Appendix D – Hydrology and Drainage Report

DRAFT

Preliminary Drainage & Lid Calculations

Owner:
Al Amidy

Site Location:
Northfront Road
Livermore, CA
Alameda County APN: 009B-550-2-3, 5, 1-2

Date:
March, 2018

Prepared By:
Alberto Vasquez, PE, QSD, QSP

INTRODUCTION

This drainage and LID Calculations report is for the Greenville Plaza Project located along Northfront Road in Livermore, CA. The site is 2.52 acres in size and currently has not structures on it and has seasonal grasses. The owner wishes to use the site for a fueling station and retail/commercial use with the necessary improvements.

EXISTING DRAINAGE

The site is flat with seasonal grasses and all runoff drains to the west.

POST DEVELOPMENT CALCULATIONS

All runoff from the site resulting from development will be routed and pumped into a treatment basin and then into a detention basin. Pumping will be necessary due to the amount of earth material removed from the site resulting from building height restrictions. Runoff will then be pumped into new storm drain infrastructure that will tie into an existing drain pipe at the intersection of Northfront Road and Laughlin Road.

Stormwater Requirements Checklist

Municipal Regional Stormwater Permit (MRP 2.0)
Stormwater Controls for Development Projects

CITY OF LIVERMORE
1052 South Livermore Avenue
Livermore, CA 94550
PHONE: 925-960-4500, FAX: 925-960-4505
WEB: http://www.cityoflivermore.net

I. Applicability of C.3 and C.6 Stormwater Requirements

I.A. Enter Project Data *(For "C.3 Regulated Projects," data will be reported in the municipality's stormwater Annual Report.)*

I.A.1 Project Name: GREENVILLE PLAZA

I.A.2 Project Address (include cross street): I-580 & GREENVILLE ROAD, ALONG NORTHFRONT ROAD

I.A.3 Project APN: 99B-550-1-2, 2-3, 5 I.A.4 Project Watershed[1]: ARROYO LAS POSITAS

I.A.5 Applicant Name: AL AMIDY I.A.6 Date Submitted:

I.A.7 Applicant Address: P.O. BOX 882, LOS GATOS, CA 95031

I.A.8 Applicant Phone: 408-497-4137 I.A.9 Applicant Email Address: aliamidy@aol.com

I.A.10 Development type: (check all that apply)

☐ Residential ☒ Commercial ☐ Industrial ☐ Mixed-Use ☐ Streets, Roads, etc.

☐ 'Redevelopment' as defined by MRP: creating, adding and/or replacing exterior existing impervious surface on a site where past development has occurred[2]

☐ 'Special land use categories' as defined by MRP: (1) auto service facilities[3], (2) retail gasoline outlets, (3) restaurants[3], (4) uncovered parking area (stand-alone or part of a larger project)

I.A.11 Project Description[4]: (Also note any past or future phases of the project.) COMMERCIAL DEVELOPMENT WITH RETAIL BUILDING, FUEL STATION C-STORE AND RESTAURANT

I.A.12 Total Area of Site: 2.52 acres I.A.13 Slope on Site: VARIES, 1%-12.5% %

I.A.14 Total Area of land disturbed during construction (include clearing, grading, excavating and stockpile area: 2.52 acres.

I.B. Is the project a "C.3 Regulated Project" per MRP Provision C.3.b?

I.B.1. Enter the amount of impervious surface[4] created and/or replaced by the project (if the total amount is 5,000 sq.ft. or more):

Table of Impervious and Pervious Surfaces

Type of Impervious Surface	a Pre-Project Impervious Surface (sq.ft.)	b Existing Impervious Surface to be Replaced[7] (sq.ft.)	C New Impervious Surface to be Created[7] (sq.ft.)	d Post-project pervious surface (sq.ft.)
Roof area(s) – excluding any portion of the roof that is vegetated ("green roof")	0	0	12920	N/A
Impervious[5] sidewalks, patios, paths, driveways	0	0	3803	
Impervious[5] uncovered parking[6]	0	0	51284	
Streets (public)		0	0	
Streets (private)		0	0	
Totals:	0	0	68007	
Area of Existing Impervious Surface to remain in place		N/A		
Total New Impervious Surface *(sum of totals for columns b and c):*		68007		

[1] Watershed is defined by the maps from the Alameda County Flood Control District at http://acfloodcontrol.org/resources/explore-watersheds

[2] Roadway projects that replace existing impervious surface are subject to C.3 requirements only if one or more lanes of travel are added.

[3] Standard Industrial Classification (SIC) codes are in Section 2.3 of the C.3 Technical Guidance (download at www.cleanwaterprogram.org)

[4] Project description examples: 5-story office building, industrial warehouse, residential with five 4-story buildings for 200 condominiums, etc.

[5] Per the MRP, pavement that meets the following definition of pervious pavement is NOT an impervious surface. Pervious pavement is defined as pavement that stores and infiltrates rainfall at a rate equal to immediately surrounding unpaved, landscaped areas, or that stores and infiltrates the rainfall runoff volume described in Provision C.3.d.

[6] Uncovered parking includes top level of a parking structure.

