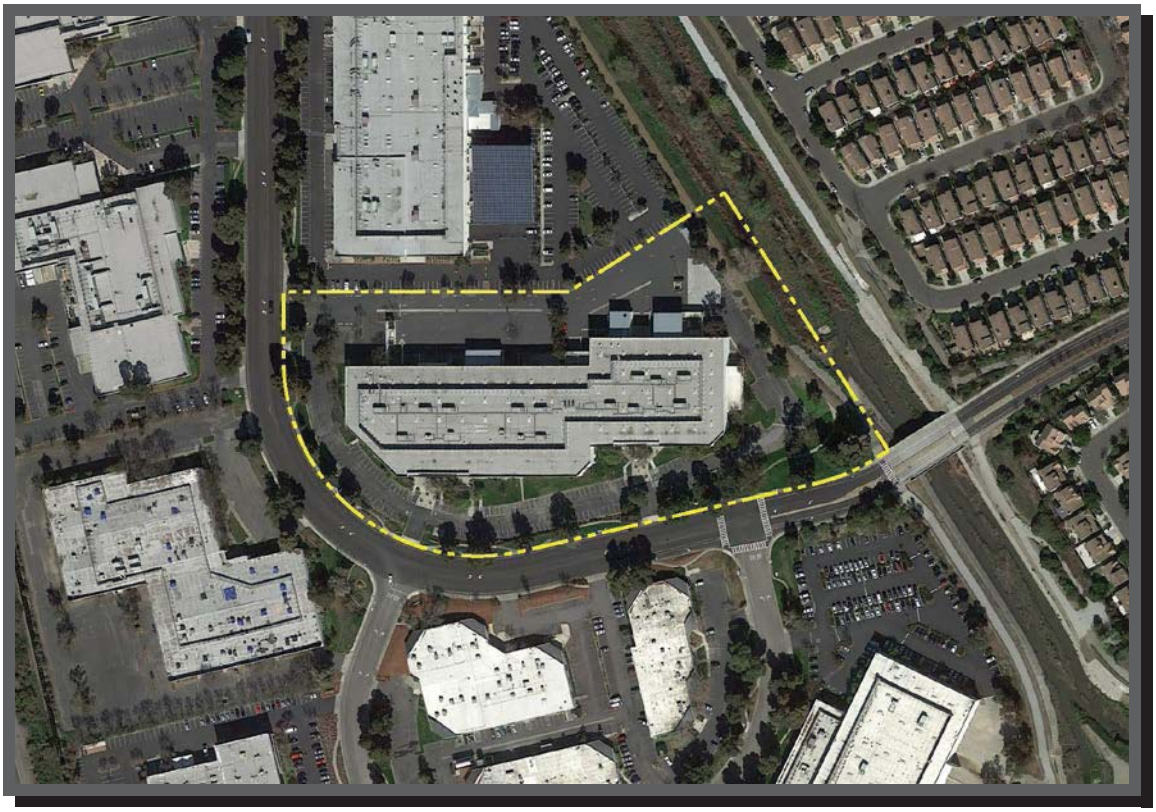
Stormwater Control Plan

CALIFORNIA CIRCLE

MILPITAS, CALIFORNIA



For
Stormwater C.3 Guideline Compliance
with California Circle Vesting Tentative Map

August 15, 2014

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STATE OF CALIFORNIA

TABLE OF CONTENTS

I. PROJECT SETTING 1

A. Project Description 1
B. Site Features and Conditions 1
C. Opportunities and Constraints for Stormwater Control 2
D. Hydromodification Management Requirements 3

II. MEASURES TO LIMIT IMPERVIOUSNESS 4

A. Measures to Cluster Development and Protect Natural Resources 4
B. Measures to Limit Directly Connected Impervious Areas 4
C. Selection of Paving Materials 4

III. SELECTION AND DESIGN OF STORMWATER TREATMENT BMP'S 5

A. Hydrology 5
B. Recommended Permanent BMP's 5

IV. SOURCE CONTROL MEASURES 9

A. Permanent Source Control BMP's 9
B. Operational Source Control BMP's 9

V. PERMITTING AND CODE COMPLIANCE ISSUES 10

VI. BMP MAINTENANCE REQUIREMENTS 11

A. Recommended BMP Maintenance 11

VII. SUMMARY FORMS 13

A. Construction Plan C.3 Checklist 13
B. C.3 Data Form 14
C. SCVURPPP Infiltration Feasibility Form 15

VIII. CERTIFICATION 16

TABLE OF CONTENTS

TABLES

Table 1 Site Data
Table 2 C.3 Runoff Coefficients -"C' Value
Table 3 Preliminary BMP Sizing – Bioretention
Table 4 Preliminary BMP Sizing – Pervious Pavement

FIGURES

Figure 1 Vicinity Map
Figure 2 Aerial Photo
Figure 3 Existing Conditions
Figure 4 Proposed Conditions
Figure 5 Building Treatment Areas
Figure 6 Street Treatment Areas
Figure 7 Self-Treating Areas
Figure 8 Bioretention Detail

APPENDIX

Appendix A SCVURPPP C.3 Stormwater Handbook Bioretention Fact Sheet

I. PROJECT SETTING

A. Project Description

This Stormwater Control Plan (SWCP) for California Circle is submitted to the Engineering Department of the City of Milpitas as an accompaniment to the California Circle Vesting Tentative Map. The SWCP provides recommendations on the use of permanent Best Management Practices (BMP) for the proposed project. Probable design storm flows and permanent BMP selection are presented in this report. BMP technical requirements are presented in the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) C.3 Stormwater Handbook dated April 2012.

The California Circle project is located on the northeastern side of California Circle, as shown in Figure 1. The project is bordered by Penitencia Creek to the east, industrial properties to the north, and California Circle to the south and west. An aerial view of the surrounding area is shown in Figure 2. The improvements to the 9.45± ac site will include 148 multi-family buildings, private roadways, landscaped paseos, and open space.

B. Site Features and Conditions

Existing Conditions

The existing site is located in an area currently used for industrial purposes and contains a large building and its associated parking lots and hardscape. The eastern edge of the project consists of a levee and dirt trail along Penitencia Creek. Elevations range from approximately 25 feet at the southeastern corner of the site to approximately 11 feet along the northern boundary. The existing buildings, paving, concrete, and other impervious surfaces account for approximately 75% (7.0 ac) of the site. The remaining 25% of the site is covered by pervious surfaces consisting of landscaped areas along the California Circle frontage and the Penitencia Creek levee. All existing surface improvements west of the levee will be demolished as part of the project.

The existing surface type and corresponding areas are shown in Table 1 and the existing conditions and storm drain lines are identified in Figure 3.

Proposed Conditions

Upon construction of the proposed improvements, approximately 5.9 acres (63%) will be covered by impervious surface and about 3.5 acres (37%) will be covered by landscaped areas including lawns, shrubs, and trees. All walkways within these areas will be sloped to drain onto the surrounding landscaping. Of the 9.4 acre total project area, only approximately 8.7 acres will be disturbed. No construction is to occur over the approximately 0.7 acres of Penitencia Creek within the project boundary.

The proposed on-site drainage system will consist of six principle drainage areas:

- *Drainage Area 'A'* – Approximately 4.8 acres of the northern portion of the project site will discharge into the existing storm drain line in California Circle. This area will be treated by bioretention areas and pervious pavement before entering the storm drain system.

- *Drainage Area 'B'* – Approximately 0.3 acres at the south western perimeter of the project site will discharge into the existing storm drain stub to the property which ultimately flows into the existing storm drain line in California Circle. This area will be treated by bioretention areas before entering the storm drain system.

- *Drainage Area 'C'* – Approximately 0.9 acres at the southern end of the project site will discharge into the existing storm drain stub to the property which ultimately flows into the existing storm drain line in California Circle. This area will be treated by bioretention areas before entering the storm drain system.

- *Drainage Area 'D'* – Approximately 2.3 acres of the southeastern portion of the project site will discharge into the existing storm drain line in California Circle. This area will be treated by bioretention areas and pervious pavement before entering the storm drain system.

- *Drainage Area 'E'* – Approximately 0.5 acres of the project site along California Circle will discharge into the existing storm drain line in California Circle. This area is a self-retaining area and will discharge directly into the storm drain system.

- *Drainage Area 'F'* – Approximately 0.7 acres of the eastern edge of the project site is within the Penitencia Creek levee. No improvements will be done to this portion of the site. This area is entirely pervious and self-treating. This area will continue to discharge directly into the creek.

The proposed on-site storm drainage system improvements for the site will tie into several existing storm drain stubs as shown in Figure 4.

Pervious and impervious surface areas are shown in Figure 4, and the corresponding land types are presented in Table 1.

C. Opportunities and Constraints for Stormwater Control

Opportunities

- *Landscape Areas* – All landscape areas within the proposed site including open space areas, street frontages, and paseos, provide an opportunity for treatment through bioretention areas. These bioretention areas will be incorporated into the landscape design to provide appropriate vegetation and treatment.

- *Self-Treating/Self-Retaining Areas* – Landscape areas adjacent to sidewalks and other impervious areas provide a treatment option. Drainage from sidewalks that is directed to landscape areas provides treatment options for evapotranspiration and infiltration.

Constraints

- *High Density Land Use* – The site will be largely covered by rooftops and paving with limited open space available to use for both storm water control and site aesthetics (i.e. landscaping).

- *Existing Site* – In order to maintain the structural integrity of the existing Penitencia Creek levee, infiltration and stormwater treatment measures will be limited along the eastern edge of the project.

- *Existing Utilities* – Existing utility vaults and an existing sanitary sewer trunk main encumber the majority of the California Circle frontage which eliminates opportunities for stormwater treatment in these landscape strips.

D. Hydromodification Management Requirements

The proposed project reduces the impervious surface of the site as compared to the existing industrial building on the property. The project site is also within the area defined as draining to a hardened channel or tidal area in the SCVURPPP Handbook. Projects meeting either of these criteria are exempt from the Hydromodification Management Plan requirements.

II. MEASURES TO LIMIT IMPERVIOUSNESS

A. Measures to Cluster Development and Protect Natural Resources

The proposed project was planned with water quality treatment goals at the forefront. Every effort will be made to minimize impervious surfaces and redirect runoff to less pervious surfaces. The Stormwater Control Plan has identified the following design strategies which will aid in achieving these goals.

- The site incorporates 148 residential units into 27 multi-story buildings with two car garages for each unit. This limits the amount of impervious area that may otherwise be associated with on-street parking spaces. Surface parking is provided as necessary to meet the City's requirements without providing excess impervious surface.

- Minimal width sidewalks provide pedestrian access while maximizing pervious landscape areas.

- The project will maintain the natural state of Penitencia Creek and the associated levee by offsetting the development away from the eastern edge of the site to the extent practical.

B. Measures to Limit Directly Connected Impervious Areas

The proposed site layout and building locations offer the possibility of directing stormwater runoff to proposed landscape areas.

Approximately 3.5 acres (37%) of the site will be covered by landscaped or pervious surfaces which include lawn, shrubs, and trees.

- The project will be designed to direct runoff from impervious surfaces into landscape areas or drainage treatment features, such as bioretention areas, where possible.

- Pedestrian pathways within the landscape areas, such as the paseos, will be sloped to drain towards adjacent landscape areas.

C. Selection of Paving Materials

Conventional concrete and asphalt have been selected for use throughout the majority of this site.

Pervious pavement will be used in several of the private drive aisles which will reduce the total imperviousness of the site.

III. SELECTION AND DESIGN OF STORMWATER TREATMENT BMP'S

A. Hydrology

Runoff coefficients for existing and proposed on-site conditions were based on the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) as shown in Table 2.

A rainfall intensity value of *0.2 inches per hour* is used for treatment flows based on the SCVURPPP uniform intensity approach. The weighted runoff coefficient is based on the imperviousness percentage for each particular drainage area. The rational method is used to calculate minimum treatment flows where required for sizing flow-based BMP's.

