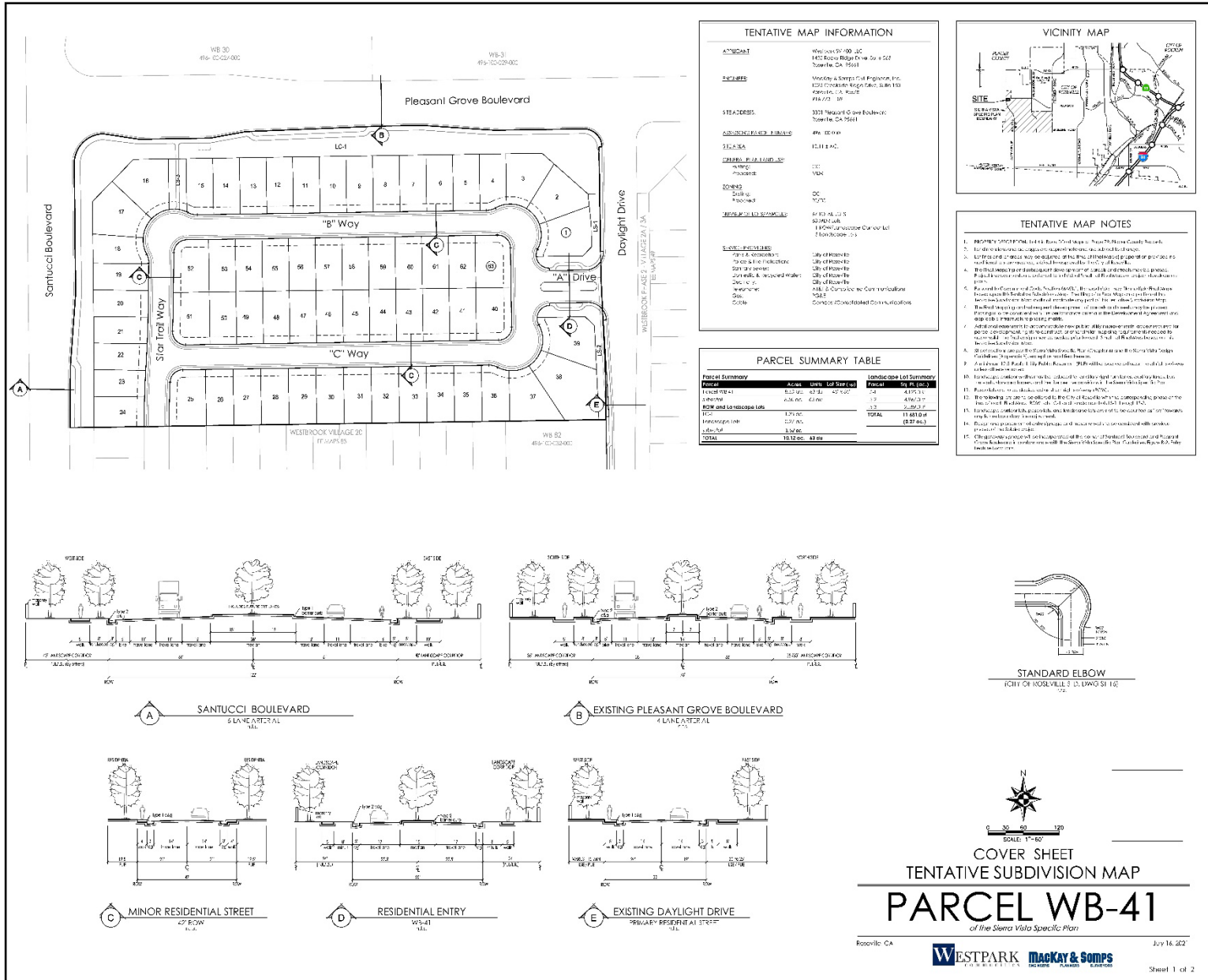
The proposed project is a 63-unit single-family residential subdivision. The project entitlements include a General Plan Amendment and Specific Plan Amendment for Parcel WB-41 to modify the land use from CC to Medium Density Residential (MDR), a Rezone from CC to Small Lot Residential with Modified Development Standards (RS/DS), and Tentative Subdivision Map to create 63 single-family residential lots on WB-41. A Development Agreement Amendment (DAA) is included to update unit allocations and reflect the land use change.

### **Aerial View of Project Site**





## Proposed Tentative Subdivision Map





**CEQA AB52  
Tribal Consultation Notice**

---

Date: August 5, 2021

To: Anna Starkey, Cultural Regulatory Specialist  
United Auburn Indian Community  
10720 Indian Hill Road  
Auburn, CA 95603

Don Ryberg, Chairperson  
Tsi Akim Maidu  
PO Box 510  
Browns Valley, CA 95918

Sara D. Setshwaelo, Cultural Committee Chair  
Ione Band of Miwok Indians  
P.O. Box 699  
Plymouth, CA 95669

Nicholas Fonseca, Chairperson  
Shingle Springs Band of Miwok Indians  
P.O. Box 1340  
Shingle Springs, CA 95682

**RE: Notice of Opportunity to Consult Under AB52 for the SVSP PCL WB-41 – Rezone Project (File #PL21-0161) in the City of Roseville**

---

The City of Roseville will soon be initiating environmental review under the California Environmental Quality Act (CEQA) for the above referenced project. A project location map and preliminary project description are enclosed for your information.

In accordance with Assembly Bill 52 (AB 52) and Section 21080.3.1(d) of the California Public Resources Code (PRC), we are responding to your Tribe's request to be notified of projects in our jurisdiction that will be reviewed under CEQA. The above names were provided to the City of Roseville as the point of contact for your tribe. We are hereby notifying you of an opportunity to consult with us regarding the potential for this project to impact Tribal Cultural Resources, as defined in Section 21074 of the PRC. The purposes of tribal consultation under AB 52 are to determine, as part of the CEQA review process, whether or not Tribal Cultural Resources are present within the project area, and if so, whether or not those resources will be significantly impacted by the project. If Tribal Cultural Resources may be significantly impacted, then consultation will also help to determine the most appropriate way to avoid or mitigate those impacts.

Mackenzie Harrison is the City's Lead Agency Contact to receive replies in response to this notice. In accordance with Section 21080.3.1(d) of the PRC, you have 30 days from the receipt of this notice to either request or decline AB52 consultation in writing for this project from the City's Lead Agency Contact. Please send your written response by letter or by email to:

Mackenzie Harrison  
311 Vernon Street  
Roseville, CA 95678  
[msharrison@roseville.ca.us](mailto:msharrison@roseville.ca.us)

Cc: Jason Camp, Tribal Historic Preservation Officer



### **Project Description:**

The project site is an undeveloped 10.11-acre parcel (APN 496-100-030-000) located on Parcel WB-41 of the Sierra Vista Specific Plan (SVSP), which was approved on May 5, 2010. The address of the property is 3301 Pleasant Grove Boulevard. The Environmental Impact Report (EIR) for the SVSP included an evaluation of the Cultural and Paleontological Resources within the project area. The proposed project will not result in any additional ground disturbance that was not considered in the EIR for the SVSP. The site has an existing General Plan land use designation and zoning designation of Community Commercial (CC). The site is adjacent to vacant High Density Residential (HDR) parcels to the north across Pleasant Grove Boulevard, a Low Density Residential (LDR) parcel currently under construction to the east across Daylight Drive, a lift station and a LDR parcel to the south, and agricultural land to the west beyond City limits across Santucci Boulevard.