[7] "Replace" means to install new impervious surface where existing impervious surface is removed. "Create" means to install new impervious surface where there is currently no impervious surface.

I.B. Is the project a "C.3 Regulated Project" per MRP 2.0 Provision C.3.b? (continued)

		Yes	No	NA
I.B.2	In Item I.B.1, does the Total New Impervious Surface equal 10,000 sq.ft. or more? *If YES, skip to Item I.B.5 and check "Yes." If NO, continue to Item I.B.3.*	☒	☐	☐
I.B.3	Does the Item I.B.1 Total New Impervious Surface equal 5,000 sq.ft. or more, but less than 10,000 sq.ft? *If YES, continue to Item I.B.4. If NO, skip to Item I.B.5 and check "No."*	☐	☐	☐
I.B.4	Is the project a "Special Land Use Category" per Item I.A.10? For uncovered parking, check YES only if there is 5,000 sq.ft or more uncovered parking. *If NO, go to Item I.B.5 and check "No." If YES, go to Item I.B.5 and check "Yes."*	☐	☐	☐
I.B.5	Is the project a C.3 Regulated Project? *If YES, go to Item I.B.6; if NO, continue to Item I.C.*	☒	☐	☐
I.B.6	Does the total amount of Replaced impervious surface equal 50 percent or more of the Pre-Project Impervious Surface? *If YES, stormwater treatment requirements apply to the whole site; if NO, these requirements apply only to the impervious surface created and/or replaced.*	☒	☐	☐
I.B.7	Is the project installing a total of 3,000 sq.ft. or more (excluding private-use patios in single family homes, townhomes, or condominiums) of new pervious pavement systems? (Pervious pavement systems include pervious concrete, pervious asphalt, pervious pavers and grid pavers etc. and are described in the C3 Technical Guidance at www.cleanwaterprogram.org) If YES, stormwater treatment system inspection requirements (C.3.h) apply; (Municipal staff – add this site to your list of sites needing a final inspection at the end of construction and on-going O&M inspections.) If NO, inspection requirements only apply if there are other treatment systems installed on the project.	☐	☒	☐

I.C. Projects that are NOT C.3 Regulated Projects

If you answered NO to Item I.B.5, or the project creates/replaces less than 5,000 sq. ft. of impervious surface, then the project is NOT a C.3 Regulated Project, and stormwater treatment is not required, BUT the municipality may determine that source controls and site design measures are required. Skip to Section II.

I.D. Projects that ARE C.3 Regulated Projects

If you answered YES to Item I.B.5, then the project is a C.3 Regulated Project. The project must include appropriate site design measures and source controls AND hydraulically-sized stormwater treatment measures. Hydromodification management may also be required; refer to Section II to make this determination. If final discretionary approval was granted on or after **DECEMBER 1, 2011**, Low Impact Development (LID) requirements apply, except for "Special Projects." See Section II.

I.E. Identify C.6 Construction-Phase Stormwater Requirements

		Yes	No
I.E.1	Does the project disturb 1.0 acre (43,560 sq.ft.) or more of land? (See Item I.A.14). *If Yes, obtain coverage under the state's Construction General Permit at https://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin.jsp. Submit to the municipality a copy of your Notice of Intent and Storm Water Pollution Prevention Plan (SWPPP) before a grading or building permit is issued.*	☒	☐
I.E.2	Is the site a "High Priority Site" that disturbs less than 1.0 acre (43,560 sq.ft.) of land? (Municipal staff will make the final determination.) "High Priority Sites" are sites having any of the following criteria: ▪ that require a grading permit, ▪ are adjacent to a creek, ▪ or are otherwise high priority for stormwater protection during construction (see MRP 2.0 Provision C.6.e.ii.(2)(c))	☐	☒
I.E.3	Is the site a "Hillside Site" that disturbs 5,000 sq.ft. or more, but less than 1.0 acre (43,560 sq.ft.) of land? (Municipal staff will make the final determination.) ▪ "Hillside Sites" are located on hillsides, as indicated on a jurisdictional map of hillside development areas or as indicated by meeting jurisdictional hillside development criteria. ▪ If no map or criteria exist, then Hillside Sites are sites with a slope of 15% or more (see I.A.13 above and MRP 2.0 Provision C.6.e.ii.(2)(b)).	☐	☒

- NOTE TO APPLICANT: All projects require appropriate stormwater best management practices (BMPs) during construction. Refer to the Section II to identify appropriate construction BMPs.

- NOTE TO MUNICIPAL STAFF: If the answer is "Yes" to I.E.1, I.E.2, OR I.E.3, refer this project to construction site inspection staff to be added to their list of projects that require stormwater inspections at least monthly during the wet season (October 1 through April 30) and other times of the year as appropriate.

II. Implementation of Stormwater Requirements

II.A. Complete the appropriate sections for the project. For non-C.3 Regulated Projects, Sections II.B, II.C, and II.D apply. For C.3 Regulated Projects, all sections of Section II apply.