B. Recommended Permanent BMP's

This SWCP has identified a combination of bioretention, pervious pavement, and landscape treatment as the best methods to fulfill on-site treatment requirements and the recommended BMP solutions are shown in Figures 5-7. These BMP's will provide a level of treatment that meets the C.3 requirements for the runoff generated by the project improvements:

- Selected landscaping areas can be used as bioretention BMP's. Where feasible, adjacent roof, patio and street runoff will be directed to bioretention areas.

- Pervious pavement will act as self-retaining areas. They will reduce the site's total imperviousness and also treat adjoining impervious surfaces, including roofs and roadways.

- Site sidewalks and detached street sidewalks will be directed to landscape areas for treatment. These landscape areas will act as self-retaining treatment areas.

<u>Bioretention</u>

Bioretention treatment areas are designed to filter pollutants from stormwater runoff from adjacent roofs, streets and landscape areas using a combination of vegetation, ponding, permeable planting soil, and a subdrain system. Bioretention treatment areas, which will receive runoff through curb cuts, disconnected downspouts, and the local area drain system, will be located throughout the site and will ultimately discharge into the public storm drain system. The local area drain system will collect runoff from building downspouts and pathways prior to discharging into the bioretention areas. Street runoff will discharge directly into the bioretention areas via curb cuts. One of the larger storm drain mains through the project will have a pump installed to discharge the water quality treatment flows into a central bioretention area in the middle of the project.

Bioretention treatment areas will be sized to maximize treatment for tributary areas. Runoff that is directed into the bioretention areas will infiltrate through a minimum of

18” of biotreatment soil (as identified in the SCVURPPP Handbook). The treatment soil and the planting material to be used within the bioretention treatment areas must have an infiltration rate of 5 inches per hour to meet the minimum infiltration criteria as described in the SCVURPPP bioretention design and sizing guidelines.

Each bioretention area is equipped with a bypass pipe that will direct excess water directly into the drainage system. In all cases, the rim of the overflow pipe will be set to meet the minimum ponding depth requirements for each individual bioretention area.

Sizing of the bioretention areas is calculated using the Uniform Intensity Method. Bioretention areas will be sized to have a surface area equivalent to 4% of the contributing impervious area. Table 3 provides a spreadsheet of the drainage areas and the corresponding bioretention sizing.

Pervious Pavement

Pervious pavement is designed to allow stormwater runoff to permeate through the pavement and be stored within the voids of the rock roadway base where it will ultimately be allowed to infiltrate into the earth. Pervious pavement thereby reduces the total runoff and imperviousness of the site. Areas in which pervious pavement are used act as self-retaining areas which can treat adjoining roof areas at a ratio of 2:1 (tributary impervious area to pervious pavement area).

Table 4 shows the ratios of pervious pavement areas to tributary impervious roof areas for each drainage area. During final design, the ultimate roadway section for the pervious pavement will be sized to provide adequate storage capacity to accept the adjacent roof runoff.

Drainage Areas

Proposed Drainage Area 'A'

Proposed Drainage Area 'A' includes approximately 4.8 acres of roadway, roofs, sidewalk, and landscaping. Building downspouts will direct runoff to bioretention areas, and curb cuts will allow water to enter street-side bioretention areas. A pump will be installed to direct runoff conveyed by the proposed storm drain system into a large bioretention area at the center of the site. This drainage area will be treated by a combination of pervious pavement and bioretention areas.

- Bioretention Areas 1-9, 19-20 & 24-25 (Sizing per Table 3 and Locations per Figures 5-6)
- Pervious Pavement Areas 32-33 (Sizing per Table 4 and Locations per Figure 6)
- Self-Treating & Self-Retaining Landscape Areas (see Figure 7)

Proposed Drainage Area 'B'

Proposed Drainage Area 'B' includes approximately 0.3 acres of roofs, paseos, and landscaping. This drainage area will be treated by bioretention areas.

- Bioretention Areas 10-12 (Sizing per Table 3 and Locations per Figures 5-6)
- Self-Treating & Self-Retaining Landscape Areas (see Figure 7)

Proposed Drainage Area 'C'

Proposed Drainage Area 'C' includes approximately 0.9 acres of roadway, roofs, sidewalk, and landscaping. This drainage area will be treated by bioretention areas.

- Bioretention Areas 13-14, 16-17 & 26 (Sizing per Table 3 and Locations per Figures 5-6)
- Self-Treating & Self-Retaining Landscape Areas (see Figure 7)

Proposed Drainage Area 'D'

Proposed Drainage Area 'D' includes approximately 2.3 acres of roadway, roofs, sidewalk, and landscaping. This drainage area will be treated by a combination of bioretention areas and pervious pavement.

- Bioretention Areas 15, 18, 21-23, 27-30 (Sizing per Table 3 and Locations per Figures 5-6)
- Pervious Pavement Area 31 (Sizing per Table 4 and Locations per Figure 6)
- Self-Treating & Self-Retaining Landscape Areas (see Figure 7)

Proposed Drainage Area 'E'

Proposed Drainage Area 'E' includes approximately 0.5 acres of sidewalk and landscaping. This drainage area will be treated by self-retaining landscape strips adjacent to the sidewalk.

- Self-Treating & Self-Retaining Landscape Areas (see Figure 7)

Proposed Drainage Area ‘F’

Proposed Drainage Area ‘F’ includes approximately 0.7 acres of open space along Penitencia Creek. This drainage area will not be disturbed through project construction and will continue to act as a self-treating area.

- Self-Treating Landscape Areas (see Figure 7)

Maintenance procedures for the recommended BMPs are outlined in Section VI, BMP Maintenance Requirements.

IV. SOURCE CONTROL MEASURES

A. Permanent Source Control BMP's

- *On-Site Drain Inlets* – On-site inlets will be impressed with "NO DUMPING - DRAINS TO BAY."

- *Landscape / Outdoor Pesticide Use* – Landscaping will be designed to minimize required irrigation and runoff, to promote surface infiltration, and to minimize the use of fertilizers and pesticides that can contribute to storm water pollution. Where possible, pest-resistant plants will be selected, especially for locations adjacent to hardscape. Plants will be selected appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.

- *Refuse Areas* – A covered or enclosed area shall be provided for dumpsters. The area shall be designed to prevent water run-on to the area and run-off from the area.

- *Regular Street Sweeping* – Routine street sweeping will be conducted to remove debris and ensure permeability of pervious pavement.

B. Operational Source Control BMP's

- *On-site Drain Inlets* – Inlet markings will be inspected annually and replaced or renewed as needed.

- *Private Streets* – Owner of private streets and storm drains shall prepare and implement a plan for street sweeping of paved private roads and cleaning of all storm drain inlets.

- *Paved Sidewalks and Parking Lots* – Sidewalks and parking lots shall be swept regularly to prevent the accumulation of litter and debris.

- *Landscape / Outdoor Pesticide Use* – All on-site landscaping is to be privately maintained by the property owner using Integrated Pest Management (IPM) principles, with minimal or no use of pesticides.

V. PERMITTING AND CODE COMPLIANCE ISSUES

There are no known conflicts between the proposed Stormwater Control Plan and the City of Milpitas ordinances and policies. Any conflicts that are found will be resolved through the design review process or during subsequent permitting.

VI. BMP MAINTENANCE REQUIREMENTS

A. Recommended BMP Maintenance

Proper operation and maintenance of stormwater management facilities will be the responsibility of the property owner in perpetuity. The property owner will be subject to an annual fee (set by the City's standard fee schedule) to offset the cost of inspecting the site or verifying that the stormwater management facilities are being maintained.

The applicant will prepare and submit, for the City's review, an acceptable Stormwater Control Operation and Maintenance Plan prior to the completion of construction and will execute a Stormwater Management Facilities Operation and Maintenance Agreement before sale, transfer, or permanent occupancy of the site. The applicant accepts the responsibility for maintenance of stormwater management facilities until such responsibility is transferred to another entity.

Treatment BMP's require minimum maintenance similar to that for any landscape areas. BMP's must be regularly maintained to insure that they continue to be effective and do not cause flooding or other harmful nuisances. The maintenance requirements are:

<u>Bioretention Areas</u>

- Limit the use of fertilizers and/or pesticides. Mosquito larvicides should be applied only when absolutely necessary.

- Replace and amend plants and soils as necessary to insure the planters are effective and attractive. Plants must remain healthy and trimmed if overgrown. Soils must be maintained to efficiently filter the storm water.

- Visually inspect for ponding water to ensure that filtration is occurring.

- After all major storm events, remove trash, inspect drain pipes and bubble-up risers for obstructions, and remove if necessary.

- Continue general landscape maintenance, including pruning and cleanup throughout the year.

- Irrigate throughout the dry season. Irrigation will be provided with sufficient quantity and frequency to allow plants to thrive.

- Excavate, clean and or replace filter media (sand, gravel, topsoil) to insure adequate infiltration rate (annually or as needed).

Pervious Concrete Paving

- Regular sweeping of pervious surfaces to remove large debris.

- Annual pressure washing of pervious surfaces.

Landscape Areas (Self-Treating and Self-Retaining Areas)

- Limit the use of fertilizers and/or pesticides. Mosquito larvicides should be applied only when absolutely necessary.

- Replace and amend plants and soils as necessary to insure the planters are effective and attractive. Plants must remain healthy and trimmed if overgrown. Soils must be maintained to efficiently filter the storm water.

- After all major storm events, remove trash and inspect drain pipes for obstructions and remove if necessary.

- Continue general landscape maintenance, including pruning and cleanup throughout the year.

- Irrigate throughout the dry season. Irrigation will be provided with sufficient quantity and frequency to allow plants to thrive.

VII. SUMMARY FORMS

A. Construction Plan C.3 Checklist

Stormwater Control Plan Page #	BMP Description	See Plan Sheet #s
Figure 5, Figure 6, Figure 8	Bioretention Area	
Figure 7, Appendix A	Pervious Paving	
Figure 7	Self-Treating & Self-Retaining Landscape	
Section IV	Inlets that could be accessed from sidewalks or driveways are to be marked with "no dumping" message	
Section IV	Adequate trash receptacles throughout common areas	

B. C.3 Data Form

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

PROVISION C.3 DATA FORM

Which Projects Must Comply with Stormwater Requirements?

All projects that create and/or replace **10,000 sq. ft.** or more of impervious surface on the project site must fill out this worksheet and submit it with the development project application.

All restaurants, auto service facilities, retail gasoline outlets, and uncovered parking lot projects (stand-alone or part of another development project, including the top uncovered portion of parking structures) that create and/or replace **5,000 sq. ft.** or more of impervious surface on the project site must also fill out this worksheet.

Interior remodeling projects, routine maintenance or repair projects such as re-roofing and re-paving, and single family homes that are not part of a larger plan of development are **NOT** required to complete this worksheet.

What is an Impervious Surface?

An impervious surface is a surface covering or pavement that prevents the land's natural ability to absorb and infiltrate rainfall/stormwater. Impervious surfaces include, but are not limited to rooftops, walkways, paved patios, driveways, parking lots, storage areas, impervious concrete and asphalt, and any other continuous watertight pavement or covering. Pervious pavement, underlain with pervious soil or pervious storage material (e.g., drain rock), that infiltrates rainfall at a rate equal to or greater than surrounding unpaved areas OR that stores and infiltrates the water quality design volume specified in Provision C.3.d of the Municipal Regional Stormwater Permit (MRP), is not considered an impervious surface.