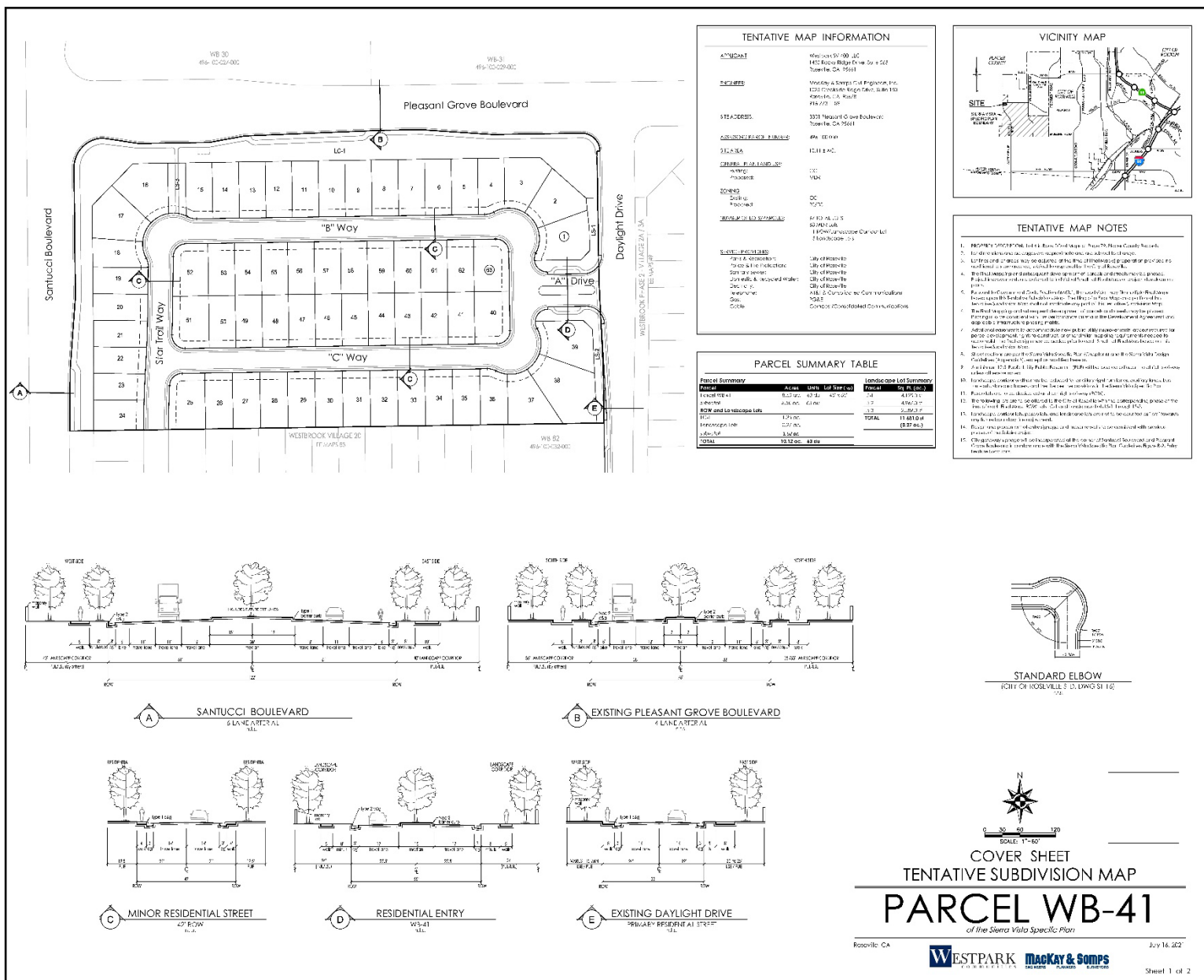
The proposed project is a 63-unit single-family residential subdivision. The project entitlements include a General Plan Amendment and Specific Plan Amendment for Parcel WB-41 to modify the land use from CC to Medium Density Residential (MDR), a Rezone from CC to Small Lot Residential with Modified Development Standards (RS/DS), and Tentative Subdivision Map to create 63 single-family residential lots on WB-41. A Development Agreement Amendment (DAA) is included to update unit allocations and reflect the land use change.

### **Aerial View of Project Site**





## Proposed Tentative Subdivision Map





**Date:** October 15, 2021

**Project Number:** 18512 and 18437

**To:** Ryan O’Keefe

**From:** Allison Wathen

**Subject:** Sierra View, WB-31, and WB-41 Water and Sewer Demands

---

**Message:**

MacKay and Somps is processing a specific plan amendment and general plan amendment for Sierra View, Parcel WB-41 and Parcel WB-31 within the City of Roseville. Sierra View is located south of Diamond Oaks Road and north of Shasta Street. Parcel WB-41 is located south of Pleasant Grove Boulevard, west of Daylight Drive, and east of Santucci Boulevard. Parcel WB-31 is located north of Pleasant Grove Boulevard and east of Santucci Boulevard.

Sierra View is currently designated as a residential land use in the medium density residential (MDR) category and allocates 168 units. Parcel WB-41 is approximately 10.11 acres and is currently designated as commercial (CC) land use. Parcel WB-31 is approximately 11.1 acres and is currently designated as high density residential (HDR) land use with a current allocation of 263 units. This condition is referred to in the tables below as the “Approved Project”

The applicant is proposing to change the land uses for these projects as follows:

- Sierra View: 75 low density residential (LDR) units
- Parcel WB-41: 63 (MDR) units
- Parcel WB-31: 293 HDR units

This proposed condition is referred to in the tables below as the “Proposed Project”.

MacKay and Somps has analyzed the changes in sanitary sewer flow and potable water demand based on the proposed land use designations and unit allocations. Table 1 below calculates and compares the sewer flow for the Approved Project and Proposed Project conditions. It has been determined that the proposed changes to the land use designations and unit allocations results in approximately 0.07 MDG less flow.

Table 2 below calculates and compares the total surface water required for the Approved Project and Proposed Project conditions. It has been determined that the proposed changes to the land use designations and unit allocations results in a reduced need for surface water, approximately 2.0 AFY less. These calculations have been confirmed with the City of Roseville in an email exchange dated June 23, 2021.



# MEMORANDUM

Table 1 - Sewer								
APPROVED PROJECT	ZONING	ACRES	TOTAL UNITS	FLOW FACTOR	Q(ADWF)	FACTORED FLOW	PEAK FACTOR	Q(PWWF)
			EDU	GPD/EDU	MG/D	MG/D	MG/D	MG/D
PARCEL WB-41	CC	10.11		850	0.009	0.017	3.5	0.06
PARCEL WB-31	HDR	11.1	263	130	0.034	0.068	3.5	0.24
SIERRA VIEW	MDR	23.1	168	190	0.032	0.064	3.5	0.22
								0.52
PROPOSED PROJECT	ZONING	ACRES	TOTAL UNITS	FLOW FACTOR	Q(ADWF)	FACTORED FLOW	PEAK FACTOR	Q(PWWF)
			EDU	GPD/EDU	MG/D	MG/D	MG/D	MG/D
PARCEL WB-41	MDR	10.11	63	190	0.012	0.024	3.5	0.0838
PARCEL WB-31	HDR	11.1	293	130	0.038	0.076	3.5	0.2666
SIERRA VIEW	LDR	23.1	75	190	0.014	0.029	3.5	0.10
								0.45
LESS FLOW								0.07

Table 2 - Water											
APPROVED PROJECT	ZONING	ACRES	UNITS	DENSITY	DEMAND FACTOR	PROJECTED DEMAND (MGD)	TOTAL AFY	ANNUAL IRRIGATION DEMAND	% SITE IRRIGATED	RW AFY	TOTAL SURFACE WATER
PARCEL WB-41	CC	10.11			2598	0.03	29.42	3.60	0.30	10.92	18.50
PARCEL WB-31	HDR	11.1	263	23.7	177	0.05	52.14	3.60	0.40	15.98	36.15
SIERRA VIEW	MDR	23.1	168	7.3	430	0.07	80.91			0.00	80.91
											135.56
PROPOSED PROJECT	ZONING	ACRES	UNITS	DENSITY	DEMAND FACTOR	PROJECTED DEMAND (MGD)	TOTAL AFY	ANNUAL IRRIGATION DEMAND	% SITE IRRIGATED	RW AFY	TOTAL SURFACE WATER
PARCEL WB-41	MDR	10.11	63	6.2	430	0.0271	30.3			0.00	30.34
PARCEL WB-31	HDR	11.1	293	26.4	177	0.052	58.1	3.60	0.4	15.98	42.10
SIERRA VIEW	LDR	23.1	75	3.2	728	0.055	61.2			0.00	61.15
											133.59
ADDITIONAL WATER REQUIRED											-2.0

Best Regards,

**MacKay & Somps Civil Engineers, Inc.**

BY: Allison Wathen

cc: Eric Crow

— SINCE 1953 —



## ADDENDUM ATTACHMENT 8

### APPLICABLE MITIGATION MEASURES from the Sierra Vista Specific Plan EIR

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<p>SVSP EIR MM 4.1-2. Agricultural Conversion Policies</p> <p>One acre of open space shall be preserved within Placer County for each acre of open space impacted within the Specific Plan area. This is to be accomplished through the recordation of conservation easements that result in the formation of preserve lands (as a “mitigation property or “preserve site” and collectively, “mitigation lands” or “preserve lands”). For the purposes of assessing impacts associated with a specific development project, “open space” impacts shall include all land proposed to be developed for urban uses. For purposes of mitigation for the specific development project, the term “open space” shall include any and all undeveloped land proposed to be preserved by conservation easement or otherwise required by any governmental agency to be preserved for any reason, specifically including all lands preserved for habitat or agricultural mitigation is required beyond the 1:1 open space requirement noted above, as long as a substantial portion, as determined by the Planning Director, of the mitigation lands acquired are (1) in agricultural production, (2) are undeveloped and have the same or higher value CDC categorization as lands being affected within the Specific Plan property at issue. In-kind mitigation is not required for agricultural land development within the Specific Plan area.</p>	<p>The Applicant shall be responsible for securing the offsite grassland mitigation prior to approval of tentative maps proportional to the development proposed.</p>	<p>Prior to the issuance of a Grading Permit.</p>	<p>Planning Director, City Open Space Preserve Manager, and CDD Director</p>	<p>Documentation of conservation easements</p>	
<p>SVSP EIR MM 4.3-1. Roseville Intersections: Pay Fair Share of Improvements in the CIP including Improvements to □ Intersections</p> <ul style="list-style-type: none"> <li>• Fiddymont/Baseline Road: improve intersection as part of the project</li> <li>• Watt Avenue/Baseline Road: improve intersection as part of the project</li> </ul> <p>Improvements would be necessary to the following intersections, as part of the project to achieve acceptable service levels under the 2025 CIP plus Project scenario. However, as noted, many intersections cannot be mitigated because of constraints.</p> <ol style="list-style-type: none"> <li>1. Foothills Boulevard and Baseline Road: No feasible mitigation</li> <li>2. Industrial Avenue and Alantown Drive: No feasible mitigation</li> <li>3. Cirby Way and Northridge Drive: No feasible mitigation</li> </ol>	<p>The Development Agreements between Applicant and the City, require the City to update the CIP and the Applicants to pay fair share fees.</p>	<p>In accordance with Development Agreements, the traffic mitigation fees shall be paid on a pro-rata basis prior to the issuance of</p>	<p>Public Works Director</p>	<p>Project will pay fair share of fees</p>	