II.B. Select Appropriate Site Design Measures

- *Required for C.3 Regulated Projects.*
- *Starting December 1, 2012, projects that create and/or replace 2,500 - 10,000 sq.ft. of impervious surface, and stand-alone single family homes that create/replace 2,500 sq.ft. or more of impervious surface, must include one of Site Design Measures a through f.*[8]
- *All other projects are encouraged to implement site design measures, which may be required at municipality discretion.*
- *Consult with municipal staff about requirements for your project.*

II.B.1 Is the site design measure included in the project plans?

Yes	No	Plan Sheet No.	
☐	☒		a. Direct roof runoff into cisterns or rain barrels and use rainwater for irrigation or other non-potable use.
☐	☒		b. Direct roof runoff onto vegetated areas.
☐	☒		c. Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
☐	☒		d. Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
☐	☒		e. Construct sidewalks, walkways, and/or patios with pervious surfaces. Use the specifications in the C3 Technical Guidance (Version 4.1) or for small projects see the BASMAA Pervious Paving Factsheet. For these documents and others go to www.cleanwaterprogram.org and click on "Resources."
☐	☒		f. Construct bike lanes, driveways, and/or uncovered parking lots with pervious surfaces. Use the specifications in the C3 Technical Guidance (Version 4.1) or for small projects see the BASMAA Pervious Paving Factsheet. For these documents and others go to the program website at: www.cleanwaterprogram.org and click on "Resources."
☐	☒		g. Minimize land disturbance and impervious surface (especially parking lots).
☐	☒		h. Maximize permeability by clustering development and preserving open space.
☐	☒		i. Use micro-detention, including distributed landscape-based detention.
☐	☒		j. Protect sensitive areas, including wetland and riparian areas, and minimize changes to the natural topography.
☒	☐		k. Self-treating area (see Section 4.1 of the C.3 Technical Guidance)
☒	☐		l. Self-retaining area (see Section 4.2 of the C.3 Technical Guidance)
☐	☒		m. Plant or preserve interceptor trees (Section 4.5, C.3 Technical Guidance)

[8] See MRP Provision C.3.a.i(6) for non-C.3 Regulated Projects, C.3.c.i(2)(a) for Regulated Projects, C.3.i for projects that create/replace 2,500 to 10,000 sq.ft. of impervious surface and stand-alone single family homes that create/replace 2,500 sq.ft. or more of impervious surface.

II.C. Select appropriate source controls *(Applies to C.3 Regulated Projects; encouraged for other projects. Consult municipal staff.[9])*

Are these features in project?		Features that require source control measures	Source control measures (Refer to Local Source Control List for detailed requirements)	Is source control measure included in project plans?		
Yes	No			Yes	No	Plan Sheet No.
☒	☐	Storm Drain	Mark on-site inlets with the words "No Dumping! Flows to Bay" or equivalent.	☐	☐	
☐	☒	Floor Drains	Plumb interior floor drains to sanitary sewer[10] [or prohibit].	☐	☐	
☐	☒	Parking garage	Plumb interior parking garage floor drains to sanitary sewer.[9]	☐	☐	
☒	☐	Landscaping	▪ Retain existing vegetation as practicable. ▪ Select diverse species appropriate to the site. Include plants that are pest- and/or disease-resistant, drought-tolerant, and/or attract beneficial insects. ▪ Minimize use of pesticides and quick-release fertilizers. ▪ Use efficient irrigation system; design to minimize runoff.	☐	☐	
☐	☒	Pool/Spa/Fountain	Provide connection to the sanitary sewer to facilitate draining.[9]	☐	☐	
☒	☐	Food Service Equipment (non-residential)	Provide sink or other area for equipment cleaning, which is: ▪ Connected to a grease interceptor prior to sanitary sewer discharge. [9] ▪ Large enough for the largest mat or piece of equipment to be cleaned. ▪ Indoors or in an outdoor roofed area designed to prevent stormwater run-on and run-off, and signed to require equipment washing in this area.	☐	☐	
☒	☐	Refuse Areas	▪ Provide a roofed and enclosed area for dumpsters, recycling containers, etc., designed to prevent stormwater run-on and runoff. ▪ Connect any drains in or beneath dumpsters, compactors, and tallow bin areas serving food service facilities to the sanitary sewer.[9]	☐	☐	
☐	☒	Outdoor Process Activities [11]	Perform process activities either indoors or in roofed outdoor area, designed to prevent stormwater run-on and runoff, and to drain to the sanitary sewer.[9]	☐	☐	
☐	☒	Outdoor Equipment/ Materials Storage	▪ Cover the area or design to avoid pollutant contact with stormwater runoff. ▪ Locate area only on paved and contained areas. ▪ Roof storage areas that will contain non-hazardous liquids, drain to sanitary sewer[9], and contain by berms or similar.	☐	☐	
☐	☒	Vehicle/ Equipment Cleaning	▪ Roofed, pave and berm wash area to prevent stormwater run-on and runoff, plumb to the sanitary sewer[9], and sign as a designated wash area. ▪ Commercial car wash facilities shall discharge to the sanitary sewer.[9]	☐	☐	
☐	☒	Vehicle/ Equipment Repair and Maintenance	▪ Designate repair/maintenance area indoors, or an outdoors area designed to prevent stormwater run-on and runoff and provide secondary containment. Do not install drains in the secondary containment areas. ▪ No floor drains unless pretreated prior to discharge to the sanitary sewer. [9] ▪ Connect containers or sinks used for parts cleaning to the sanitary sewer. [9]	☐	☐	
☒	☐	Fuel Dispensing Areas	▪ Fueling areas shall have impermeable surface that is a) minimally graded to prevent ponding and b) separated from the rest of the site by a grade break. ▪ Canopy shall extend at least 10 ft in each direction from each pump and drain away from fueling area.	☐	☐	
☐	☒	Loading Docks	▪ Cover and/or grade to minimize run-on to and runoff from the loading area. ▪ Position downspouts to direct stormwater away from the loading area. ▪ Drain water from loading dock areas to the sanitary sewer.[9] ▪ Install door skirts between the trailers and the building.	☐	☐	
☒	☐	Fire Sprinklers	Design for discharge of fire sprinkler test water to landscape or sanitary sewer.[9]	☐	☐	
☒	☐	Miscellaneous Drain or Wash Water	▪ Drain condensate of air conditioning units to landscaping. Large air conditioning units may connect to the sanitary sewer.[9] ▪ Roof drains shall drain to unpaved area where practicable. ▪ Drain boiler drain lines, roof top equipment, all washwater to sanitary sewer [9].	☐	☐	
☐	☒	Architectural Copper	▪ Discharge rinse water to sanitary sewer [9], or collect and dispose properly offsite. See flyer "Requirements for Architectural Copper."	☐	☐	