For More Information

For more information regarding selection of Best Management Practices for stormwater pollution prevention or stormwater treatment contact:_____

1. Project Information

Project Name: California Circle **APN #** 022-37-017

Project Address: 1210 California Circle, Milpitas, CA

Cross Streets:_____

Applicant/Developer Name: iStar Financial, Inc

Project Phase(s): 1 **of** 1 **Engineer:** Carlson, Barbee & Gibson

Project Type (Check all that apply): ☐ New Development ☒ Redevelopment

☒ Residential ☐ Commercial ☐ Industrial ☐ Mixed Use ☐ Public ☐ Institutional

☐ Restaurant ☐ Uncovered Parking ☐ Retail Gas Outlet ☐ Auto Service (SIC code)_____
(5013-5014, 5541, 7532-7534, 7536-7539)

☐ Other _____

Project Description: 148 Unit Multi-Family Residential

Project Watershed/Receiving Water (creek, river or bay): Lower Penitencia Creek

2. Project Size

a. Total Site Area: 9.4 acre	b. Total Site Area Disturbed: 8.7 acre (including clearing, grading, or excavating)			
	Existing Area (ft^2)	Proposed Area (ft^2)		Total Post-Project Area (ft^2)
		Replaced	New	
Impervious Area				
Roof			130,000	130,000
Parking				
Sidewalks and Streets			127,500	127,500
c. Total Impervious Area	307,000		257,500	257,500
d. Total new and replaced impervious area		257,500		
Pervious Area				
Landscaping	104,500		133,500	133,500
Pervious Paving			20,500	20,500
Other (e.g. Green Roof)				
e. Total Pervious Area	104,500		154,000	154,000
f. Percent Replacement of Impervious Area in Redevelopment Projects (Replaced Total Impervious Area ÷ Existing Total Impervious Area) x 100% = 84 %				

3. State Construction General Permit Applicability:

a. Is #2.b. equal to 1 acre or more?

☒ Yes, applicant must obtain coverage under the State Construction General Permit (i.e., file a Notice of Intent and prepare a Stormwater Pollution Prevention Plan) (see www.swrcb.ca.gov/water_issues/programs/stormwater/construction.shtml for details).

☐ No, applicant does not need coverage under the State Construction General Permit.

4. MRP Provision C.3 Applicability:

a. Is #2.d. equal to **10,000** sq. ft. or more, or **5,000** sq. ft. or more for restaurants, auto service facilities, retail gas outlets, and uncovered parking?

*(*Note that for public projects, the 5,000 sq. ft. threshold does not take effect until 12/1/12.)*

☒ Yes, C.3. source control, site design and treatment requirements apply

☐ No, C.3. source control and site design requirements may apply – check with local agency

b. Is #2.f. equal to 50% or more?

☒ Yes, C.3. requirements (site design and source control, as appropriate, and stormwater treatment) apply to entire site

☐ No, C.3. requirements only apply to impervious area created and/or replaced

5. Hydromodification Management (HM) Applicability:

a. Does project create and/or replace one acre or more of impervious surface AND is the total post-project impervious area greater than the pre-project (existing) impervious area?

☐ Yes (continue) ☒ No – exempt from HM, go to page 3

b. Is the project located in an area of HM applicability (green area) on the HM Applicability Map? (www.scvurppp-w2k.com/hmp_maps.htm)

☐ Yes, project must implement HM requirements

☒ No, project is exempt from HM requirements

6. Selection of Specific Stormwater Control Measures:

Site Design Measures

- ☐ Minimize land disturbed
- ☒ Minimize impervious surfaces
- ☐ Minimum-impact street or parking lot design
- ☒ Cluster structures/ pavement
- ☒ Disconnected downspouts
- ☒ Pervious pavement
- ☐ Green roof
- ☐ Microdetention in landscape
- ☒ Other self-treating area
- ☒ Self-retaining area
- ☐ Rainwater harvesting and use (e.g., rain barrel, cistern connected to roof drains) [1]
- ☒ Preserved open space: 0.7 ac. or sq. ft .(circle one)
- ☐ Protected riparian and wetland areas/buffers (Setback from top of bank: _____ft.)
- ☐ Other _____

Source Control Measures

- ☐ Alternative building materials
- ☐ Wash area/racks, drain to sanitary sewer[2]
- ☒ Covered dumpster area, drain to sanitary sewer[2]
- ☐ Sanitary sewer connection or accessible cleanout for swimming pool/spa/fountain[2]
- ☒ Beneficial landscaping (minimize irrigation, runoff, pesticides and fertilizers; promotes treatment)
- ☐ Outdoor material storage protection
- ☐ Covers, drains for loading docks, maintenance bays, fueling areas
- ☒ Maintenance (pavement sweeping, catch basin cleaning, good housekeeping)
- ☒ Storm drain labeling
- ☐ Other _____

Treatment Systems

- ☐ None (all impervious surface drains to self-retaining areas)

LID Treatment

- ☐ Rainwater harvest and use (e.g., cistern or rain barrel sized for C.3.d treatment)
- ☐ Infiltration basin
- ☐ Infiltration trench
- ☐ Exfiltration trench
- ☒ Underground detention and infiltration system (e.g. pervious pavement drain rock, large diameter conduit)

Biotreatment [3]

- ☒ Bioretention area
- ☐ Flow-through planter
- ☐ Tree box with bioretention soils
- ☐ Other _____

Other Treatment Methods

- ☐ Proprietary tree box filter[4]
- ☐ Media filter (sand, compost, or proprietary media)[4]
- ☐ Vegetated filter strip[5]
- ☐ Dry detention basin[5]
- ☐ Other _____

Flow Duration Controls for Hydromodification Management (HM)

- ☐ Detention basin
- ☐ Underground tank or vault
- ☐ Bioretention with outlet control
- ☐ Other _____

[1] Optional site design measure; does not have to be sized to comply with Provision C.3.d treatment requirements.
[2] Subject to sanitary sewer authority requirements.
[3] Biotreatment measures are allowed only with completed feasibility analysis showing that infiltration and rainwater harvest and use are infeasible.
[4] These treatment measures are only allowed if the project qualifies as a "Special Project".
[5] These treatment measures are only allowed as part of a multi-step treatment process.

7. Treatment System Sizing for Projects with Treatment Requirements

Indicate the hydraulic sizing criteria used and provide the calculated design flow or volume:

Treatment System Component	Hydraulic Sizing Criteria Used[3]	Design Flow or Volume (cfs or cu.ft.)
Bioretention Areas	2c	cfs

[3]Key: 1a: Volume – WEF Method
1b: Volume – CASQA BMP Handbook Method
2a: Flow – Factored Flood Flow Method
2b: Flow – CASQA BMP Handbook Method
2c: Flow – Uniform Intensity Method
3: Combination Flow and Volume Design Basis

8. Alternative Certification: Was the treatment system sizing and design reviewed by a qualified third-party professional that is not a member of the project team or agency staff?

☐ Yes ☒ No Name of Reviewer _____

9. Operation & Maintenance Information

A. Property Owner's Name _____

B. Responsible Party for Stormwater Treatment/Hydromodification Control O&M:

a. Name: _____

b. Address: _____

c. Phone/E-mail: _____

This section to be completed by Municipal staff.

O&M Responsibility Mechanism

Indicate how responsibility for O&M is assured. Check all that apply:

☐ O&M Agreement

☐ Other mechanism that assigns responsibility (describe below):

_____

_____

Reviewed:

Community Development Department

Planning Division: _____

Building Division: _____

Public Works Department

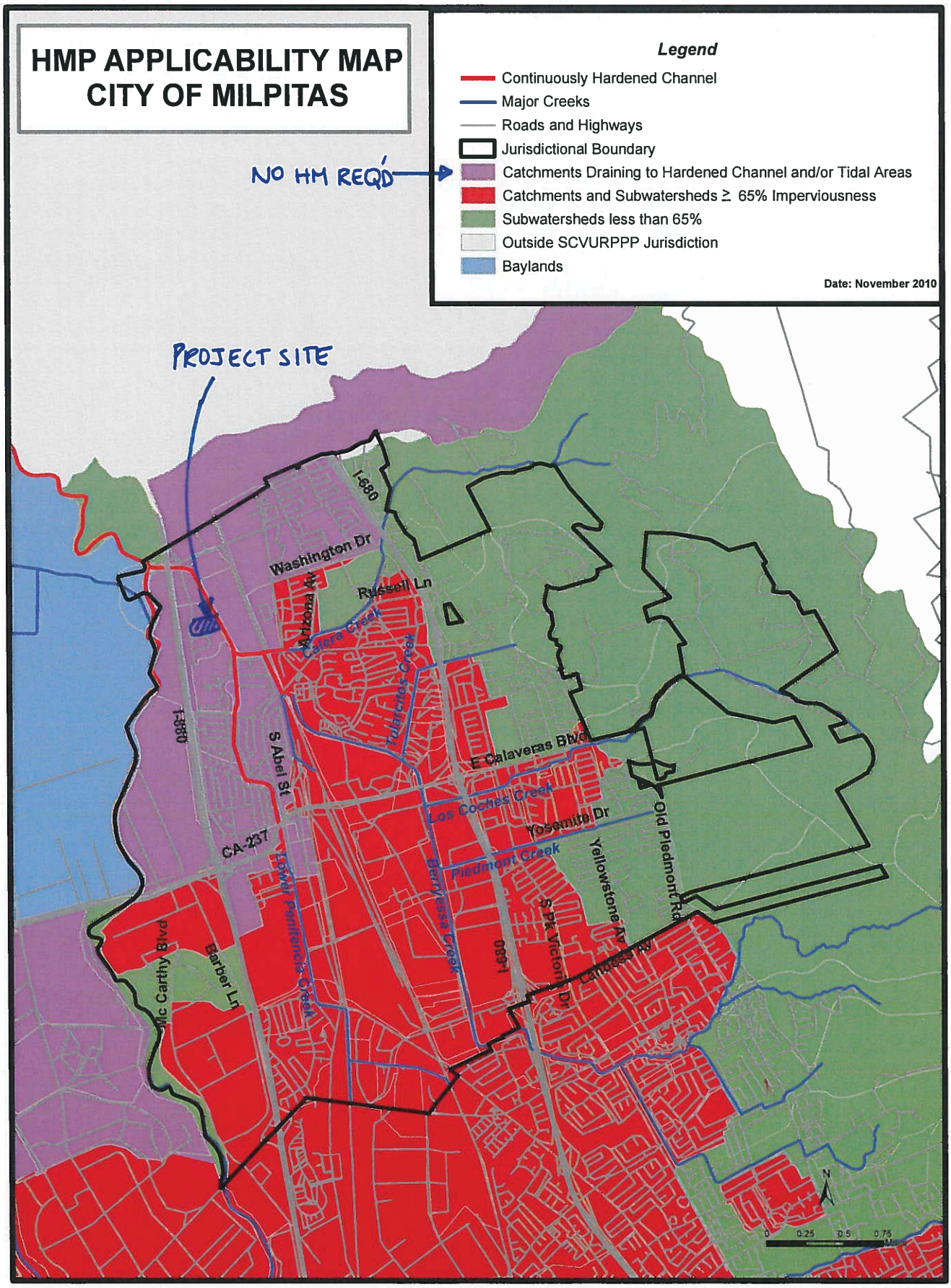
Engineering: _____

Other (Specify): _____

Return form to: _____

Data entry performed by: _____

HMP APPLICABILITY MAP
CITY OF MILPITAS



C. SCVURPPP Infiltration/Harvesting and Use Feasibility Screening Worksheet

Infiltration/Harvesting and Use Feasibility Screening Worksheet

Apply these screening criteria for ***C.3 Regulated Projects**** *required to implement Provision C.3 stormwater treatment requirements. See the Glossary (Attachment 1) for definitions of terms marked with an asterisk (*). Contact municipal staff to determine whether the project meets* ***Special Project**** *criteria. If the project meets Special Project criteria, it may receive LID treatment reduction credits.*

1. Applicant Info

Site Address: 1210 California Circle, Milpitas, CA APN: 022-37-017

Applicant Name: iStar Financial, Inc Phone No.: 415-391-4300

Mailing Address: 1 Sansome Street, 30th Floor, San Francisco, CA 94104

2. Feasibility Screening for Infiltration

Do site soils either (a) have a **saturated hydraulic conductivity*** (Ksat) that will NOT allow infiltration of 80% of the annual runoff (that is, the Ksat is LESS than 1.6 inches/hour), or, if the Ksat rate is not available, (b) consist of Type C or D soils?[1]

☒ Yes (continue) ☐ No – complete the Infiltration Feasibility Worksheet. If infiltration of the C.3.d amount of runoff is found to be feasible, there is no need to complete the rest of this screening worksheet.

3. Recycled Water Use

Check the box if the project is installing and using a recycled water plumbing system for non-potable water use.