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<p>4. Foothills Boulevard and Junction Boulevard: No feasible mitigation</p> <p>5. Junction Boulevard and Baseline Road: No feasible mitigation</p> <p>6. Roseville Parkway and Sierra College Boulevard: No feasible mitigation</p> <p>7. Blue Oaks Boulevard and Crocker Ranch Road: Re-stripe to include two south bound to east bound left turn lanes and a separate right turn. This improvement shall be added to the City of Roseville's Capital Improvement program. Development within the Sierra Vista Specific Plan Area shall be required to pay fair share costs for this improvement</p> <p>8. Blue Oaks Boulevard and New Meadow Drive: Re-stripe the southbound through lane to a shared through and left-turn lane. This improvement shall be added to the City of Roseville's Capital Improvement program. Development within the Sierra Vista Specific Plan Area shall be required to pay fair share costs for this improvement. As such, this impact would be reduced to less than significant.</p> <p>9. Foothills Boulevard and Baseline/Main: No feasible mitigation</p> <p>10. Sunrise Boulevard and Sandringham/Kensinton: add a dedicated southbound right-turn lane</p> <p>11. Woodcreek Oaks and Baseline Road: construction of a second eastbound through lane. This improvement is currently in the City's CIP program. SVSP would be required to pay fair share costs for this improvement.</p> <p>The SVSP will develop over a period of years. Therefore, the impacts on these impacts would occur over a period of time. As with other improvements in the 2025 CIP, the City shall monitor traffic conditions and determine when specific improvements are needed. The City of Roseville's traffic impact fees should be revised to include the SVSP area. The City of Roseville's Traffic Impact Fees should be revised to include the SVSP. Specific Plans and/or development proposals shall provide for fair share contributions of the cost of the improvements through the updated traffic impact fees.</p> <p>Construction of intersection improvements could have impacts on biological and cultural resources, air quality, water quality, and noise levels. These impacts will be evaluated as part of the CIP update to incorporate the adopted mitigation.</p>		any building permit.			
<p>SVSP EIR MM 4.3-6. State Facilities Segments: Pay Fair Share Costs</p> <p>No specific improvements have been identified to mitigate project</p>	The City and Sutter County shall implement a regional traffic fee to fund the identified improvements.	Payment of applicable fees by the Applicant at the time	Sutter County Public Works Director	Project will pay fair share of fees	



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<p>impacts on I-80, SR 70/99, or SR 65; however, the City is willing to work with Caltrans &amp; the Placer County Transportation Planning Agency (PCTPA) to establish a regional approach to institute a fee program for the purpose of funding improvements on these facilities. If and when Caltrans and the City enter into an enforceable agreement, the Project shall pay impact fees to the City of Roseville in amounts that constitute the Project's fair share contributions to the construction of transportation facilities and/or improvements, consistent with the Mitigation Fee Act (Gov. Code, § 66000 et seq.). The City shall determine the means of providing the project's fair share of the funds for these improvements to Caltrans through the inter-agency agreement or other arrangement required by Mitigation Measure 4.3-7.</p>	<p>Applicant within the SVSP shall be required to contribute to the regional fee to fund a portion of the improvements per the Development Agreements. The State shall be responsible for overseeing the improvements.</p>	<p>of each building permit.</p>	<p>and the City Public Works Director</p>		
<p>SVSP EIR MM 4.3-7. Sutter County Facilities: Pay Fair Share Costs</p> <ul style="list-style-type: none"> <li>• Reigo Road and Pleasant Grove South</li> <li>• Riego Road and Pleasant Grove North</li> <li>• Riego Road</li> </ul> <p>The City of Roseville shall negotiate in good faith to enter into a fair agreement with Sutter County regarding Sierra Vista's fair share mitigation for this improvement. In reaching an accommodation with Sutter County, the City and Sutter County, in order to better ensure an effective sub-regional approach to mitigating transportation-related impacts, may choose to include within the same agreements or Joint Powers Authority additional public agencies with whom it must work to mitigate transportation-related impacts, such as Placer County, Sacramento County, and Caltrans. As the City strives to achieve agreement(s) with one or more of these other agencies, the City shall insist that "fair share" fee obligations be reciprocal, in the sense that the other local agencies, in accepting fair share contributions from the SVSP developers, must agree to require new development occurring in their own jurisdictions to make fair share contributions towards mitigation the significant effects of such development on the City's transportation network. Any such arrangement(s), with just Sutter County or with additional agencies, shall account for existing inter-agency fee programs in order to avoid requiring redundant mitigation or fee payments exceeding fair share mitigation levels. The City intends that its arrangement(s) with Sutter County and any other agencies shall permit the participating agencies flexibility in providing cross-jurisdictional credits and reimbursements consistent with the general "fair share" mitigation standard, and</p>	<p>The City and Sutter County shall implement a regional traffic fee to fund the identified improvements. Applicant within the SVSP shall be required to contribute to the regional fee to fund a portion of the improvements per the Development Agreements. Sutter County shall be responsible for overseeing the improvements.</p>	<p>Payment of fees by the Applicant at the time of each building permit.</p>	<p>Sutter County Public Works Director and the City Public Works Director</p>	<p>Project will pay fair share of fees</p>	



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<p>require an updated model run incorporating the best available information in order to obtain the most accurate, up-to-date impact assessment feasible and to generate the most accurate, up-to-date estimates of regional fair share contributions. These arrangements, moreover, should also include provisions that allow for periodic updates to the traffic modeling on which fair share payment calculations depend in order to account for (i) newly approved projects cumulatively contributing to transportation-related impacts and that therefore should contribute to the funding of necessary improvements (e.g., the Curry Creek Community Plan in Placer County), (ii) additional physical improvements necessitated in whole or in part by newly approved projects, (iii) changing cost calculations for the construction of needed improvements based on changes in the costs of materials, labor, and other inputs. Implementation of MM 4.3-8 would reduce impacts to a less than significant level; however, these improvements lie outside the jurisdiction of the City of Roseville. As such, this impact is considered significant and unavoidable.</p>					
<p>SVSP EIR MM 4.4-1. Dust and Construction Control Policies</p> <p>In accordance with the PCAPCD, the applicant shall comply with all applicable rules and regulations as listed above (e.g., Rule 202, 218 and 228). In addition, at the time of tentative map the applicant(s) shall implement a minimum of five (5) of the following measures unless superseded by state or other more stringent standards:</p> <p>The following mitigation measures shall be implemented to reduce short-term construction-related air quality impacts. In addition, dust control measures are required to be implemented by all projects in accordance with the City of Roseville Grading Ordinance, and the PCAPCD Fugitive Dust Rule 228.</p> <ul style="list-style-type: none"> <li>• Applicant shall submit to PCAPCD a Construction Emission / Dust Control Plan within 30 days prior to groundbreaking. If the PCAPCD does not respond within 20 days, the plan shall be considered approved. The plan must address the minimum requirements found in section 300 and 400 of District Rule 228, Fugitive Dust (<a href="http://www.placer.ca.gov/airpollution/airpollut.htm">www.placer.ca.gov/airpollution/airpollut.htm</a>). The applicant shall keep a hard or electronic copy of Rule 228, Fugitive Dust on-site for reference.</li> <li>• The Construction Emission/Dust Control Plan shall include a comprehensive inventory (i.e. make, model, year, emission rating) of all heavy-duty off-road equipment (50 horsepower (HP) or greater) that will be used an aggregate of 40 or more hours for the construction project. The project representative shall</li> </ul>	<p>The Applicant shall submit construction management plans as part of the Grading Permit application. The Public Works Director shall review grading plans for inclusion of these measures prior to issuance of grading permits. The City Code Enforcement Officer shall respond to complaints.</p>	<p>Prior to issuance of Grading Permits.</p>	<p>Director of Public Works</p>	<p>Dust Control Plan and proof of submittal to PCAPCD</p>	



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<p>provide PCAPCD with the anticipated construction timeline including start date, and name and phone number of the project manager and on-site foreman. The plan shall demonstrate that the heavy-duty (&gt; 50 HP) off-road vehicles to be used in the construction project, including owned, leased and subcontractor vehicles, will achieve a project wide fleet-average 20% NOX reduction and 45% particulate reduction compared to the most recent ARB fleet average. PCAPCD shall be contacted for average fleet emission data. Acceptable options for reducing emissions may include use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, and/or other options as they become available. Contractors can access the Sacramento Metropolitan Air Quality Management District's web site to determine if their off-road fleet meets the requirements listed in this measure (<a href="http://www.airquality.org/ceqa/Construction_Mitigation_Calculator.xls">http://www.airquality.org/ceqa/Construction_Mitigation_Calculator.xls</a>).</p> <p>The following measures are also included to reduce construction-related ROG, Nox, PM10 and PM2.5 emissions:</p> <ul style="list-style-type: none"> <li>• All construction equipment shall be maintained in good operating condition. Contractor shall ensure that all construction equipment is being properly serviced and maintained as per the manufacturer's specifications. Maintenance records shall be available at the construction site for verification. This measure will reduce combustion emissions of all criteria air pollutants.</li> <li>• Prior to the issuance of any grading permits, all applicants shall submit construction plans denoting the proposed schedule and projected equipment use. Construction contractors shall provide evidence that low emission mobile construction will be used, or that their use was investigated and found to be infeasible for the project. Low emission equipment is defined as meeting the California Air Resources Board's Tier III standards. Contractors shall also conform to any construction measures imposed by the PCAPCD as well as City Planning Staff. This measure will primarily reduce ROG, Nox, PM10, and PM2.5 exhaust emissions.</li> <li>• Paints and coating shall be applied either by hand or by high volume, low-pressure spray. This measure will reduce evaporative ROG emissions.</li> <li>• All construction shall comply with the following measures to reduce fugitive dust related emissions of PM10 and PM2.5: <ul style="list-style-type: none"> <li>o Maintain a minimum 24-inch freeboard on soil haul trucks or cover payloads using tarps or other suitable means.</li> <li>o Suspend grading operations during high winds (greater than 15 mph).</li> </ul> </li> </ul>					