[9] See MRP Provision C.3.a.i(7) for non-C.3 Regulated Projects and Provision C.3.c.i(1) for C.3 Regulated Projects.
[10] Any connection to the sanitary sewer system is subject to sanitary district approval.
[11] Businesses that may have outdoor process activities/equipment include machine shops, auto repair, industries with pretreatment facilities.

II.D. Implement Construction Best Management Practices (BMPs) *(Applies to all projects – see Provision C.6 for more details.)*

Yes	No	Best Management Practice (BMP)
☒	☐	Attach the municipality's construction BMP plan sheet to project plans and require contractor to implement the applicable BMPs on the plan sheet.
☒	☐	Temporary erosion controls to stabilize all denuded areas until permanent erosion controls are established.
☒	☐	Delineate with field markers clearing limits, easements, setbacks, sensitive or critical areas, buffer zones, trees, and drainage courses.
☒	☐	Provide notes, specifications, or attachments describing the following: ▪ Construction, operation and maintenance of erosion and sediment controls, include inspection frequency; ▪ Methods and schedule for grading, excavation, filling, clearing of vegetation, and storage and disposal of excavated or cleared material; ▪ Specifications for vegetative cover & mulch, include methods and schedules for planting and fertilization; ▪ Provisions for temporary and/or permanent irrigation.
☒	☐	Perform clearing and earth moving activities only during dry weather.
☒	☐	Use sediment controls or filtration to remove sediment when dewatering and obtain all necessary permits.
☒	☐	Protect all storm drain inlets in vicinity of site using sediment controls such as berms, fiber rolls, or filters.
☒	☐	Trap sediment on-site, using BMPs such as sediment basins or traps, earthen dikes or berms, silt fences, check dams, soil blankets or mats, covers for soil stock piles, etc.
☒	☐	Divert on-site runoff around exposed areas; divert off-site runoff around the site (e.g., swales and dikes).
☒	☐	Protect adjacent properties and undisturbed areas from construction impacts using vegetative buffer strips, sediment barriers or filters, dikes, mulching, or other measures as appropriate.
☒	☐	Limit construction access routes and stabilize designated access points.
☒	☐	No cleaning, fueling, or maintaining vehicles on-site, except in a designated area where washwater is contained and treated.
☒	☐	Store, handle, and dispose of construction materials/wastes properly to prevent contact with stormwater.
☒	☐	Contractor shall train and provide instruction to all employees/subcontractors re: construction BMPs.
☒	☐	Control and prevent the discharge of all potential pollutants, including pavement cutting wastes, paints, concrete, petroleum products, chemicals, washwater or sediments, rinse water from architectural copper, and non-stormwater discharges to storm drains and watercourses.

PROJECTS THAT ARE <u>NOT</u> C.3 REGULATED PROJECTS STOP HERE!

II.E. Biotreatment, Infiltration and Rain Water Harvesting and Use.

MRP 2.0 no longer requires that a feasibility analysis of infiltration and rainwater harvesting be conducted. However, applicants using biotreatment are encouraged to maximize infiltration of stormwater if site conditions allow. If feasible and desired, infiltration and rainwater harvesting may be cost effective solutions depending on the project.

II.F. Stormwater Treatment Measures (Applies to C.3 Regulated Projects)

II.F.1 Check the applicable box and indicate the treatment measures to be included in the project.