☐ The project is installing a recycled water plumbing system, and installation of a second non-potable water system for harvested rainwater is impractical, and considered infeasible due to cost considerations. Skip to Section 6.

4. Calculate the Potential Rainwater Capture Area* for Screening of Harvesting and Use

Complete this section for the entire project area. If rainwater harvesting and use is infeasible for the entire site, and the project includes one or more buildings that each have an individual roof area of 10,000 sq. ft. or more, then complete Sections 4 and 5 of this form for each of these buildings.

4.1 Table 1 for (check one): ☒ The whole project ☐ Area of 1 building roof (10,000 sq.ft. min.)

Table 1: Calculation of the Potential Rainwater Capture Area*

The Potential Rainwater Capture Area may consist of either the entire project area or one building with a roof area of 10,000 sq. ft. or more.

	1	2	3	4
	Pre-Project Impervious surface[2] (sq.ft.), if applicable	Proposed Impervious Surface[2] (IS), in sq. ft.		Post-project landscaping (sq.ft.), if applicable
		Replaced[3] IS	Created[4] IS	
a. Enter the totals for the area to be evaluated:	307,000		257,500	133,500
b. Sum of replaced and created impervious surface:	N/A	257,500		N/A
c. Area of existing impervious surface that will NOT be replaced by the project.	0	N/A		N/A

[1] Base this response on the site-specific soil report, if available. If this is not available, consult soil hydraulic conductivity maps in Attachment 3.
[2], Enter the total of all impervious surfaces, including the building footprint, driveway(s), patio(s), impervious deck(s), unroofed porch(es), uncovered parking lot (including top deck of parking structure), impervious trails, miscellaneous paving or structures, and off-lot impervious surface (new, contiguous impervious surface created from road projects, including sidewalks and/or bike lanes built as part of new street). Impervious surfaces do NOT include vegetated roofs or pervious pavement that stores and infiltrates rainfall at a rate equal to immediately surrounding, unpaved landscaped areas, or that stores and infiltrates the **C.3.d amount of runoff***.
[3] "Replaced" means that the project will install impervious surface where existing impervious surface is removed.
[4] "Created" means the project will install new impervious surface where there is currently no impervious surface.
* For definitions, see Glossary (Attachment 1).

4.2 Answer this question ONLY if you are completing this section for the entire project area. If existing impervious surface will be replaced by the project, does the area to be replaced equal 50% or more of the existing area of impervious surface? *(Refer to Table 1, Row "a". Is the area in Column 2 > 50% of Column 1?)*

☒ Yes, C.3. stormwater treatment requirements apply to areas of impervious surface that will remain in place as well as the area created and/or replaced. This is known as the 50% rule.

☐ No, C.3. requirements apply only to the impervious area created and/or replaced.

4.3 Enter the square footage of the **Potential Rainwater Capture Area***. If you are evaluating only the roof area of a building, or you answered "no" to Question 4.2, this amount is from Row "b" in Table 1. If you answered "yes" to Question 4.2, this amount is the sum of Rows "b" and "c" in Table 1.:

257,500 square feet.

4.4 Convert the measurement of the **Potential Rainwater Capture Area*** from square feet to acres (divide the amount in Item 4.3 by 43,560):

5.9 acres.

5. Feasibility Screening for Rainwater Harvesting and Use

5.1 Use of harvested rainwater for landscape irrigation:

Is the onsite landscaping LESS than 2.5 times the size of the **Potential Rainwater Capture Area*** (Item 4.3)? (Note that the landscape area(s) would have to be contiguous and within the same Drainage Management Area to use harvested rainwater for irrigation via gravity flow.)

☒ Yes (continue) ☐ No – Direct runoff from impervious areas to **self-retaining areas*** OR refer to Table 11 and the curves in Appendix F of the LID Feasibility Report to evaluate feasibility of harvesting and using the C.3.d amount of runoff for irrigation.

5.2 Use of harvested rainwater for toilet flushing or non-potable industrial use:

a. Residential Projects: Proposed number of dwelling units: 148

Calculate the dwelling units per impervious acre by dividing the number of dwelling units by the acres of the **Potential Rainwater Capture Area*** in Item 4.4. Enter the result here:

25.1)

Is the number of dwelling units per impervious acre LESS than 100 (assuming 2.7 occupants/unit)?

☒ Yes (continue) ☐ No – complete the Harvest/Use Feasibility Worksheet.

b. Commercial/Industrial Projects: Proposed interior floor area: _____ (sq. ft.)

Calculate the proposed interior floor area (sq.ft.) per acre of impervious surface by *dividing the interior floor area (sq.ft.) by the acres of the* ***Potential Rainwater Capture Area**** *in Item 4.4. Enter the result here:*

_____

Is the square footage of the interior floor space per impervious acre LESS than 70,000 sq. ft.?

☐ Yes (continue) ☐ No – complete the Harvest/Use Feasibility Worksheet

c. School Projects: Proposed interior floor area: _____ (sq. ft.)

Calculate the proposed interior floor area per acre of impervious surface by *dividing the interior floor area (sq.ft.) by the acres of the* ***Potential Rainwater Capture Area**** *in Item 4.4 . Enter the result here:*

_____.

Is the square footage of the interior floor space per impervious acre LESS than 21,000 sq. ft.?

☐ Yes (continue) ☐ No – complete the Harvest/Use Feasibility Worksheet

* For definitions, see Glossary (Attachment 1).

d. Mixed Commercial and Residential Use Projects

- Evaluate the residential toilet flushing demand based on the dwelling units per impervious acre for the residential portion of the project, following the instructions in Item 5.2.a, except you will use a prorated acreage of impervious surface, based on the percentage of the project dedicated to residential use.
- Evaluate the commercial toilet flushing demand per impervious acre for the commercial portion of the project, following the instructions in Item 5.2.a, except you will use a prorated acreage of impervious surface, based on the percentage of the project dedicated to commercial use.

e. Industrial Projects: Estimated non-potable water demand (gal/day): _____

Is the non-potable demand LESS than 2,400 gal/day per acre of the Potential Rainwater Capture Area?

☐ Yes (continue) ☐ No – refer to the curves in Appendix F of the LID Feasibility Report to evaluate feasibility of harvesting and using the C.3.d amount of runoff for industrial use.

6. Use of Biotreatment

If only the "Yes" boxes were checked for all questions in Sections 2 and 5, or the project will have a recycled water system for non-potable use (Section 3), then the applicant may use appropriately designed bioretention facilities for compliance with C.3 treatment requirements. The applicant is encouraged to maximize infiltration of stormwater if site conditions allow.

7. Results of Screening Analysis

Based on this screening analysis, the following steps will be taken for the project (check all that apply):

☒ Implement biotreatment measures (such as an appropriately designed bioretention area).

☐ Conduct further analysis of infiltration feasibility by completing the Infiltration Feasibility Worksheet.

☐ Conduct further analysis of rainwater harvesting and use (check one):

- ☐ Complete the Rainwater Harvesting and Use Feasibility Worksheet for:
  - ☐ The entire project
  - ☐ Individual building(s), if applicable, describe:_____
- ☐ Evaluate the feasibility of harvesting and using the C.3.d amount of runoff for irrigation, based on Table 11 and the curves in Appendix F of the LID Feasibility Report
- ☐ Evaluate the feasibility of harvesting and using the C.3.d amount of runoff for non-potable industrial use, based on the curves in Appendix F of the LID Feasibility Report.

* For definitions, see Glossary (Attachment 1).

VIII. CERTIFICATION

Carlson, Barbee & Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS

August 15, 2014
Job No.: 2384-00

Mr. Babak Kaderi
CITY OF MILPITAS
Engineering Department
455 E. Calaveras Blvd.
Milpitas, CA 95035

Subject: Stormwater Control Plan Certification
California Circle
APN: 022-37-017
Milpitas, California

Dear Babak,

The preliminary selection, sizing, and design of treatment BMP's and other control measures in this plan meet the requirements of Regional Water Quality Control Board Adopted Order R2-2009-0074.

Very truly yours,

Jason J. Neri, P.E.
Principal

REGISTERED PROFESSIONAL ENGINEER
JASON J. NERI
59136
CIVIL
STATE OF CALIFORNIA

Tables

TABLE 1 - Site Data

Existing Site - Surface Type

Impervious Surface	Area (SF)	Area (AC)	%	C
Roof/Pavement/Concrete	*307,000*	*7.0*	*75%*	*0.80*
Pervious Surface				
General	*104,500*	*2.4*	*25%*	*0.10*
Total	**411,500**	**9.4**	**100%**	**0.62**

Proposed Site - Surface Type

Impervious Surface	Area (SF)	Area (AC)	%	C
Roof	*130,000*	*3.0*	*32%*	*0.90*
Concrete	*56,600*	*1.3*	*14%*	*0.80*
Asphalt	*70,900*	*1.6*	*17%*	*0.70*
Total Impervious	*257,500*	*5.9*	*63%*	
Pervious Surface				
Pervious Pavement	*20,500*	*0.5*	*5%*	*0.10*
Landscape	*133,500*	*3.1*	*32%*	*0.10*
Subtotal Pervious	*154,000*	*3.5*	*37%*	
Total	**411,500**	**9.4**	**100%**	**0.55**

TABLE 2 - Estimated Runoff Coefficients for Various Surfaces

(Table B-3 from SCVURPP's C.3 Stormwater Handbook, April 2012)

Types of Surface	"C" Factor
Roofs	0.90
Concrete	0.80
Stone, Brick, or Concrte Pavers w/ mortared joints and bedding	0.80
Asphalt	0.70
Stone, Brick or Concrete Paver w/ sand joints and bedding	0.70
Pervious Concrete	0.10
Porous Asphalt	0.10
Permeable Interlocking Concrete Pavement	0.10
Grid Pavements with Grass of Aggregate Surface	0.10
Crushed Aggregate	0.10
Grass	0.10

TABLE 3 - BMP Sizing - Bioretention Treatment

Sizing based upon Uniform Intensity Method assuming intensity of 0.2 in/hr. Surface area of treatment bioretention area is equal to 4% of contributing impervious area.

DMA ID	Description	Impervious Drainage Area (SF)	Required Treatment Area - 4% (SF)	Actual Planter Area (SF)	Requirement Met?
DMA 1	Roof	2,540	102	110	Yes
DMA 2	Roof	2,540	102	110	Yes
DMA 3	Roof	2,540	102	110	Yes
DMA 4	Roof	2,540	102	110	Yes
DMA 5	Roof	1,730	69	80	Yes
DMA 6	Roof	2,540	102	110	Yes
DMA 7	Roof	2,540	102	110	Yes
DMA 8	Roof	2,860	114	120	Yes
DMA 9	Roof	1,730	69	80	Yes
DMA 10	Roof	1,730	69	80	Yes
DMA 11	Roof	2,130	85	90	Yes
DMA 12	Roof	2,130	85	90	Yes
DMA 13	Roof	2,130	85	90	Yes
DMA 14	Roof	4,060	162	170	Yes
DMA 15	Roof	1,730	69	80	Yes
DMA 16	Roof	3,210	128	140	Yes
DMA 17	Roof	3,210	128	140	Yes
DMA 18	Roof	2,790	112	120	Yes
DMA 19	Roof	3,220	129	140	Yes
DMA 20	Roof	3,220	129	140	Yes
DMA 21	Roof	3,220	129	140	Yes
DMA 22	Roof	3,220	129	140	Yes
DMA 23	Roof	3,220	129	140	Yes
DMA 24	Asphalt & Roof	3,100	124	140	Yes
DMA 25	Asphalt & Roof	67,405	2,696	3,000	Yes
DMA 26	Asphalt & Roof	12,150	486	500	Yes
DMA 27	Asphalt & Roof	18,700	748	760	Yes
DMA 28	Asphalt & Roof	5,850	234	250	Yes
DMA 29	Asphalt & Roof	3,500	140	150	Yes
DMA 30	Asphalt	1,400	56	60	Yes

TABLE 4 - BMP Sizing - Self-Retaining Pervious Pavement Treatment

Sizing based upon ratio of 2:1 impervious surface area to self-retaining pavement area. Pavement section to be determined pending final design in order to accommodate required storage volume in rock base for tributary impervious area.