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<ul style="list-style-type: none"> <li>o Sweep streets as necessary if silt is carried off-site to adjacent public thoroughfares or occurs as a result of hauling.</li> <li>o Dispose of surplus excavated material in accordance with local ordinances and use sound engineering practices.</li> <li>o Schedule activities to minimize the amounts of exposed excavated soil during and after the end of work periods.</li> <li>o Phase grading into smaller areas to prevent the susceptibility of larger areas to erosion over extended periods of time.</li> <li>o Pave or apply gravel to any on-site haul roads.</li> <li>o Reestablish ground cover on the construction site through seeding and water.</li> <li>o Clean earth moving construction equipment with water or sweep clean, once per day, or as necessary (e.g., when moving onsite), consistent with National Pollutant Discharge Elimination System Best Management Practices and the Roseville Grading Ordinance. Water shall be applied to control dust as needed to prevent dust impacts offsite. Operational water truck(s), shall be on-site, as required, to control fugitive dust. Construction vehicles leaving the site shall be cleaned, as needed, to prevent dust, silt, mud, and dirt from being released or tracked off-site.</li> <li>o Spread soil binders on unpaved roads and employee/equipment parking areas. Soil binders shall be non-toxic in accordance with state and local regulations. Apply approved chemical soil stabilizers, or vegetated mats, etc. according to manufacturers' specifications, to all-inactive construction areas (previously graded areas which remain inactive for 96 hours).</li> <li>o Minimize diesel idling time to a maximum of five minutes.</li> <li>o Utilize existing power sources (e.g., power poles) or clean fuel generators rather than temporary diesel power generators, if feasible.</li> <li>o An applicant representative, ARB-certified to perform Visible Emissions Evaluations (VEE), shall routinely (i.e., once per week) evaluate project related off-road and heavy-duty on-road equipment emissions for compliance with this requirement for projects grading more than 20 acres in size, regardless of how many acres are to be disturbed daily.</li> <li>o Construction equipment exhaust emissions shall not exceed the PCAPCD Visible Emissions Rule 202. Fugitive dust is not to exceed 40% opacity and not go beyond property boundary at any time. Operators of vehicles and</li> </ul>					



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<p>equipment found to exceed opacity limits are to be immediately notified and the equipment must be repaired within 72 hours.</p> <p>The City of Roseville is currently working with the Placer County Pollution Control District to update the standard mitigation measures. The following measures will likely be required at the time specific development is proposed.</p> <p>1c. Prior to approval of Grading/ plans the applicant shall submit a Construction Emission / Dust Control Plan to the Placer County APCD. The plan must be submitted by certified mail, or receive a date stamp or other submittal proof. This plan must address the minimum Administrative Requirements found in section 300 and 400 of APCD Rule 228, Fugitive Dust. The applicant shall not break ground prior to receiving APCD approval of the Construction Emission/Dust Control Plan. If the applicant has submittal proof of submittal and no response is received from the District within 20 working days the plan shall be deemed complete, and construction may begin.</p> <p>1c. Include the following standard note on the Improvement/Grading Plan: The prime contractor shall submit to the District a comprehensive inventory (i.e. make, model, year, emission rating) of all the heavy-duty off-road equipment (50 horsepower or greater) that will be used an aggregate of 40 or more hours for the construction project. If any new equipment is added after submission of the inventory, the prime contractor shall the prime contractor shall contact the APCD prior to the new equipment being utilized. At least three business days prior to the use of subject heavy-duty off-road equipment, the project representative shall provide the District with the anticipated construction timeline including start date, and name and phone number of the property owner, project manager, and on-site foreman.</p> <p>1c. Prior to approval of Grading/Improvement Plans, the applicant shall provide a plan to the Placer County APCD for approval by the District demonstrating that the heavy-duty (&gt; 50 horsepower) off-road vehicles to be used in the construction project, including owned, leased and subcontractor vehicles, will achieve a project wide fleet-average 20 percent Nox reduction and 45 percent particulate reduction compared to the most recent CARB fleet average. Acceptable options for reducing emissions may include use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, and/or other options as they become available.</p> <p>2. Include the following standard note on the Improvement/Grading Plan: If required by the Public Works Department, the contractor shall hold a pre-</p>					



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<p>construction meeting prior to grading activities. The contractor shall invite the Placer County APCD to the pre-construction meeting in order to discuss the construction emission/dust control plan with employees and/or contractors.</p> <p>3. Prior to building permit approval, the applicant shall show, on the plans submitted to the Building Department, that electrical outlets shall be installed on the exterior walls of both the front and back of all residences or all commercial buildings to promote the use of electric landscape maintenance equipment.</p> <p>4. Prior to building permit approval, the applicant shall show, on the plans submitted to the Building Department, provisions for construction of new residences, and where natural gas is available, the installation of a gas outlet for use with outdoor cooking appliances, such as a gas barbecue or outdoor recreational fire pits.</p> <p>5. Prior to building permit approval, in accordance with District Rule 225, only U.S. EPA Phase II certified wood burning devices shall be allowed in single-family residences. The emission potential from each residence shall not exceed a cumulative total of 7.5 grams per hour for all devices. Masonry fireplaces shall have either an EPA certified Phase II wood burning device or shall be a U.L. Listed Decorative Gas Appliance. (Rule 225)</p> <p>6. Wood burning or Pellet appliances shall not be permitted in multi-family developments. Only natural gas or propane fired fireplace appliances are permitted. These appliances shall be clearly delineated on the Floor Plans submitted in conjunction with the Building Permit application. (Rule 225 / section 302.2)</p> <p>7. Prior to the issuance of a Building Permit, the applicant shall show that all flat roofs with parapets shall include a white or silver cap sheet to reduce energy demands.</p> <p>8. Diesel trucks shall be prohibited from idling more than five minutes. Prior to the issuance of a Building Permit, the applicant shall show that all truck loading and unloading docks shall be equipped with one 110/208 volt power outlet for every two dock doors. Diesel Trucks idling for more than five minutes shall be required to connect to the 110/208 volt power to run any auxiliary equipment. 2'x3' signage which indicates "Diesel engine Idling Limited to a Maximum of 5 Minutes" shall be shown on the building elevations and shall be submitted to the Placer County APCD prior to the issuance of Building Permits for the project.</p> <p>9. Prior to approval of Improvement Plans, an enforcement plan shall be established, and submitted to the APCD for review, in order to evaluate project-</p>					



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<p>related on-and-off- road heavy-duty vehicle engine emission opacities on a weekly basis, using standards as defined in California Code of Regulations, Title 13, Sections 2180 – 2194. An Environmental Coordinator, hired by the prime contractor or property owner, and who is CARB-certified to perform Visible Emissions Evaluations (VEE), shall routinely evaluate project related off-road and heavy duty on-road equipment emissions for compliance with this requirement. Operators of vehicles and equipment found to exceed opacity limits will be notified by APCD and the equipment must be repaired within 72 hours. (California Code of Regulations, Title 13, Sections 2180 – 2194)</p> <p>PCAPCD Rules (Existing District requirements to be added as construction notes or referenced in conditions of approval)</p> <p>New Standard Condition of Approval (for all projects): The project shall comply with all applicable Placer County Air Pollution Control District rules and regulations, and shall obtain applicable permits and/or clearances from the District prior to the start of construction.</p> <p>The following air quality notes shall be added to the grading and/or improvement plans:</p> <ul style="list-style-type: none"> <li>• The contractor shall use CARB ultra low sulfur diesel fuel for all diesel–powered equipment. In addition, low sulfur fuel shall be utilized for all stationary equipment. (California Standards for Motor Vehicle Diesel Fuel, title 13, article 4.8, chapter 9, California Code of Regulations).</li> <li>• Processes that discharge 2 pounds per day or more of air contaminants, as defined by Health and Safety Code Section 39013, to the atmosphere may require a permit. Permits are required for both construction and operation. Developers/contractors should contact the District prior to construction and obtain any necessary permits prior to the issuance of a Building Permit. (Rule 501)</li> <li>• Pursuant to the Placer County Air Pollution Control District Rule 501, General Permit Requirements, the proposed project may need a permit from the District prior to construction. In general, any engine greater than 50 brake horsepower or any boiler with heat greater than 1,000,000 Btu per hour shall require a permit issued by the District. (Rule 501)</li> <li>• All on-site stationary equipment which is classified as 50 hp or greater shall either obtain a state issued portable equipment permit or a Placer County APCD issued portable equipment permit. (California Portable Equipment Air Quality</li> </ul>					