Yes	No	
☐	☒	Is the project a Special Project? (See Appendix K of the C.3 Technical Guidance for criteria.) If Yes, complete the Special Projects Worksheet (go to the program website at: www.cleanwaterprogram.org and click on "Resources") and consult with municipal staff about the need to prepare a discussion of the feasibility and infeasibility of 100% LID treatment. Indicate the type of non-LID treatment to be used, the hydraulic sizing method*, and percentage of the amount of runoff specified in Provision C.3.d that is treated: Non-LID Treatment — Hydraulic sizing method* — % of C.3.d amount of runoff treated ☐ Media filter ☐ Tree well filter
☒	☐	Is the project using biotreatment to treat the C.3.d amount of runoff? For more information on infiltration and rainwater harvesting and use of stormwater, refer to the C3 Technical Guidance downloadable at the program website: www.cleanwaterprogram.org If Yes, indicate the biotreatment measures to be used, and the hydraulic sizing method: Biotreatment Measures — Hydraulic sizing method* ☒ Bioretention area — Combination ☐ Flow-through planter ☐ Other (specify):
☒	☐	Is the project using infiltration or rainwater harvesting/use? For more information on infiltration and rainwater harvesting and use of stormwater, refer to the C3 Technical Guidance downloadable at the program website: www.cleanwaterprogram.org If Yes, indicate the measures to be used, and hydraulic sizing method: LID Treatment Measure (non-biotreatment) — Hydraulic sizing method* ☐ Rainwater harvesting and use ☒ Bioinfiltration[12] — Combination ☐ Infiltration trench ☐ Other (specify):_____

***Hydraulic Sizing Method:** Indicate which of the following Provision C.3.d.i hydraulic sizing methods were used:

1. Volume based approaches – Refer to Provision C.3.d.i.(1):
   1(a) Urban Runoff Quality Management approach, or
   1(b) 80% capture approach (recommended volume-based approach).

2. Flow-based approaches – Refer to Provision C.3.d.i.(2):
   2(a) 10% of 50-year peak flow approach,
   2(b) Percentile rainfall intensity approach, or
   2(c) 0.2-Inch-per-hour intensity approach (this is recommended flow-based approach AND the basis for the 4% rule of thumb described in Section 5.1 of the C.3 Technical Guidance).

3. Combination hydraulic sizing approach -- Refer to Provision C.3.d.i.(3):
   If a combination flow and volume design basis was used, indicate which flow-based and volume-based criteria were used.

[12] See Section 6.1 of the C.3 Technical Guidance for conditions in which bioretention areas provide bioinfiltration.

II.G. Is the project a Hydromodification Management[13] (HM) Project? (Complete this section for C.3 Regulated Projects)

II.G.1 Does the project create and/or replace 1 acre (43,560 sq. ft.) or more of impervious surface? (Refer to Item I.B.1.)

- ☒ Yes. *Continue to Item II.G.2.*
- ☐ No. *The project is NOT required to incorporate HM measures. Skip to Item II.G.6 and check "No."*

II.G.2 Is the total impervious area increased over the pre-project condition? (Refer to Item I.B.1.)

- ☒ Yes. *Continue to Item II.G.3.*
- ☐ No. *The project is NOT required to incorporate HM measures. Skip to Item II.G.6 and check "No."*

II.G.3 Is the site located in a tidally influenced/depositional area, or in the extreme eastern portion of the county that is not subject to HM requirements? *(See HMP Susceptibility Map in Appendix I of the C.3 Technical Guidance.)*

- ☐ Yes. *Project is exempt from HM requirements. Attach map indicating project location. Skip to II.G.6 and check "No".*
- ☒ No. *Continue to II.G.4.*

II.G.4 Is the site located in a high slope zone or special consideration watershed, as shown on the HMP Susceptibility Map?

- ☒ Yes. *Project is subject to HM requirements. Attach map indicating project location. Skip to II.G.6 and check "Yes."*
- ☐ No. *Continue to II.G.5.*

II.G.5 For sites located in a white area on the HMP Susceptibility Map, has an engineer or qualified environmental professional determined that runoff from the project flows only through a hardened channel or enclosed pipe along its entire length before emptying into a waterway in the exempt area?

- ☐ Yes. *Project is exempt from HM requirements. Attach signed statement by qualified professional. Go to II.G.6 and check "No."*
- ☒ No. *Project is subject to HM requirements. Attach map indicating project location. Go to Item G.6 and check "Yes."*

II.G.6 Is the project a Hydromodification Management Project?

- ☒ Yes. *The project is subject to HM requirements in Provision C.3.g of the Municipal Regional Stormwater Permit.*
- ☐ No. *The project is EXEMPT from HM requirements.*
- ☐ HM requirements are impracticable. *(Attach documentation needed to comply with the impracticability provision in MRP Attachment B.)*

➢ *If the project is subject to the HM requirements, incorporate in the project flow duration stormwater control measures designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations. The Bay Area Hydrology Model (BAHM) has been developed to size flow duration controls. See www.bayareahydrologymodel.org. Guidance is provided in Chapter 7 of the C.3 Technical Guidance.*

II.H Stormwater Treatment Measure and/HM Control Owner or Operator's Information:

Name: AL AMIDY

Address: P.O. BOX 882, LOS GATOS, CA 95031

Phone: 408-497-4137 Email: ALIAMIDY@AOL.COM

➢ *Applicant must call for inspection and receive inspection within 45 days of installation of treatment measures and/or hydromodification management controls.*

Name of applicant completing the form: _____

Signature: _____ Date: _____

[13] Hydromodification is the modification of a stream's hydrograph, caused in general by increases in flows and durations that result when land is developed (made more impervious). The effects of hydromodification include, but are not limited to, increased bed and bank erosion, loss of habitat, increased sediment transport and deposition, and increased flooding. Hydromodification management control measures are designed to reduce these effects.