DMA ID.	Description	Impervious Drainage Area (SF)	Pervious Pavement Area (SF)	Ratio (Impervious:Self-Retaining)	Requirement Met? (Yes if <2)
DMA 31	Roof	5,320	2,900	1.83	Yes
DMA 32	Roof	2,670	4,530	0.59	Yes
DMA 33	Roof	20,060	13,060	1.54	Yes

Figures

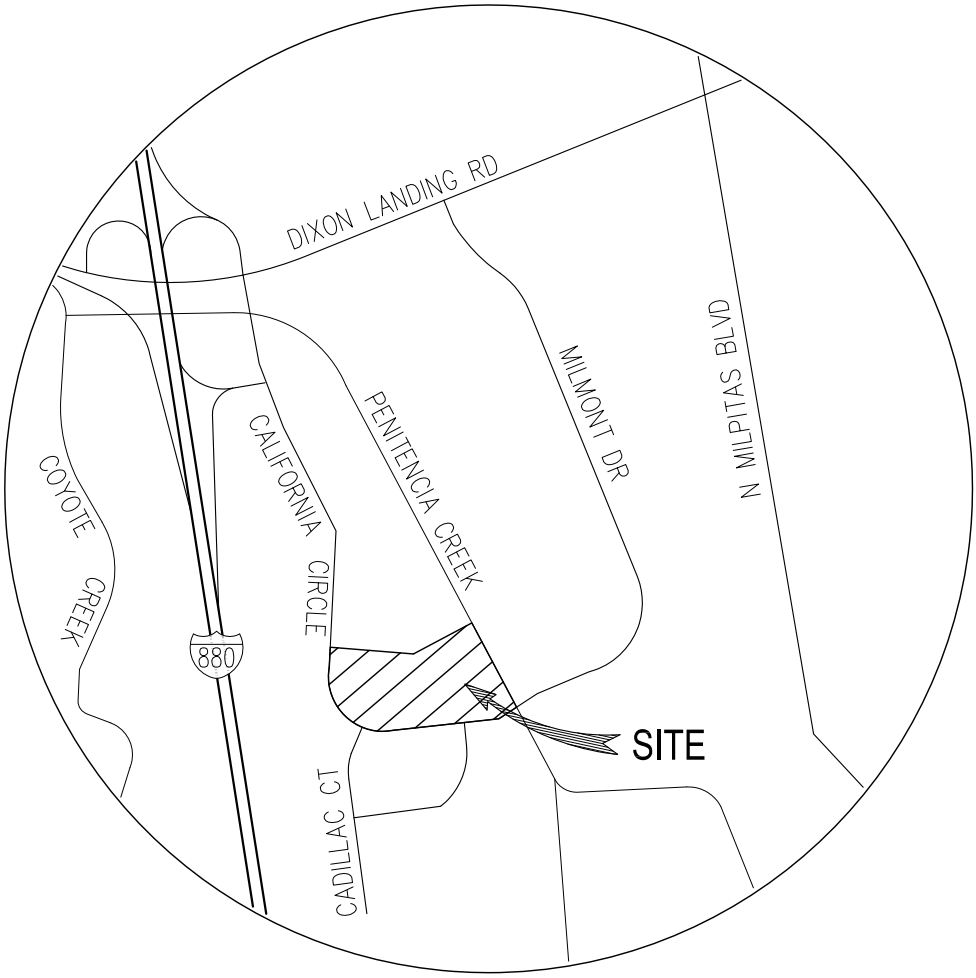


FIGURE 1

VICINITY MAP

CALIFORNIA CIRCLE

CITY OF MILPITAS SANTA CLARA COUNTY CALIFORNIA

DATE: AUGUST 15, 2014

SCALE: NTS

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SAN RAMON, CALIFORNIA 94583
(925) 866-0322
www.cbandg.com

FIGURE 2

AERIAL EXHIBIT

CALIFORNIA CIRCLE

CITY OF MILPITAS SANTA CLARA COUNTY CALIFORNIA

DATE: AUGUST 15, 2014

SCALE: 1" = 200'

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G:\2384-000\ACAD\SWCP\FIGURE 2 - AERIAL.DWG

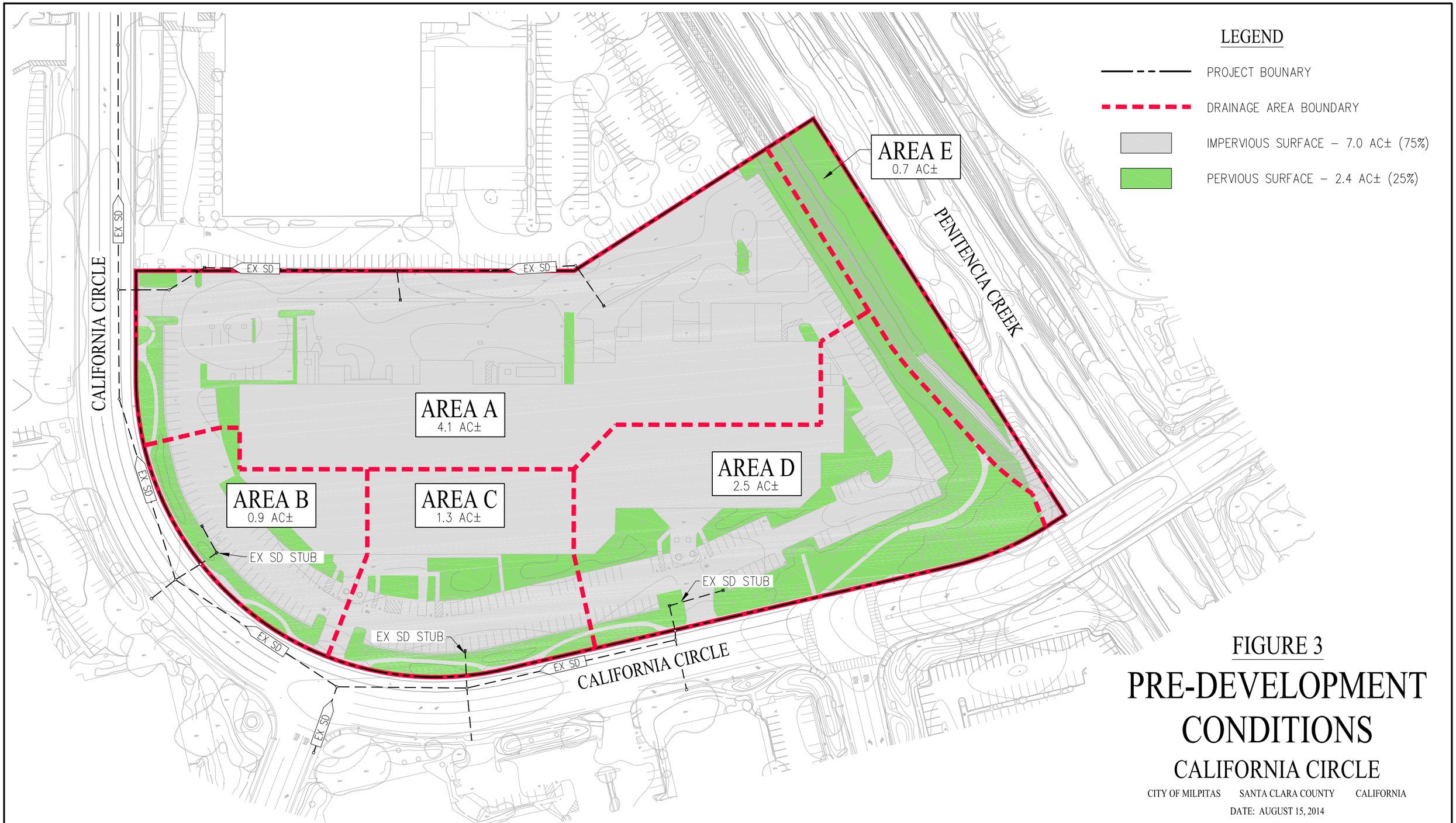

FIGURE 3

PRE-DEVELOPMENT CONDITIONS

CALIFORNIA CIRCLE

CITY OF MILPITAS SANTA CLARA COUNTY CALIFORNIA

DATE: AUGUST 15, 2014

SCALE: 1" = 100'

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G:\2384-000\ACAD\SWCP\FIGURE 3 - PRE DEVELOPMENT EXHIBIT.DWG

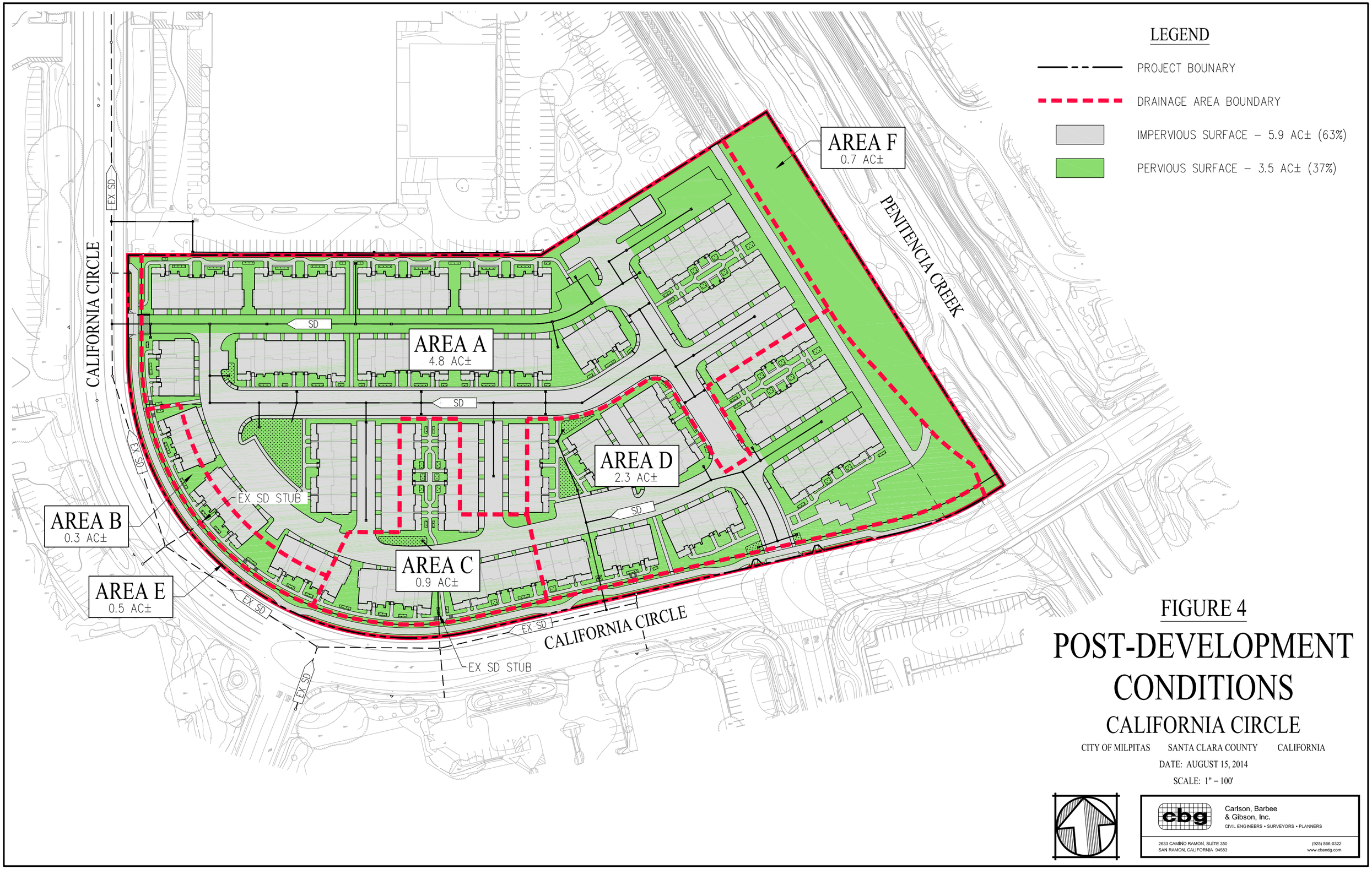

FIGURE 4

POST-DEVELOPMENT CONDITIONS

CALIFORNIA CIRCLE

CITY OF MILPITAS SANTA CLARA COUNTY CALIFORNIA

DATE: AUGUST 15, 2014

SCALE: 1" = 100'