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<p>Registration Program, Section 2452).</p> <ul style="list-style-type: none"> <li>• The contractor shall utilize existing power sources (e.g., power poles) or clean fuel generators rather than temporary diesel power generators if feasible.</li> <li>• During construction, the contractor shall minimize idling time to a maximum of 5 minutes for all diesel powered equipment.</li> <li>• During construction, traffic speeds on all unpaved surfaces shall be limited to 15 miles per hour or less. (Rule 228 / section 401.2)</li> </ul> <p>Contact the APCD prior to the new equipment being utilized. At least three business days prior to the use of subject heavy-duty off-road equipment, the project representative shall provide the District with the anticipated construction timeline including start date, and name and phone number of the property owner, project manager, and on-site foreman.</p> <p>1. Prior to approval of Grading/Improvement Plans, the applicant shall provide a plan to the Placer County APCD for approval by the District demonstrating that the heavy-duty (&gt; 50 horsepower) off-road vehicles to be used in the construction project, including owned, leased and subcontractor vehicles, will achieve a project wide fleet-average 20 percent Nox reduction and 45 percent particulate reduction compared to the most recent CARB fleet average. Acceptable options for reducing emissions may include use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, and/or other options as they become available.</p> <p>2. Include the following standard note on the Improvement/Grading Plan: If required by the Public Works Department, the contractor shall hold a pre-construction meeting prior to grading activities. The contractor shall invite the Placer County APCD to the pre-construction meeting in order to discuss the construction emission/dust control plan with employees and/or contractors.</p> <p>3. Prior to building permit approval, the applicant shall show, on the plans submitted to the Building Department, that electrical outlets shall be installed on the exterior walls of both the front and back of all residences or all commercial buildings to promote the use of electric landscape maintenance equipment.</p> <p>4. Prior to building permit approval, the applicant shall show, on the plans submitted to the Building Department, provisions for construction of new residences, and where natural gas is available, the installation of a gas outlet for use with outdoor cooking appliances, such as a gas barbecue or outdoor recreational fire pits.</p>					



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<p>5. Prior to building permit approval, in accordance with District Rule 225, only U.S. EPA Phase II certified wood burning devices shall be allowed in single-family residences. The emission potential from each residence shall not exceed a cumulative total of 7.5 grams per hour for all devices. Masonry fireplaces shall have either an EPA certified Phase II wood burning device or shall be a U.L. Listed Decorative Gas Appliance. (Rule 225)</p> <p>6. Wood burning or Pellet appliances shall not be permitted in multi-family developments. Only natural gas or propane fired fireplace appliances are permitted. These appliances shall be clearly delineated on the Floor Plans submitted in conjunction with the Building Permit application. (Rule 225 / section 302.2)</p> <p>7. Prior to the issuance of a Building Permit, the applicant shall show that all flat roofs with parapets shall include a white or silver cap sheet to reduce energy demands.</p> <p>8. Diesel trucks shall be prohibited from idling more than five minutes. Prior to the issuance of a Building Permit, the applicant shall show that all truck loading and unloading docks shall be equipped with one 110/208 volt power outlet for every two dock doors. Diesel Trucks idling for more than five minutes shall be required to connect to the 110/208 volt power to run any auxiliary equipment. 2'x3' signage which indicates "Diesel engine Idling Limited to a Maximum of 5 Minutes" shall be shown on the building elevations and shall be submitted to the Placer County APCD prior to the issuance of Building Permits for the project.</p> <p>9. Prior to approval of Improvement Plans, an enforcement plan shall be established, and submitted to the APCD for review, in order to evaluate project-related on-and-off- road heavy-duty vehicle engine emission opacities on a weekly basis, using standards as defined in California Code of Regulations, Title 13, Sections 2180 – 2194. An Environmental Coordinator, hired by the prime contractor or property owner, and who is CARB-certified to perform Visible Emissions Evaluations (VEE), shall routinely evaluate project related off-road and heavy duty on-road equipment emissions for compliance with this requirement. Operators of vehicles and equipment found to exceed opacity limits will be notified by APCD and the equipment must be repaired within 72 hours. (California Code of Regulations, Title 13, Sections 2180 – 2194)</p> <p>PCAPCD Rules (Existing District requirements to be added as construction notes or referenced in conditions of approval)</p> <p>New Standard Condition of Approval (for all projects): The project shall comply with all applicable Placer County Air Pollution Control District rules and</p>					



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<p>regulations, and shall obtain applicable permits and/or clearances from the District prior to the start of construction.</p> <p>The following air quality notes shall be added to the grading and/or improvement plans:</p> <ul style="list-style-type: none"> <li>• The contractor shall use CARB ultra low sulfur diesel fuel for all diesel-powered equipment. In addition, low sulfur fuel shall be utilized for all stationary equipment. (California Standards for Motor Vehicle Diesel Fuel, title 13, article 4.8, chapter 9, California Code of Regulations).</li> <li>• Processes that discharge 2 pounds per day or more of air contaminants, as defined by Health and Safety Code Section 39013, to the atmosphere may require a permit. Permits are required for both construction and operation. Developers/contractors should contact the District prior to construction and obtain any necessary permits prior to the issuance of a Building Permit. (Rule 501)</li> <li>• Pursuant to the Placer County Air Pollution Control District Rule 501, General Permit Requirements, the proposed project may need a permit from the District prior to construction. In general, any engine greater than 50 brake horsepower or any boiler with heat greater than 1,000,000 Btu per hour shall require a permit issued by the District. (Rule 501)</li> <li>• All on-site stationary equipment which is classified as 50 hp or greater shall either obtain a state issued portable equipment permit or a Placer County APCD issued portable equipment permit. (California Portable Equipment Registration Program, Section 2452).</li> <li>• The contractor shall utilize existing power sources (e.g., power poles) or clean fuel generators rather than temporary diesel power generators if feasible.</li> <li>• During construction, the contractor shall minimize idling time to a maximum of 5 minutes for all diesel powered equipment.</li> <li>• During construction, traffic speeds on all unpaved surfaces shall be limited to 15 miles per hour or less. (Rule 228 / section 401.2)</li> </ul>					
<p>SVSP EIR MM 4.5-1. Reduction of Operational Emissions</p> <p>Implementation of the Air Quality Mitigation Measures listed in Section 4.3 Air Quality would reduce operational and construction-related emissions of criteria air pollutants and precursors, and would also act to reduce GHG emissions</p>	<p>The Applicant shall submit construction management plans as part of the Grading Permit application. The Public Works Director</p>	<p>Prior to issuance of Grading Permits.</p>	<p>Director of Public Works</p>	<p>Operational Emissions Plan</p>	



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<p>associated with project construction and operation. Mitigation Measure 4.4-1 found in the Air Quality section of this EIR, is relevant to impact 4.5-1 because both criteria air pollutant and GHG emissions are frequently associated with combustion byproducts. In addition, the City shall implement the following measures to reduce direct and indirect GHG emissions associated with the proposed project. Certain measures would already be components of the project (i.e., Specific Plan policies, design guidelines and standards), and/or would be applied consistent with the City's General Plan Policies, addressing GHG emissions and climate change, but are provided here for purposes of completeness.</p>	<p>shall review grading plans for inclusion of these measures prior to issuance of grading permits. The City Code Enforcement Officer shall respond to complaints.</p> <p>In addition, plans will be reviewed by the Placer County Air Pollution Control District for compliance with their rules and regulations.</p>				
<p><b>SVSP EIR MM 4.5-2. Additional Measures to Reduce GHG Emissions</b></p> <p>For each new development within the project site requiring a discretionary approval (e.g., tentative subdivision map, conditional use permit), the City shall impose mitigation measures that reduce GHG emissions to the extent feasible and to the extent appropriate with respect to the state's progress at the time toward meeting GHG emissions reductions required by the California Global Warming Solutions Act of 2006 (AB 32).</p> <p>The City shall require feasible reduction measures that, in combination with existing and future regulatory measures developed under AB 32, will reduce GHG emissions associated with the operation of developments and supporting infrastructure that are part of the proposed project by 30% from business-as-usual emissions levels projected for 2025, if feasible.</p>	<p>The Applicant shall submit construction management plans as part of the Grading Permit application. The Public Works Director shall review grading plans for inclusion of these measures prior to issuance of grading permits. The City Code Enforcement Officer shall respond to complaints.</p> <p>In addition, plans will be reviewed by the Placer County Air Pollution Control District for compliance with their rules and regulations.</p>	<p>Prior to issuance of Grading Permits.</p>	<p>Director of Public Works</p>	<p>Construction Management Plan</p>	
<p><b>SVSP EIR MM 4.6-1. Construction Noise Reduction</b></p>	<p>These measures shall be included on building plans. The Chief</p>	<p>Prior to approval of grading</p>	<p>Chief Building Inspector,</p>	<p>Measures shall be located on</p>	