III. For Completion By Municipal Staff

III.1 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_____

III.2. Confirm Operations and Maintenance (O&M) Submittal:

The following questions apply to C.3 Regulated Projects and Hydromodification Management Projects.

		Yes	No	N/A
III.2.a	Was maintenance plan submitted?	☐	☐	☐
III.2.b	Was maintenance plan approved?	☐	☐	☐
III.2.c	Was maintenance agreement submitted? (Date executed:_____)	☐	☐	☐

- *Attach the executed maintenance agreement as an appendix to this checklist.*

III.3 Incorporate HM Controls (if required)

Are the applicable items for HM compliance included in the plan submittal?

Yes	No	NA	Documentation for HM Compliance
☐	☐	☐	Site plans with pre- and post-project impervious surface areas, surface flow directions of entire site, locations of flow duration controls and site design measures per HM site design requirement
☐	☐	☐	Soils report or other site-specific document showing soil types at all parts of site
☐	☐	☐	If project uses the Bay Area Hydrology Model (BAHM), a list of model inputs.
☐	☐	☐	If project uses custom modeling, a summary of the modeling calculations with corresponding graph showing curve matching (existing, post-project, and post-project with HM controls curves), goodness of fit, and (allowable) low flow rate.
☐	☐	☐	If project uses the Impracticability Provision, a listing of all applicable costs and a brief description of the alternative HM project (name, location, date of start up, entity responsible for maintenance).
☐	☐	☐	If the project uses alternatives to the default BAHM approach or settings, a written description and rationale.

- *Municipal staff: Refer to the "Flow Duration Control Review Worksheet for HM Submittals" to review the documentation submitted for HM compliance.*

III.4 Annual Operations and Maintenance (O&M) Submittals:

For C.3 Regulated Projects and Hydromodification Management Projects, indicate the dates on which the Applicant submitted annual reports for project O&M: _____

III.5 Comments:

III.6 Notes:

Section I Notes:_____

Section II Notes:_____

Section III Notes:_____

III.7 Project Close-Out:

III.7.a Were final Conditions of Approval met? ☐ ☐

III.7.b	Was initial inspection of the completed treatment/HM measure(s) conducted? (Date of inspection:_____)	☐	☐	☐
III.7.c	Was maintenance plan submitted? (Date executed:_____)	☐	☐	☐
III.7.d	Was project information provided to staff responsible for O&M verification inspections? (Date provided to inspection staff:_____)	☐	☐	☐

Name of staff confirming project is closed out:_____

Signature:_____ Date:_____

Name of O&M staff receiving information:_____

Signature:_____ Date:_____

Appendices

Appendix A: O&M Agreement
Appendix B: O&M Annual Report Form

Worksheet for Calculating the Combination Flow and Volume Method

Instructions: After completing Section 1, make a copy of this Excel file for each Drainage Management Area within the project. Enter information specific to the project and DMA in the cells shaded in yellow. Cells shaded in light blue contain formulas and values that will be automatically calculated.

1.0 Project Information

1-1	Project Name:	Greenville Plaza	
1-2	City application ID:		
1-3	Site Address or APN:	009B-550-2-3, 5, 1-2	
1-4	Tract or Parcel Map No:		
1-5	Site Mean Annual Precip. (MAP)[1]	13.5	Inches

The calculations presented here are based on the **combination flow and volume hydraulic sizing method** provided in the Clean Water Program Alameda County C.3 Technical Guidance, Version 4.0. The steps presented below are explained in Chapter 5, Section 5.1 of the guidance manual, applicable portions of which are included in this file, in the tab called "Guidance from Chapter 5".

Refer to the Mean Annual Precipitation Map in Appendix D of the C.3 Technical Guidance to determine the MAP, in inches, for the site. Click here for map

1-6	Applicable Rain Gauge[2]	San Jose	

Enter "Oakland Airport" if the site MAP is 16.4 inches or greater. Enter "San Jose" if the site MAP is less than 16.4 inches.

MAP adjustment factor is automatically calculated as: 0.94

(The "Site Mean Annual Precipitation (MAP)" is divided by the MAP for the applicable rain gauge, showin in Table 5.2, below.)

2.0 Calculate Percentage of Impervious Surface for Drainage Management Area (DMA)

2-1 Name of DMA: DMA 1

For items 2-2 and 2-3, enter the areas in square feet for each type of surface within the DMA.