G:\2384-000\ACAD\SWCP\FIGURE 4 - POST DEVELOPMENT EXHIBIT.DWG

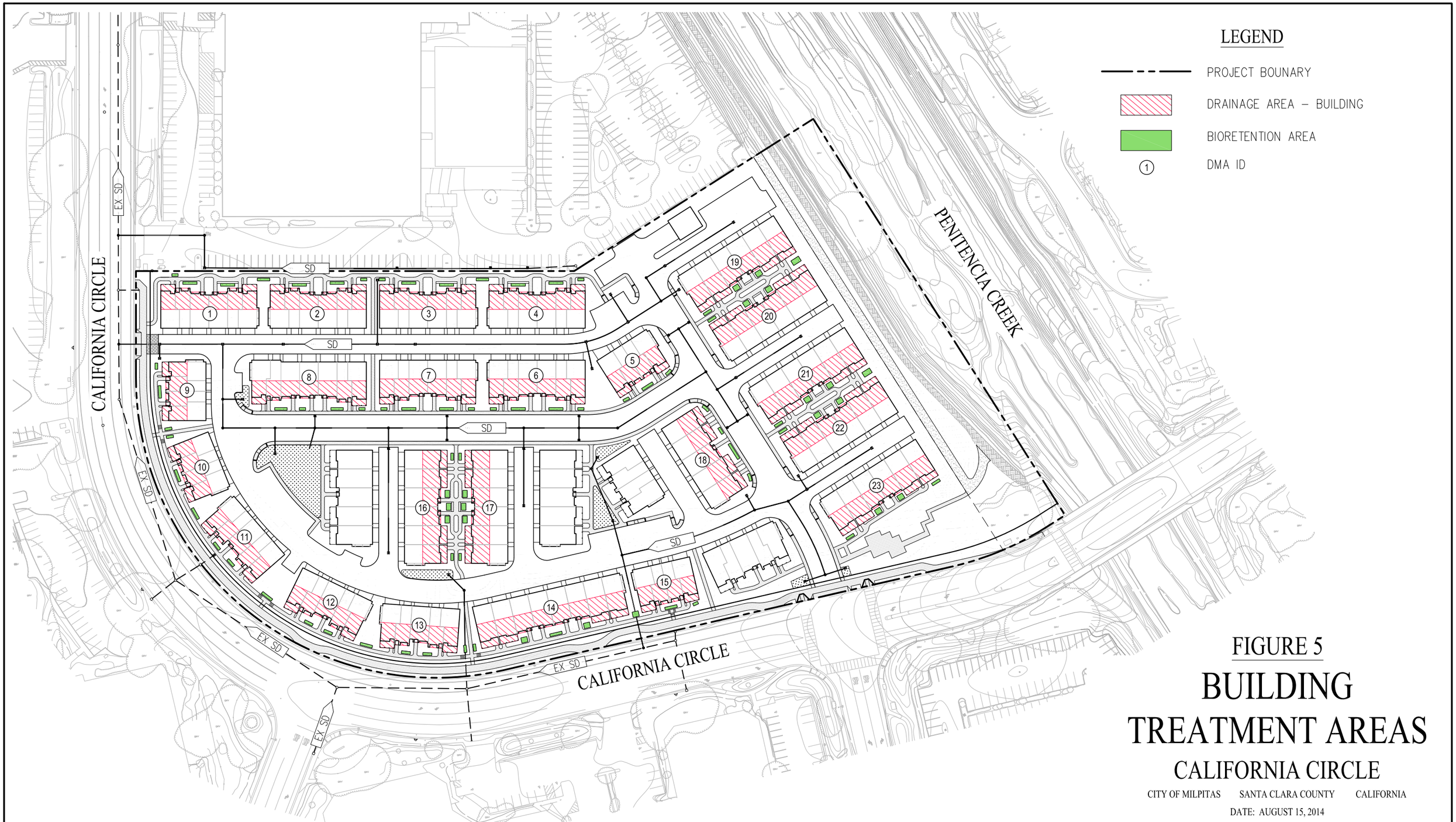

FIGURE 5

BUILDING TREATMENT AREAS

CALIFORNIA CIRCLE

CITY OF MILPITAS SANTA CLARA COUNTY CALIFORNIA

DATE: AUGUST 15, 2014

SCALE: 1" = 100'

NOTE:
100% OF REQUIRED SITE STORM WATER TO BE TREATED USING TREAMENT FEATURES SHOWN ON THIS FIGURE IN CONJUNCTION WITH OTHER FIGURES IN THIS SWCP.

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G:\2384-000\ACAD\SWCP\FIGURE 5 - BUILDING TREATMENT AREAS.DWG

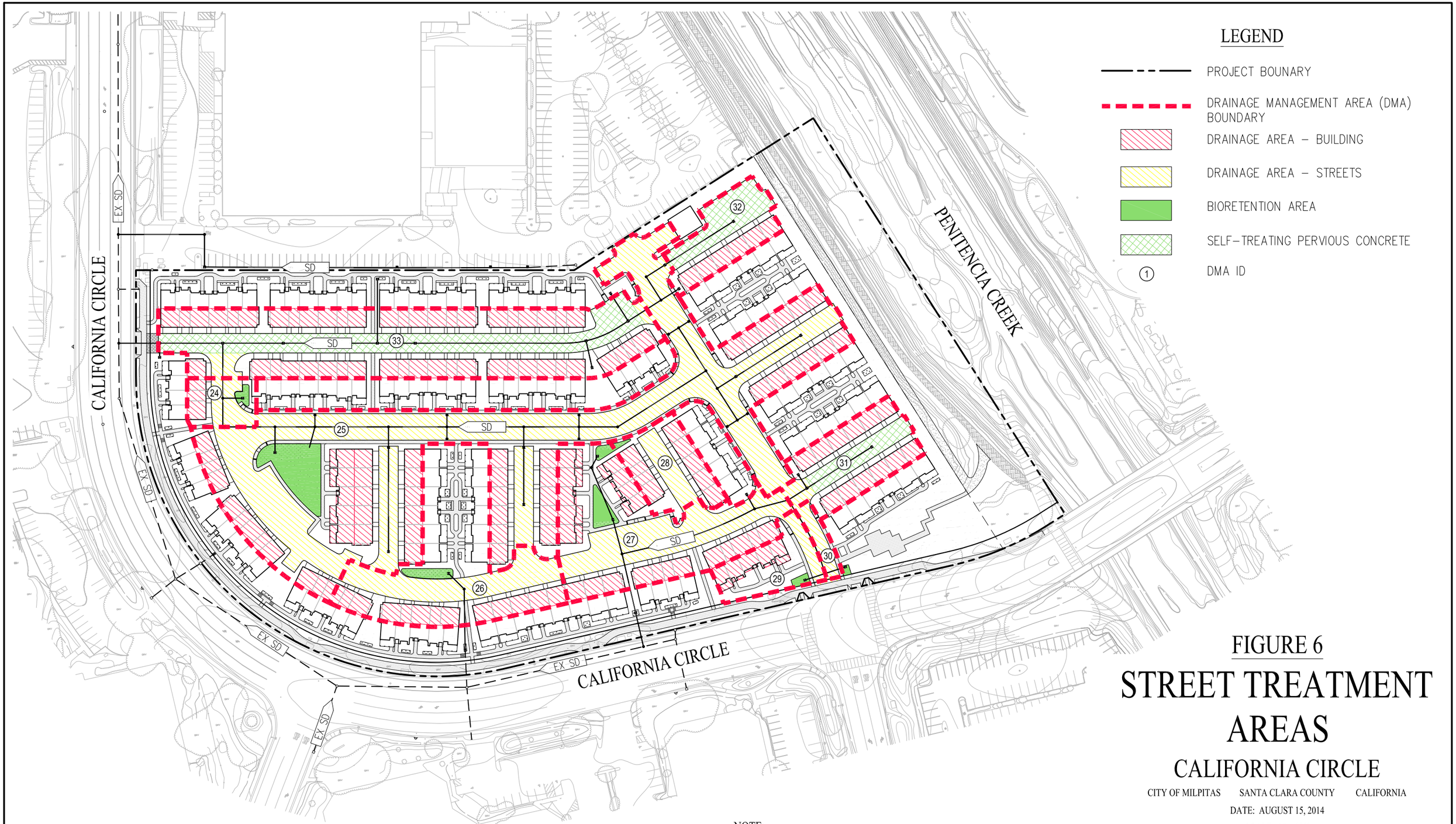

FIGURE 6

STREET TREATMENT AREAS

CALIFORNIA CIRCLE

CITY OF MILPITAS SANTA CLARA COUNTY CALIFORNIA

DATE: AUGUST 15, 2014

SCALE: 1" = 100'

NOTE:
100% OF REQUIRED SITE STORM WATER TO BE TREATED USING TREAMENT FEATURES SHOWN ON THIS FIGURE IN CONJUNCTION WITH OTHER FIGURES IN THIS SWCP.

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G:\2384-000\ACAD\SWCP\FIGURE 6 - STREET TREATMENT AREAS.DWG

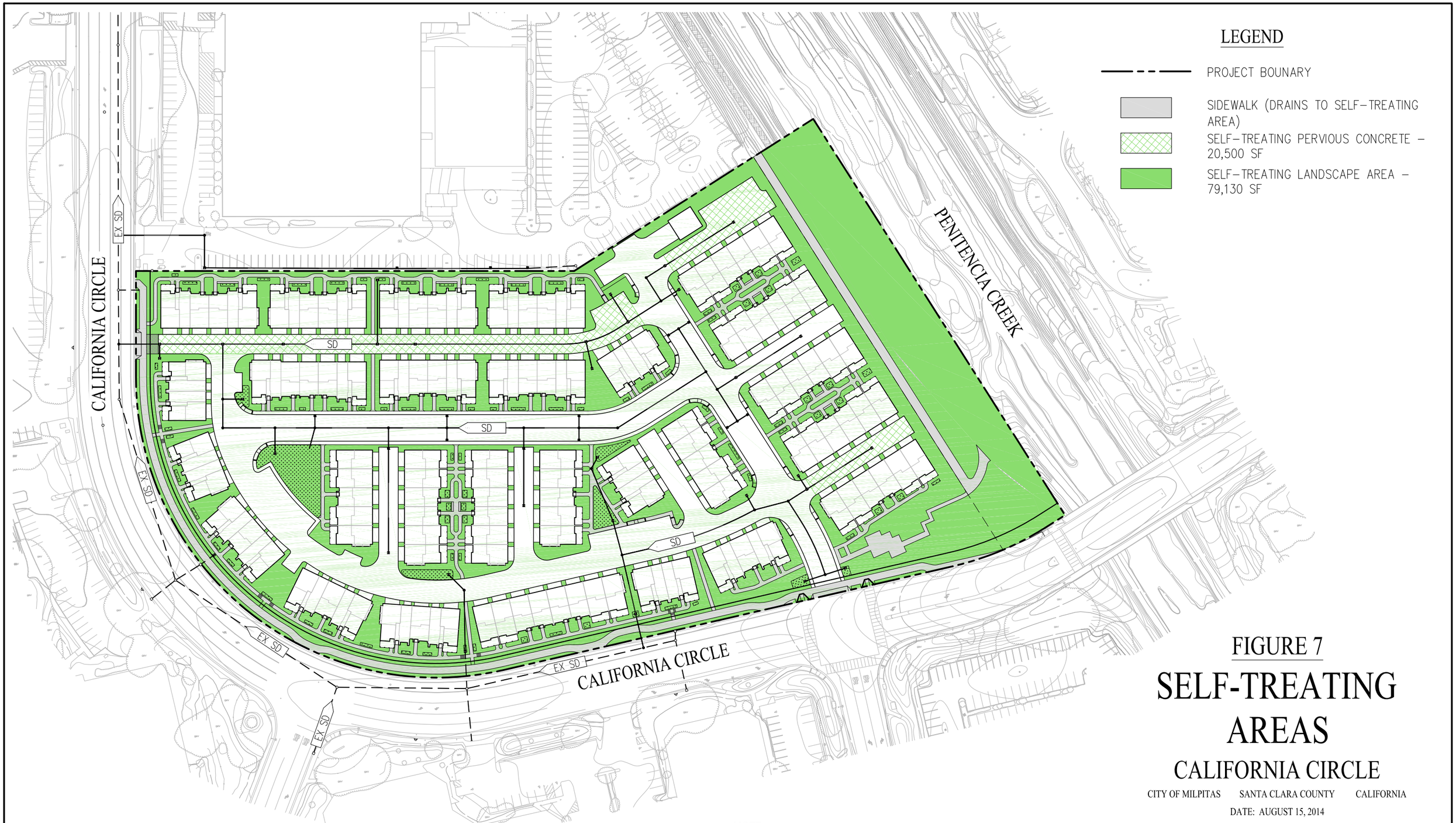

FIGURE 7

SELF-TREATING AREAS

CALIFORNIA CIRCLE

CITY OF MILPITAS SANTA CLARA COUNTY CALIFORNIA

DATE: AUGUST 15, 2014

SCALE: 1" = 100'

NOTE:
100% OF REQUIRED SITE STORM WATER TO BE TREATED USING TREAMENT FEATURES SHOWN ON THIS FIGURE IN CONJUNCTION WITH OTHER FIGURES IN THIS SWCP.