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<p>MM 4.6-1(a): Construction activities shall comply with the requirements of the City of Roseville Noise Ordinance.</p> <p>MM4.6-1(b): Locate fixed construction equipment such as compressors and generators as far as possible from sensitive receptors. Shroud or shield all impact tools, and muffle or shield all in-take and exhaust ports on power construction equipment.</p> <p>MM 4.6-1(c): Designate a construction disturbance coordinator and conspicuously post the Coordinator's contact information around the project site and in adjacent public spaces. The disturbance coordinator will receive all public complaints about construction noise disturbances, and will be responsible for determining the cause of the complaint, and implementing any feasible measures to be taken to alleviate the problem.</p> <p>MM 4.6-1(d): Well drilling shall occur prior to construction of the adjacent subdivision, to the extent feasible. If construction timing for the wells occurs after subdivision construction, then measures to reduce noise shall include; hanging flexible sound control curtains around the drilling apparatus, and the drill rig, to the degree feasible, as determined by the Environmental Utilities Director, if located within 1,000-feet of an occupied residence.</p>	<p>Building Inspector shall review plans for inclusion of these measures prior to issuance of building permits. The Code Enforcement Inspector shall respond to complaints.</p>	<p>permits and/or building permits.</p>	<p>Building Official, Code Enforcement Inspector</p>	<p>Building Permit Plans</p>	
<p>SVSP EIR MM 4.8-3. Avoid Nesting Sites</p> <p>To ensure that fully protected bird and raptor species are not injured or disturbed by construction in the vicinity of nesting habitat, the project applicant shall implement the following measures:</p> <p>Raptors</p> <p>a) When feasible, all tree removal shall occur between August 30th and February 15th to avoid the breeding season of any raptor species that could be using the area, and to discourage hawks from nesting in the vicinity of an upcoming construction area.</p> <p>b) For Swainson's hawk, if avoidance of tree removal outside the breeding season is not feasible, and a nest is present, the applicants would be required to obtain a 2081 permit from CDFG to mitigate for potential "take" under CESA. If no nesting is occurring, a take permit would not be required.</p> <p>c) Prior to the beginning of mass grading, including grading for major infrastructure improvements, during the period between February 15th and August 30th, all trees and potential burrowing owl habitat within 350 feet of any grading or earthmoving activity shall be surveyed for active raptor nests or burrows by a qualified biologist no more than 30-days prior to disturbance. If</p>	<p>Results of preconstruction surveys shall be submitted to the Chief Building Inspector prior to the issuance of a grading permit. Applicable construction restrictions shall be reflected within building plans. The applicants shall prepare annual reports on the status and success of mitigation and shall submit these reports to USFWS and CDFG. The applicants shall coordinate with USFWS and CDFG to modify as</p>	<p>Prior to approval of grading and building permits.</p>	<p>Chief Building Inspector, Building Official, Code Enforcement Inspector, Environmental Coordinator</p>	<p>Nesting Bird Surveys</p>	



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<p>active raptor nests or burrows are found, and the site is within 350-feet of potential construction activity, a highly visible temporary fence shall be erected around the tree or burrow(s) at a distance of up to 350-feet, depending on the species, from the edge of the canopy to prevent construction disturbance and intrusions on the nest area.</p> <p>d) Preconstruction and non-breeding season exclusion measures shall be developed in consultation with CDFG, and shall preclude burrowing owl occupation of the portions of the project site subject to disturbance such as grading. Burrowing owls may be passively excluded from burrows in construction areas by placing one-way doors in the burrows according to CDFG protocol. The one-way doors must be in place for a minimum of three days. All burrows that may be occupied by burrowing owls regardless of whether they exhibit signs of occupation must be cleared with the one way doors. Burrows that have been cleared through the use of the one-way doors shall then be closed or backfilled to prevent owls from entering the burrow.</p> <p>e) No construction vehicles shall be permitted within restricted areas (i.e., raptor protection zones) unless directly related to the management or protection of the legally protected species.</p> <p>f) If a legally protected species nest is located in a tree designated for removal, the removal shall be deferred until after August 30th or until the adults and young of the year are no longer dependent on the nest site as determined by a qualified biologist.</p> <p><b>Black Rails and Tri-colored Blackbirds</b></p> <p>Prior to earth moving that would disturb marsh habitat, a qualified biologist shall conduct surveys to determine the presence of the California black rail. If either of these species is found, all earth moving within 250 feet shall stop and measures, including establishing nest protection buffers along both sides of Curry Creek during the nesting season (generally February 1 through August 31st) shall be implemented.</p> <p><b>Rookeries</b></p> <p>No heron rookeries are present within the plan area. Prior to earthmoving that would disturb marsh habitat or tree removal of the eucalyptus grove, pre-construction surveys should be conducted to verify that no rookeries have been established. If rookeries are present all earth moving within 250-feet shall stop, during the breeding season.</p>	<p>necessary any mitigation plans in an effort to attain mitigation success.</p>				



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<p>SVSP EIR MM 4.8-4. Onsite and Offsite Grassland Preservation</p> <p>Swainson's Hawk</p> <p>a) CDFG recommends that projects that result in the loss of potential foraging habitat for Swainson's hawk (which includes grasslands) within 10-miles of an active nest site provide mitigation for that loss. To the extent feasible, strategies for preserving on-site grasslands as raptor and migratory bird foraging habitat will be addressed in the Operations and Maintenance Plan prepared pursuant to the Section 404 Permit. Some of these strategies could include; but are not necessarily limited to, grazing for grassland management, monitoring for biological values, and adaptive management. Mitigation for Swainson's hawk foraging habitat would concurrently mitigate for loss of habitat for a number of other wildlife species in the region such as burrowing owl, red-tailed hawk, white-tailed kite, northern harrier, Ferruginous hawk, and logger-head shrike among others.</p> <p>Based on information obtained through consultation with CDFG and otherwise, a Swainson's Hawk Grassland Habitat Mitigation Plan shall be developed to mitigate for the loss of grassland foraging habitat, consistent with the ratios set forth in Table 4.8-7. Areas within Placer County including the Toad Hill Mitigation Bank, the Western Placer Schools Mitigation Area and a portion of Koshman Ranch and other sites that will be located within Placer County via conservation easements or other mechanisms would provide a total of 1,036 upland/grassland acres. This would reduce the impacts to Swainson's Hawk to a less than significant level.</p> <p>[See Table 4.8-8 in SVSP EIR]</p> <p>Long-billed Curlew, Burrowing Owls</p> <p>Mitigation for the Swainson's hawk would ensure that adequate grassland is preserved at ratios identified in Table 4.8-7. For foraging within one mile of an active nest, mitigation would be 1:1. Greater than a mile would be at an amount of .75:1. This would set aside adequate grassland that would reduce impacts from loss of grasslands to these species to a less than significant level.</p>	The applicant shall submit documentation certifying that grassland habitat has obtained to the City's Environmental Coordinator.	Prior to grading plan approval.	Environmental Coordinator	Documentation of Conservation Easements	
SVSP EIR MM 4.8-5. Wildlife Movement Protection Policies	The Applicant shall enter into a Section	Prior to approval of	NPDES Coordinator	1600 Alteration Agreement	



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<p>To protect the long term habitat of the stream channels and the WAPA corridor and their potential use by wildlife as movement corridors, the project applicants shall ensure that movement corridors are not obstructed. Through compliance with Section 1600 of the CDFG Code, the applicant(s) will enter into a Streambed Alteration Agreement prior to conducting any construction activities within a stream corridor, which sets forth mitigation measures that the applicant must implement. These measures shall include, but not be limited to; the use of either bridges or culverts that are large enough that wildlife have enough space to pass through road crossings without having to travel over the road surface, the implementation of bank stabilization measures, and/or restoration and re-vegetation of stream corridor habitat that has been damaged due to the project's construction. Furthermore, the recreational trails shall be lined by post and rail fence and signage would be used to direct trail users to stay within the designated trail corridor. The trails would be closed after dark and no exterior lighting would be used. Lastly, the implementation of MM 4.8-1 which provides for the conservation of onsite open space along the WAPA corridor and the stream channels would ensure adequate opportunities for wildlife movement through the plan area.</p>	<p>1600 Streambed Alteration Agreement with CDFG. The City's NPDES Coordinator shall ensure measures are included in the project to reduce water quality impacts.</p>	<p>grading permits.</p>	<p>r, Environmental Coordinator</p>		
<p>SVSP EIR MM 4.8-7. Offsite Surveys</p> <p>Prior to construction of any off- site infrastructure, a qualified biologist shall perform detailed, and if necessary, focused biological surveys of any undisturbed areas that would be affected by infrastructure development. Because infrastructure for the proposed project would be located in road right-of-way, or undeveloped land similar to the project site, the biological resources that would be expected to occur would not differ substantially from those identified in this EIR. If it is determined that wetland resources or sensitive species would be impacted MM 4.8-1 and MM 4.8-2 shall be implemented, as appropriate to the resource. If it is determined that active nests exist within the off-site improvement location, MM 4.8-3 shall be implemented as appropriate to the species. If it is determined the off-site improvement is located within or adjacent to a wildlife movement corridor, MM 4.8-5 shall be implemented.</p>	<p>Appropriate biological surveys, environmental review, and appropriate permits shall be conducted in accordance with applicable rules and regulations governing the protection of listed species.</p>	<p>Prior to issuance of grading permit.</p>	<p>Public Works Director, Environmental Coordinator</p>	<p>Biological Survey</p>	
<p>SVSP EIR MM 4.9-1. Cease Work and Consult with Qualified Archaeologist</p> <p>Should any cultural resources, such as structural features, any amount of bone or shell, artifacts, human remains, or architectural remains, be encountered</p>	<p>This condition shall be reflected in all construction and building plans. The Public Works Director</p>	<p>Prior to issuance of grading permit and/or</p>	<p>Public Works Director, Building Official,</p>	<p>Measure to be reflected on all construction plans</p>	