	Type of Surface	Area of surface type within DMA (Sq. Ft)	Adjust Pervious Surface	Effective Impervious Area
2-2	Impervious surface	68,007	1.0	68,007
2-3	Pervious service	41,764	0.1	4,176
	Total DMA Area (square feet) =	109,771		

2-4 ***Total Effective Impervious Area (EIA)*** 72,183 **Square feet**

3.0 Calculate Unit Basin Storage Volume in Inches

Table 5-2: Unit Basin Storage Volumes (in inches) for 80 Percent Capture Using 48-Hour Drawdowns

		Unit Basin Storage Volume (in) for Applicable Runoff Coefficients
Applicable Rain Gauge	**Mean Annual Precipitation (in)**	**Coefficient of 1.00**
Oakland Airport	18.35	0.67
San Jose	14.4	0.56

3-1 ***Unit basin storage volume from Table 5.2:*** 0.56 **Inches**

(The coefficient for this method is 1.00, due to the conversion of any landscaping to effective impervious area)

3-2 ***Adjusted unit basin storage volume:*** 0.53 **Inches**

(The unit basin storage volume is adjusted by applying the MAP adjustment factor.)

3-3 ***Required Capture Volume (in cubic feet):*** 3,158 **Cubic feet**

(The adjusted unit basin sizing volume [inches] is multiplied by the size of the DMA and converted to feet)

4.0 Calculate the Duration of the Rain Event

4-1	Rainfall intensity	0.2	Inches per hour
4-2	Divide Item 3-2 by Item 4-1	2.63	Hours of Rain Event Duration

5.0 Preliminary Estimate of Surface Area of Treatment Measure

5-1	4% of DMA impervious surface	2,887	Square feet
5-2	Area 25% smaller than item 5-1	2,166	Square feet
5-3	Volume of treated runoff for area in Item 5-2	2,369	Cubic feet (Item 5-2 * 5 inches per hour * 1/12 * Item 4-2)

6.0 Initial Adjustment of Depth of Surface Ponding Area

6-1	Subtract Item 5-3 from Item 3-3	790	Cubic feet (Amount of runoff to be stored in ponding area)
6-2	Divide Item 6-1 by Item 5-2	0.4	Feet (Depth of stored runoff in surface ponding area)
6-3	Convert Item 6-2 from ft to inches	4.4	Inches (Depth of stored runoff in surface ponding area)

6-4 If ponding depth in Item 6-3 meets your target depth, skip to Item 8-1. If not, continue to Step 7-1.

7.0 Optimize Size of Treatment Measure

7-1	Enter an area larger or smaller than Item 5-2		Sq.ft. (enter larger area if you need less ponding depth; smaller for more depth.)
7-2	Volume of treated runoff for area in Item 7-1	0	Cubic feet (Item 7-1 * 5 inches per hour * 1/12 * Item 4-2)
7-3	Subtract Item 7-2 from Item 3-3		Cubic feet (Amount of runoff to be stored in ponding area)
7-4	Divide Item 7-3 by Item 7-1		Feet (Depth of stored runoff in surface ponding area)
7-5	Convert Item 7-4 from feet to inches		Inches (Depth of stored runoff in surface ponding area)

7-6 If the ponding depth in Item 7-5 meets target, stop here. If not, repeat Steps 7-1 through 7-5 until you obtain target depth.

8.0 Surface Area of Treatment Measure for DMA

8-1	Final surface area of treatment*	2,166	Square feet (Either Item 5-2 or final amount in Item 7-1)

**Note: Check with the local jurisdiction as to its policy regarding the minimum biotreatment surface area allowed.*

BAHM2013

PROJECT REPORT

General Model Information

Project Name:	default
Site Name:	Greenville Plaza
Site Address:	
City:	Livermore
Report Date:	3/22/2018
Gage:	LIVERMORE
Data Start:	1959/10/01
Data End:	2004/09/30
Timestep:	Hourly
Precip Scale:	0.933
Version Date:	2018/03/08

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C D,Grass,Flat(0-5%)	2.52
Pervious Total	2.52
Impervious Land Use	acre
Impervious Total	0
Basin Total	2.52

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C D,Grass,Flat(0-5%)	0.96
Pervious Total	0.96

Impervious Land Use	acre
Roof Area	0.3
Sidewalks,Flat(0-5%)	0.09
Parking,Flat(0-5%)	1.17
Impervious Total	1.56
Basin Total	2.52

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Mitigated Routing

Trapezoidal Pond 1

Bottom Length: 38.80 ft.
Bottom Width: 38.80 ft.
Depth: 5 ft.
Volume at riser head: 0.2464 acre-feet.
Side slope 1: 3 To 1
Side slope 2: 3 To 1
Side slope 3: 3 To 1
Side slope 4: 3 To 1
Discharge Structure
Riser Height: 4 ft.
Riser Diameter: 18 in.
Notch Type: Rectangular
Notch Width: 0.892 ft.
Notch Height: 0.494 ft.
Orifice 1 Diameter: 0.626 in. Elevation:0 ft.
Element Flows To:
Outlet 1 Outlet 2