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G:\2384-000\ACAD\SWCP\FIGURE 7 - SELF TREATING AREAS.DWG

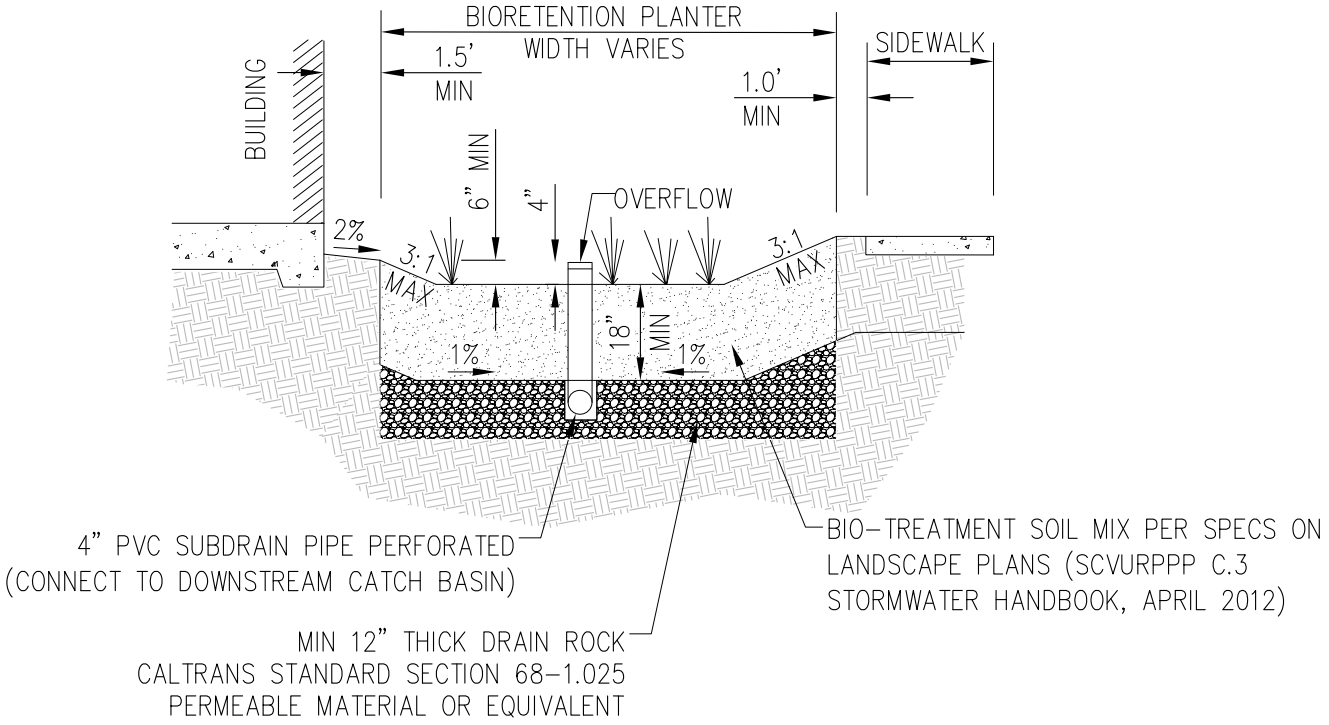

FIGURE 8

BIORETENTION DETAIL

CALIFORNIA CIRCLE

CITY OF MILPITAS SANTA CLARA COUNTY CALIFORNIA

DATE: AUGUST 15, 2014

SCALE: NTS

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Appendix A

PERVIOUS PAVEMENT

Stormwater Control for Small Projects

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Permeable Interlocking Concrete Pavers

Pervious pavement, also referred to as permeable pavement, contains pores or separation joints that allow water to flow through and seep into a base material (typically gravel or drain rock). Types of pervious pavement include porous asphalt and concrete, open joint pavers, interlocking concrete or permeable pavers, and plastic or concrete grid systems with gravel-filled voids.

Pervious pavement systems allow infiltration of stormwater into soils, thereby reducing runoff and the amount of pollutants that enter creeks, San Francisco Bay, the Pacific Ocean, and other water bodies. This improves water quality, helps reduce creek erosion, and can facilitate groundwater recharge. Pervious pavement is available in many different types that offer environmentally-friendly and aesthetically pleasing options for driveways, walkways, parking areas, and patios.

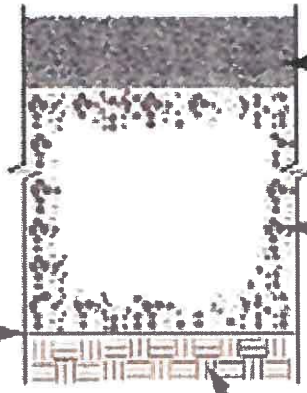
Is Pervious Pavement Feasible for My Project?

Pervious pavement is appropriate in locations with the following characteristics:

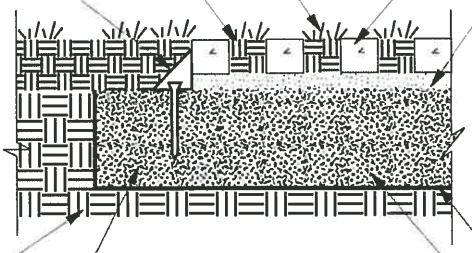
- The location is flat or nearly flat (a maximum 2% slope).
- The location is not in a seasonally wet area.
- The location is not close to a building foundation, unless measures are taken to prevent infiltration under the structure. (See Design Checklist.)

Typical Materials and Example Applications

Pervious Concrete

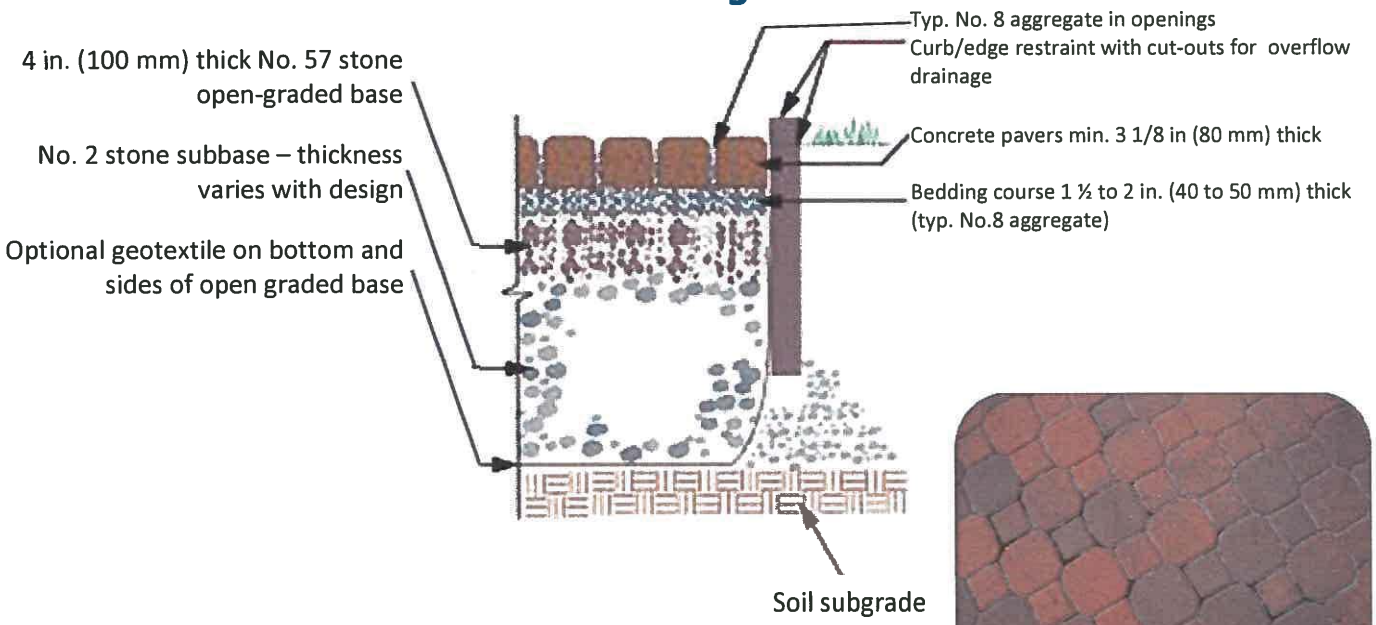


Turf Block



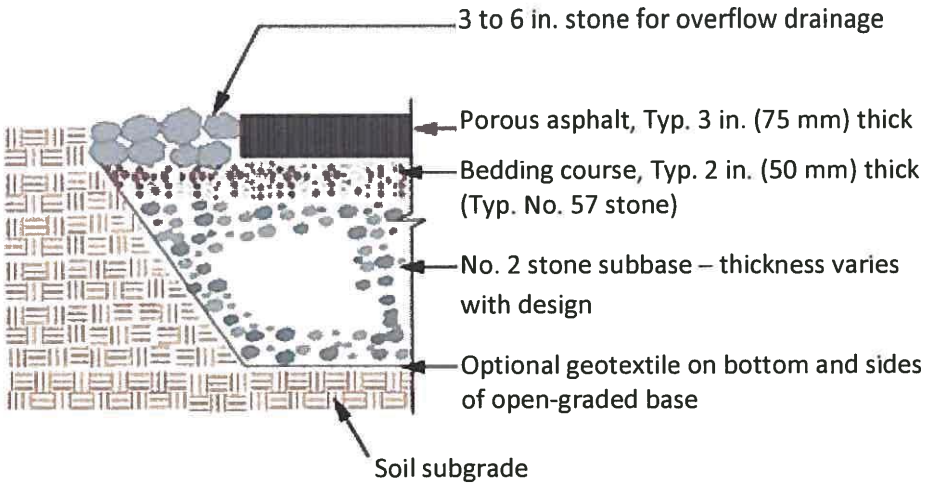
Typical Materials and Example Applications

Permeable Interlocking Concrete Pavers



Note: ASTM No. 3 or 4 stone may be substituted for No. 2 stone.
ASTM No. 89 or 9 stone may be used in the paver openings.

Porous Asphalt



Note: ASTM No. 3 or 4 stone may be substituted for No. 2 stone.
ASTM No. 89 or 9 stone may be used in the paver openings.

Design Checklist

When installing pervious pavement, the following design criteria should be considered.