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<p>during any subsurface development activities, work shall be suspended within 100-feet of the find. The City of Roseville Planning and Public Works Staff shall be immediately notified. At that time, the City of Roseville shall coordinate any necessary investigation of the site with qualified archaeologists as needed, to assess the resource (i.e., whether it is an “historical resource” or a “unique archaeological resource”) and provide proper management recommendations should potential impacts to the resources be found to be significant. Possible management recommendations for important resources could include resource avoidance or, where avoidance is infeasible in light of project design or layout or is unnecessary to avoid significant effects, data recovery excavations. The contractor shall implement any measures deemed feasible and necessary by City staff, in consultation with the archaeologists, to be to avoid or minimize significant effects to the cultural resources. In addition, pursuant to Section 5097.98 or the State Public Resources Code, and Section 7050.5 of the State Health and Safety Code, in the event of the discovery of human remains, the County Coroner shall be immediately notified. If the remains are determined to be Native American, guidelines of the Native American Heritage Commission shall be adhered to in the treatment and disposition of the remains.</p> <p>UPDATED TEXT:</p> <p>Post-Review Discovery Procedures. If subsurface deposits believed to be cultural or human in origin, or tribal cultural resources, are discovered during construction, all work shall halt within a 100-foot radius of the discovery, and the Construction Manager shall immediately notify the City of Roseville Development Services Director by phone. The Construction Manager shall also immediately coordinate with the monitoring archeologist or project archaeologist and tribal monitor(if present), or, in the absence of either, contact consulting tribes and a qualified professional archaeologist, meeting the Secretary of the Interior’s Professional Qualification Standards for archaeology and subject to approval by the City, to evaluate the significance of the find and develop appropriate management recommendations, in coordination with the consulting tribe(s) if the find is a tribal cultural resource.</p> <p>All management recommendations shall be provided to the City in writing for the City’s review and approval. If recommended by the qualified professional archeologist, and consulting tribe(s), and approved by the City, this may include modification of the no-work radius.</p>	<p>shall review plans for inclusion and permits of specifications prior to the issuance of building permits</p>	<p>approval of improvement plans.</p>	<p>Code Enforcement Inspector</p>		



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<p>The professional archaeologist must make a determination, based on professional judgement and supported by substantial evidence, within one business day of being notified, as to whether or not the find represents a cultural or tribal cultural resource or has the potential to be a cultural or tribal cultural resource. The consulting tribe shall also be given the opportunity to provide, within one business day of being notified, a determination as to whether or not the find represents a tribal cultural resource or has the potential to be a tribal cultural resource. The subsequent actions will be determined by the type of discovery, as described below. These include: 1) a work pause that, upon further investigation, is not actually a discovery and the work pause was simply needed in order to allow for closer examination of soil (a “false alarm”); 2) a work pause and subsequent action for discoveries that are clearly not related to tribal resources, such as can and bottle dumps, artifacts of European origin, and remnants of built environment features; and 3) a work pause and subsequent action for discoveries that are likely related to tribal resources, such as midden soil, bedrock mortars, groundstone, or other similar expressions.</p> <p>Whenever there is question as to whether or not the discovery represents a tribal resource, culturally affiliated tribes shall be consulted in making the determination. Whenever a tribal monitor is present, the monitor shall be consulted.</p> <p>The following processes shall apply, depending on the nature of the find, subject to the review and approval of the City:</p> <ul style="list-style-type: none"> <li>• <u>Response to False Alarms:</u> If the professional archaeologist determine that the find is negative for any cultural indicators and tribal representatives have not indicated the find is a tribal cultural resource, then work may resume immediately upon notice to proceed from the City’s representative.. No further notifications or archaeological consultation is necessary if it is determined that the discovery is not a cultural or tribal cultural resource of any kind. The professional archaeologist shall provide written documentation of this finding to the City, which shall include as an attachment any written documentation provided by tribal representatives or monitors.</li> </ul>					



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<ul style="list-style-type: none"> <li>• <u>Response to Non-Tribal Discoveries</u>: If a tribal monitor is not present at the time of discovery and a professional archaeologist determines that the find represents a non-tribal cultural resource from any time period or cultural affiliation, the City shall be notified immediately, to consult on a finding of eligibility and implementation of appropriate treatment measures, if the find is determined to be a Historical Resource under CEQA, as defined in Section 15064.5(a) of the CEQA Guidelines. The professional archaeologist shall provide a photograph of the find and a written description to the City of Roseville. The City of Roseville will notify any [tribe(s)] who, in writing, requested notice of unanticipated discovery of non-tribal resources. Notice shall include the photograph and description of the find, and a tribal representative shall have the opportunity to determine whether or not the find represents a tribal cultural resource. If a response is not received within 24 hours of notification (none of which time period may fall on weekends or City holidays), the City will deem this portion of the measure completed in good faith as long as the notification was made and documented. If requested by a [tribe(s)], the City may extend this timeframe, which shall be documented in writing (electronic communication may be used to satisfy this measure). If a notified tribe responds within 24 hours to indicate that the find represents a tribal cultural resource, then the Response to Tribal Discoveries portion of this measure applies. If the tribe does not respond or concurs that the discovery is non-tribal, work shall not resume within the no-work radius until the City, through consultation as appropriate, determines that the site either: 1) is not a Historical Resource under CEQA, as defined in Section 15064.5(a) of the CEQA Guidelines; or 2) that the treatment measures have been completed to its satisfaction.</li> <li>• <u>Response to Tribal Discoveries</u>: If the find represents a tribal or potentially tribal cultural resource that does not include human remains, the consulting tribe(s) and City shall be notified. The City will consult with the tribe(s) on a finding of eligibility and implement appropriate treatment</li> </ul>					



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<p>measures, if the find is determined to be either a Historical Resource under CEQA, as defined in Section 15064.5(a) of the CEQA Guidelines, or a Tribal Cultural Resource, as defined in Section 21074 of the Public Resources Code. Preservation in place is the preferred treatment, if feasible. Work shall not resume within the no-work radius until the City, through consultation as appropriate, determines that the site either: 1) is not a Historical Resource under CEQA, as defined in Section 15064.5(a) of the CEQA Guidelines; or 2) not a Tribal Cultural Resource, as defined in Section 21074 of the Public Resources Code; or 3) that the treatment measures have been completed to its satisfaction.</p> <ul style="list-style-type: none"> <li>• <u>Response to Human Remains:</u> If the find includes human remains, or remains that are potentially human, the construction supervisor or on-site archaeologist and (if present) tribal monitor shall ensure reasonable protection measures are taken to protect the discovery from disturbance (AB 2641) and shall notify the City and Placer County Coroner (per § 7050.5 of the Health and Safety Code). The provisions of § 7050.5 of the California Health and Safety Code, § 5097.98 of the California Public Resources Code, and Assembly Bill 2641 shall be implemented. If the Coroner determines the remains are Native American and not the result of a crime scene, the Coroner will notify the Native American Heritage Commission (NAHC), which then will designate a Native American Most Likely Descendant (MLD) for the project (§ 5097.98 of the Public Resources Code). The designated MLD will have 48 hours from the time access to the property is granted to make recommendations concerning treatment of the remains. Public Resources Code § 5097.94 provides structure for mediation through the NAHC if necessary. If the landowner does not agree with the recommendations of the MLD, the NAHC can mediate (§ 5097.94 of the Public Resources Code).</li> </ul> <p>If no agreement is reached, the landowner must rebury the remains in a respectful manner where they will not be further disturbed (§ 5097.98 of the Public Resources Code). This will also include either recording the site with the NAHC or the appropriate Information Center; using an open</p>					



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

<b>Mitigation Measure</b>	<b>Implementation</b>	<b>Timing</b>	<b>Reviewing Party</b>	<b>Documents to be Submitted to the City</b>	<b>Staff Use Only</b>
space or conservation zoning designation or easement; or recording a reinterment document with the county in which the property is located (AB 2641). Work shall not resume within the no-work radius until the City, through consultation as appropriate, determines that the treatment measures have been completed to its satisfaction.					
<p>SVSP EIR MM 4.9-3. Cease Work Until Review conducted by Qualified Paleontologist and Recommendations Implemented</p> <p>Should any evidence of paleontological resources (e.g. fossils) be encountered during grading or excavation, work shall be suspended within 100 feet of the find, and the City of Roseville shall be immediately notified. At that time, the City shall coordinate any necessary investigation of the site with a qualified paleontologist to assess the resource and provide proper management recommendations. Possible management recommendations for important resources could include resource avoidance, if feasible in light of project design or layout, or data recovery excavations. The contractor shall implement any measures deemed feasible and necessary by City staff in consultation with the paleontologist for the protection of the paleontological resources.</p>	This condition shall be reflected in all construction and building plans and permits. The Public Works Director shall review plans for inclusion of specifications prior to the issuance of building permits.	During construction, as a condition of Grading and Building Permits.	Public Works Director, Building Official, Code Enforcement Inspector	Measure to be reflected on all construction plans	
<p>SVSP EIR MM 4.10-1. Identify and Remediate Soil Contamination</p> <p>Prior to site development in the SVSP, recommended testing and remediation, if needed shall occur. Groundwater wells shall be properly closed. If evidence of soil contamination, septic tanks, or other underground storage tanks are encountered in previously unidentified locations in the SVSP area, work shall cease until the area can be tested, and if necessary remediated and/or properly removed or closed. Remediation activities could include removal of contaminated soil, and/or onsite treatment. As part of the process, the City shall ensure that any necessary investigation and/or remediation activities are coordinated with the Roseville Fire Department, Placer County Division of Environmental Health, and if needed, other appropriate federal, state and local agencies. Once a site is remediated, construction can continue.</p>	The Applicant shall be responsible for conducting soil testing and/or recommendation of the Phase I environmental site assessments.	Prior to issuance of building permits.	Fire Department	Documentation indicating soil has been remediated	
<p>SVSP EIR MM 4.11-5. Treatment Plant Capacity</p> <p>Prior to obtaining building permits for development that would cause total wastewater flows from SVSP to contribute to total flows at the PGWWTP</p>	The applicant shall demonstrate that the PGWWTP shall be expanded.	Prior to issuance of building permit that	Environmental Utilities Director	Documentation of the measure to be provided	



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<p>exceeding 75 percent utilization of treatment plant capacity (General Plan Policy 3), the City shall confirm that the PGWWTP has adequate capacity and/or will be expanded to accommodate total flow from the SVSP by the time needed to serve that development. This includes obtaining all necessary permits to discharge the treated flow. The City shall also demonstrate that the timing of the plant expansion will be adequate to serve the SVSP area without impeding other planned development within the 2005 SAB. The City shall ensure that all relevant mitigation measures identified in the Wastewater Master Plan EIR are implemented. A list of mitigation measures applicable to this project area are found in Appendix H of this EIR.</p>		<p>would cause total wastewater flows to exceed 75 percent utilization of treatment plant capacity.</p>			
<p>SVSP EIR MM 4.13-1. Implementation of Construction Activity Stormwater Protection Standards</p> <p>Prior to the issuance of a City grading permit and the commencement of construction activities, compliance with the State's General Construction permit, the City of Roseville's Construction Standards, and the City's Stormwater BMP Guidance Manual will be met. This includes the creation of a Storm Water Pollution Prevention Plan (SWPPP) that will identify the site, the location of sensitive habitats or watercourses, drainage areas, discharge locations, soil disturbance areas, and the locations of all runoff, erosion control, and sediment control Best Management Practices (BMPs). On-going monitoring and adjustments to the SWPPP will occur when needed to address changes in the field as construction activities evolve.</p>	<p>This condition shall be reflected in all construction and building plans. The Public Works Director shall review plans for inclusion of specifications prior to the issuance of building permits.</p>	<p>Prior to issuance of grading or building permits.</p>	<p>Public Works Director, Building Official, Code Enforcement Inspector</p>	<p>Measure to be reflected on all construction plans</p>	
<p>SVSP EIR MM 4.14-3. Avoid Light Spillover in Open Space Areas</p> <p>Areas Outdoor lighting shall be placed, designed and directed so as to avoid light spillover into the habitat of Curry Creek and the Open Space Preserve areas located immediately adjacent to the open space, as shown on the Land Use Map as parcels KT-1, KT-40, KT-30, KT-41, DF-1, DF-2, DF-40, CG-1, CG-82m JM-21, JM-3, and JM-4.</p>	<p>The City shall implement policies to reduce the nuisance effects of nighttime/daytime and/or high-intensity illumination from the project.</p>	<p>Prior to issuance of Building Permits; the disclosures shall occur prior to the issuance of Occupancy Permits</p>	<p>Parks and Recreation Director</p>	<p>Plans will be reviewed to ensure compliance</p>	



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
<p>SVSP EIR WMM 4.1-2. Policies to Minimize Agricultural Impacts</p> <p>Condition of Approval for Deed Disclosure and WMM 4.1-2 Policies to Minimize Agricultural impacts; WMM 4.5-2 Construction Noise Policies, and WMM 4.4-3 Reduction of Construction Emissions</p> <p>In order to reduce potential conflicts between sensitive uses and agricultural uses, residential units within 100-feet of undeveloped parcels to the west of the SVSP are where agricultural uses exist shall be provided with a deed disclosure or similar notice approved by the City attorney regarding the proximity and nature of neighboring potential agricultural uses. This disclosure shall be applied at the tentative map stage to the affected properties. A written disclosure shall be supplied to the property purchaser or renter by the vendor prior to the completion of the purchase or rental agreement, until such time, the uses are converted to urban development. The text of the disclosure language shall be approved by the City Attorney.</p> <p>To ensure that residents are made aware of other land uses in proximity to their respective neighborhoods, the developers shall also provide through deed disclosure or other similar notice approved by the City Attorney; proximity to the WAPA corridor and overhead power lines, high pressure gas lines in Baseline Road and Fiddymont Road, use of recycled water, and proximity to parks and schools that may generate noise and light.</p>	<p>The Applicant shall include site-specific design measures, such as setbacks, landscape buffers, building orientation, and appropriate design features, through the specific plan.</p>	<p>Prior to occupancy of any residence or sensitive use.</p>	<p>City Attorney, Public Works Department, Code Enforcement</p>	<p>Included in the SVSP</p>	
<p>SVSP EIR WMM 4.5-2. Construction Noise Policies</p> <p>Condition of Approval for Deed Disclosure and WMM 4.1-2 Policies to Minimize Agricultural impacts; WMM 4.5-2 Construction Noise Policies, and WMM 4.4-3 Reduction of Construction Emissions</p> <p>In order to reduce potential conflicts between sensitive uses and agricultural uses, residential units within 100-feet of undeveloped parcels to the west of the SVSP are where agricultural uses exist shall be provided with a deed disclosure or similar notice approved by the City attorney regarding the proximity and nature of neighboring potential agricultural uses. This disclosure shall be applied at the tentative map stage to the affected properties. A written disclosure shall be supplied to the property purchaser or renter by the vendor prior to the completion of the purchase or rental agreement, until such time, the uses are converted to urban development. The text of the disclosure language shall be approved by the City Attorney.</p>	<p>The Applicant shall include site-specific design measures, such as setbacks, landscape buffers, building orientation, and appropriate design features, through the specific plan.</p>	<p>Prior to occupancy of any residence or sensitive use.</p>	<p>City Attorney, Public Works Department, Code Enforcement</p>	<p>CC&amp;R's shall be submitted for review</p>	



**APPLICABLE MITIGATION MEASURES**  
**from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
To ensure that residents are made aware of other land uses in proximity to their respective neighborhoods, the developers shall also provide through deed disclosure or other similar notice approved by the City Attorney; proximity to the WAPA corridor and overhead power lines, high pressure gas lines in Baseline Road and Fiddymment Road, use of recycled water, and proximity to parks and schools that may generate noise and light.					
SVSP EIR WMM 4.5-8. Onsite Traffic Noise Attenuation  The project developer shall demonstrate through an acoustical study that residences along roadways will be subject to noise levels consistent with the City's standards. The standards could be achieved through a combination of setbacks, soundwalls or other barriers, building orientation or other measures. An acoustical analysis shall be required to demonstrate that these measures will result in acceptable noise levels.	Done	Done	Done	See Attachment 4 of Addendum	
SVSP EIR WMM 4.11.3-2. School Transportation Policies  The applicants shall work with the school districts to identify safe routes to school. The school district should encourage an appropriate mechanism for transporting students to schools, both within the specific plan area, as well as outside the project area. Bus programs would reduce traffic congestion and reduce potential air quality impacts.	Prior to building permits being issued within the SVSP, school transportation policies should be developed in coordination with appropriate school district.	Prior to issuance of Building Permits.	Planning Director, Public Works Director	Done	
SVSP EIR WMM 4.11-7. Expand the WRSL Landfill (occurred)  WMM 4.11-7 Expand the WRSL Landfill Development in the SVSP Area and Urban Reserve shall pay collection fess to the City of Roseville, a portion of which shall be used to service bonds necessary to fund landfill expansion. As a member of the WPWMA, the City of Roseville can support the expansion of the landfill, as needed; however, the City cannot compel the WPWMA to expand the landfill.	The City shall support the WPWMA efforts to expand the Western Regional Sanitary Landfill.	At the time of construction debris will be diverted to an appropriate recycling facility.	Environmental Utilities Director	Done	
SVSP EIR WMM 4.11-11. Divert Construction Debris  The applicants shall ensure a 50% reduction in the development's	The applicant shall submit evidence of their waste diversion plan to	Prior to Building Permit issuance.	Building Division	Records of diversion	



**APPLICABLE MITIGATION MEASURES  
from the Sierra Vista Specific Plan EIR**

Mitigation Measure	Implementation	Timing	Reviewing Party	Documents to be Submitted to the City	Staff Use Only
construction waste stream. In Developer contracts with construction contractors and their sub-contractors, the Developer shall require that construction waste be reduced by 50%. The Developer shall further require that contractors and sub-contractors submit records of diversion and disposal to the City's Environmental Utilities Department in order to verify compliance with this requirement.	the City's Building Division.				
SVSP EIR WMM 4.12-1. Prepare Site Specific Drainage Study  <del>If a larger detention basin near the main branch of Curry Creek is used for the Remainder Area, and includes flows for the WRSP Area, Specific Plans and/or other development proposals for the Remainder Area Urban Reserve shall prepare a site specific drainage study. The study shall identify appropriate sizing and to ensure that Remainder Area Urban Reserve flows, in combination with flows generated in the WRSP Area, can be accommodated in the larger basin. The study shall also be used to identify features that will limit peak flow runoff from the areas drained to Curry Creek to pre-development levels per the PCFCWCD SWMM and City standards. The study shall also be used to demonstrate the larger basin will not cause or exacerbate downstream flooding conditions in the SOI Amendment Area or at downstream locations outside the SOI Amendment area. The drainage study shall be submitted to the PCFCWCD and the City of Roseville for review. If a basin in the Remainder Area is used to store flows generated by sheds C-WP7 and C-WP8 in the WRSP Area, in addition to Remainder Area generated flows, the drainage study shall ensure that sufficient capacity is provided to manage total flows into the basin.</del>	Done	Done	Done	See Attachment 3 of Addendum	
SVSP EIR WMM 4.12-2. Pay fair share of Roseville Regional Stormwater Retention Facility improvements  The City shall collect the Pleasant Grove Drainage fee from the applicants prior to the approval of each building permit, which would cover the cost of retention for that development's portion of the Roseville regional retention basin at Reason Farms.	The City shall collect the Pleasant Grove Drainage fee from applicants.	Prior to the issuance of Building Permits.	Public Works Director	Fees will be collected	