- ❑ An open-graded base of crushed stone, which has 35 to 45 percent pore space, is installed below the surface pavement. The recommended base thickness is 6 inches for pedestrian use and 10 inches for driveways to provide adequate structural strength.
- ❑ Slope is flat or nearly flat (not greater than 2 percent).
- ❑ Flow directed to pervious pavement is dispersed so as not to be concentrated at a small area of pavement.
- ❑ No erodible areas drain onto the pavement.
- ❑ The subgrade is uniform and compaction is the minimum required for structural stability.
- ❑ If a subdrain is provided, its outlet elevation is a minimum of 3 inches above the bottom of the base course.
- ❑ A rigid edge is provided to retain granular pavements and unit pavers.
- ❑ If paving is close to a building, a barrier or impermeable liner may be required to keep water away from the building foundation.
- ❑ Pavers have a minimum thickness of 80 mm (3 1/8 inches) and are set in sand or gravel with minimum 3/8-inch gaps between pavers.
- ❑ Proprietary products must be installed per the manufacturer's specifications.
- ❑ The project complies with applicable sections of the current municipal code, including disabled access requirements and site drainage requirements, if applicable.

Maintenance Considerations

Once pervious pavement is installed, the following maintenance criteria should be followed:

- ❑ The use of leaf blowers on permeable pavement can force dirt and debris into pavement void spaces. Avoid blowing leaves, grass trimmings and other debris across permeable pavement.
- ❑ Remove weeds from pavement and replace missing sand or gravel between pavers as needed.
- ❑ Inspect subdrain outlets (if applicable) yearly to verify they are not blocked.
- ❑ Inspect pavement after rains for ponding or other visible problems. If there are problems with standing water, vacuum sweeping with specialized equipment may be required. Concrete grid pavers do not require sweeping.

Open Joint Pavers

The City of Los Angeles and Geosyntec Consultants are acknowledged for providing text, formatting and various images used in this fact sheet. The Interlocking Concrete Pavement Institute is acknowledged for contributing pavement sections, design details and specifications. The San Mateo Countywide Water Pollution Prevention Program, Santa Clara Valley Urban Runoff Pollution Prevention Program, and City of San Jose are acknowledged for images used in the fact sheet.

LANDSCAPE DESIGNS FOR STORMWATER MANAGEMENT

Stormwater Control for Small Projects

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Dry creek infiltrates and conveys runoff.

Designing landscaped areas to soak up rainfall runoff from building roofs and paved areas helps protect water quality in local creeks and waterways. These landscape designs reduce polluted runoff and help prevent creek erosion.

As the runoff flows over vegetation and soil in the landscaped area, the water percolates into the ground and pollutants are filtered out or broken down by the soil and plants.

This fact sheet shows how you can design your landscape to absorb runoff from impervious surfaces, such as roofs, patios, driveways, and sidewalks, with landscape designs that can be very attractive.

If you are interested in capturing and storing water for irrigation use, see the Rain Barrel fact sheet in this series.

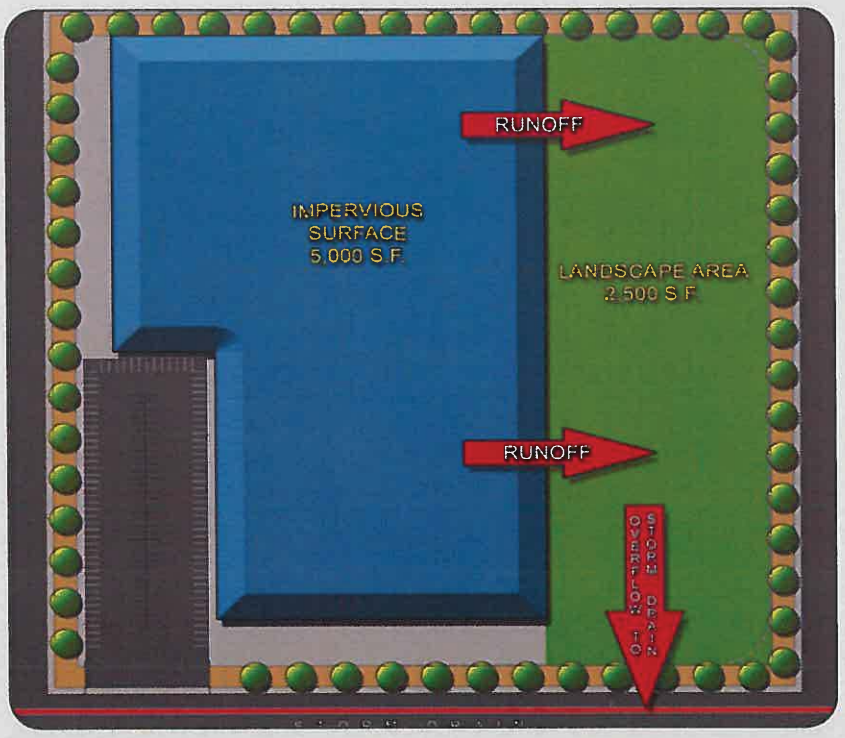
Can My Project Manage Stormwater in the Landscape?

Directing stormwater runoff to the landscape is suitable for sites with the following conditions:

- Roofs, driveways, parking areas, patios, and walkways that can drain to an existing landscape, or an area that may be converted to landscape.
- Areas of landscape with a slope of 5% or less are preferred; check with the municipality regarding requirements for steeper sites.
- Works best in well-drained soil; soil amendments may be used in areas with poor drainage.
- Landscaped areas that total at least 1/2 the size of the impervious area draining to it.
- Direct runoff away from building foundations.
- Runoff should not create ponding around trees and plants that won't tolerate wet conditions.

How Do I Size My Landscape?

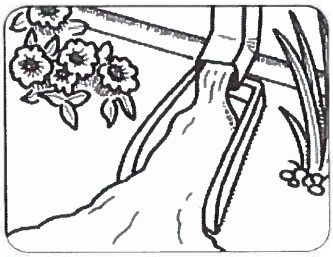
The landscaped area should be 50% of the size of the contributing impervious surface. For example (see below), to manage runoff from a 5,000 square foot roof or paved surface, you should have 2,500 square feet of landscaping.



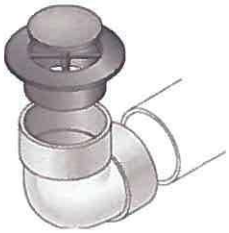
Techniques to Manage Stormwater in Landscaping

Direct Roof Runoff to Landscape

- Use additional piping to connect the downspout to the landscape if needed.
- Direct runoff away from building foundation.
- Prevent erosion by installing:
  - Splash blocks,
  - Rain chains,
  - Gravel area under a gutterless roof,
  - Pop-up drainage emitter connected to a pipe that carries runoff away from the foundation, or
  - Other energy dissipation technique.



Splash block

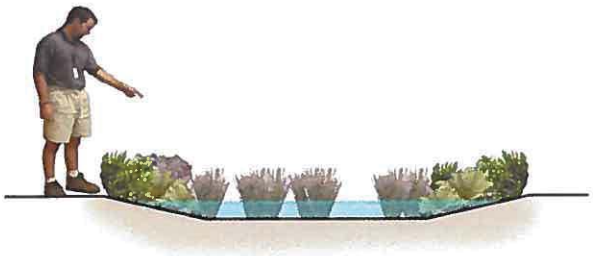


Pop-up emitter

Gravel area under a gutterless roof

Rain chain

Swales or Dry Creeks



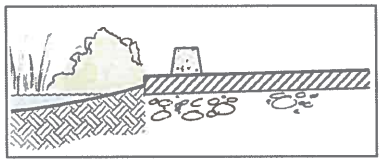
Cross section

Swales and dry creeks are narrow, linear depressions designed to capture and convey water. Swales imitate a natural creek's ability to slow, infiltrate, and filter stormwater. To install a swale follow these steps:

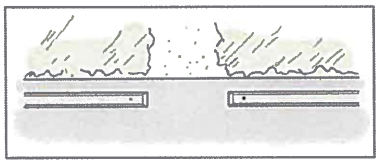
- Excavate a narrow linear depression that slopes down to provide a flow path for runoff. The path length (10 to 15 feet or more) should meander to slow water and prevent erosion.
- Use plants from creek and river ecosystems to help reduce erosion and increase evaporation of runoff.
- The end of the swale requires an outlet for high flows (another landscaped area or a yard drain). Talk to municipal staff to identify an appropriate discharge location.
- Contact municipal staff for a local list of plants suitable for swales.

Techniques to Manage Stormwater in Landscaping

Direct Parking Lot Runoff to Landscape



Cross section



View from above

During storms, parking lots generate large amounts of runoff, which picks up oils, grease, and metals from vehicles. Landscaped areas can be designed to absorb and filter this runoff.

- Landscaped areas must be below the paved elevation. Allow an elevation change of 4 to 6 inches between the pavement and the soil, so that vegetation or mulch build-up does not block the flow.
- Grade the paved area to direct runoff towards the landscaping.
- If possible, provide a long path for runoff to infiltrate (while meeting the landscaped area sizing on page 1).
- Provide multiple access points for runoff to enter the landscape. Install curb cuts or separate wheel stops for the water to flow through. Provide cobbles or other permanent erosion control at points of concentrated flow.

Manage Runoff from Driveways/Small Paved Areas

Driveways, sidewalks, patios, walkways, and other small paved areas can offer creative opportunities to drain runoff to landscaping.

- Install landscape adjacent to the paved surface, and grade the paved area so runoff flows toward the landscaping.
- Landscaped areas must be below the paved elevation. Allow an elevation change of 4 to 6 inches between the pavement and the soil, so that vegetation or mulch build-up does not block the flow.
- Install cobbles or rocks where runoff enters the landscape to avoid erosion.
- Use sizing ratio described on page 1.
- Use drought-tolerant native or climate-adapted plants to reduce irrigation.

Design Checklist

- ❑ Maximize the use of landscaping and natural areas that already exist. Try to design new landscapes immediately adjacent to impervious surfaces.
- ❑ Water should flow evenly (without concentrating runoff into small streams) from the impervious surface to the landscape; this will maximize the filtration and settling of sediment and pollutants and prevent erosion. The design should avoid allowing straight channels and streams to form.
- ❑ Amend soils to improve drainage, when necessary.
- ❑ If the project is located next to standard asphalt or concrete pavement, and there is concern about water undermining the pavement, include a water barrier in the design.
- ❑ Use curb cuts to create places where water can flow through to the landscape.
- ❑ Disconnect roof downspouts and redirect flow to adjacent landscapes. Disconnected downspout systems should incorporate a splash block to slow the runoff flow rate; a landscape flow path length of 10 to 15 feet is recommended.
- ❑ Use drought-tolerant native or climate-adapted plant species whenever possible. Avoid invasive or pest species. A list of invasive species may be found at the California Invasive Plant Council website (www.cal-ipc.org). Contact municipal staff for a list of plants suitable for stormwater management areas.
- ❑ Design the landscape area so that overflow from large storms discharges to another landscaped area or the storm drain system to prevent flooding.

Maintain Your Landscape

The following practices will help maintain your landscape to keep it attractive and managing stormwater runoff effectively.

- ❑ During dry months, irrigate during the first year to encourage root growth and establish the plants. In subsequent years, irrigate as needed by the plant species to maintain plant health.
- ❑ Repair signs of erosion immediately and prevent further erosion by reinforcing the surrounding area with ground cover or using rocks for energy dissipation.
- ❑ If standing water remains in the landscaped area for more than 4 days, use soil amendments to improve infiltration.
- ❑ Inspect the locations where water flows into a landscaped area from adjacent pavement to ensure that there is positive flow into the landscape, and vegetation or debris does not block the entrance point.

The City of Los Angeles and Geosyntec Consultants are acknowledged for providing text, formatting and various images used in this fact sheet. The Sonoma Valley Groundwater Management Program, San Mateo Countywide Water Pollution Prevention Program, City of San Jose, Sacramento Stormwater Quality Partnership, and the Purissima Hills Water District are acknowledged for images used in the fact sheet.