Pond Hydraulic Table

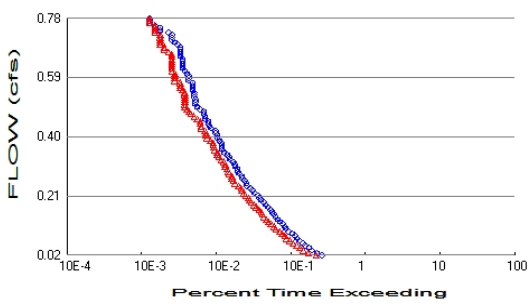
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.034	0.000	0.000	0.000
0.0556	0.035	0.001	0.002	0.000
0.1111	0.035	0.003	0.003	0.000
0.1667	0.036	0.005	0.004	0.000
0.2222	0.037	0.007	0.005	0.000
0.2778	0.037	0.010	0.005	0.000
0.3333	0.038	0.012	0.006	0.000
0.3889	0.038	0.014	0.006	0.000
0.4444	0.039	0.016	0.007	0.000
0.5000	0.040	0.018	0.007	0.000
0.5556	0.040	0.020	0.007	0.000
0.6111	0.041	0.023	0.008	0.000
0.6667	0.042	0.025	0.008	0.000
0.7222	0.042	0.027	0.009	0.000
0.7778	0.043	0.030	0.009	0.000
0.8333	0.044	0.032	0.009	0.000
0.8889	0.044	0.035	0.010	0.000
0.9444	0.045	0.037	0.010	0.000
1.0000	0.046	0.040	0.010	0.000
1.0556	0.046	0.042	0.010	0.000
1.1111	0.047	0.045	0.011	0.000
1.1667	0.048	0.048	0.011	0.000
1.2222	0.048	0.050	0.011	0.000
1.2778	0.049	0.053	0.012	0.000
1.3333	0.050	0.056	0.012	0.000
1.3889	0.051	0.059	0.012	0.000
1.4444	0.051	0.061	0.012	0.000
1.5000	0.052	0.064	0.013	0.000
1.5556	0.053	0.067	0.013	0.000
1.6111	0.053	0.070	0.013	0.000
1.6667	0.054	0.073	0.013	0.000
1.7222	0.055	0.076	0.014	0.000

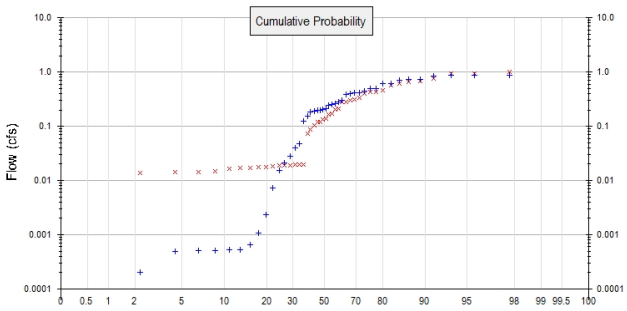
1.7778	0.056	0.079	0.014	0.000
1.8333	0.056	0.083	0.014	0.000
1.8889	0.057	0.086	0.014	0.000
1.9444	0.058	0.089	0.014	0.000
2.0000	0.059	0.092	0.015	0.000
2.0556	0.060	0.096	0.015	0.000
2.1111	0.060	0.099	0.015	0.000
2.1667	0.061	0.102	0.015	0.000
2.2222	0.062	0.106	0.015	0.000
2.2778	0.063	0.109	0.016	0.000
2.3333	0.064	0.113	0.016	0.000
2.3889	0.064	0.116	0.016	0.000
2.4444	0.065	0.120	0.016	0.000
2.5000	0.066	0.124	0.016	0.000
2.5556	0.067	0.127	0.017	0.000
2.6111	0.068	0.131	0.017	0.000
2.6667	0.068	0.135	0.017	0.000
2.7222	0.069	0.139	0.017	0.000
2.7778	0.070	0.143	0.017	0.000
2.8333	0.071	0.147	0.017	0.000
2.8889	0.072	0.151	0.018	0.000
2.9444	0.073	0.155	0.018	0.000
3.0000	0.074	0.159	0.018	0.000
3.0556	0.074	0.163	0.018	0.000
3.1111	0.075	0.167	0.018	0.000
3.1667	0.076	0.171	0.018	0.000
3.2222	0.077	0.176	0.019	0.000
3.2778	0.078	0.180	0.019	0.000
3.3333	0.079	0.184	0.019	0.000
3.3889	0.080	0.189	0.019	0.000
3.4444	0.081	0.193	0.019	0.000
3.5000	0.082	0.198	0.019	0.000
3.5556	0.083	0.202	0.053	0.000
3.6111	0.083	0.207	0.122	0.000
3.6667	0.084	0.212	0.212	0.000
3.7222	0.085	0.216	0.320	0.000
3.7778	0.086	0.221	0.442	0.000
3.8333	0.087	0.226	0.578	0.000
3.8889	0.088	0.231	0.726	0.000
3.9444	0.089	0.236	0.884	0.000
4.0000	0.090	0.241	1.054	0.000
4.0556	0.091	0.246	1.262	0.000
4.1111	0.092	0.251	1.642	0.000
4.1667	0.093	0.256	2.128	0.000
4.2222	0.094	0.261	2.691	0.000
4.2778	0.095	0.267	3.303	0.000
4.3333	0.096	0.272	3.937	0.000
4.3889	0.097	0.277	4.565	0.000
4.4444	0.098	0.283	5.158	0.000
4.5000	0.099	0.288	5.694	0.000
4.5556	0.100	0.294	6.152	0.000
4.6111	0.101	0.300	6.524	0.000
4.6667	0.102	0.305	6.810	0.000
4.7222	0.103	0.311	7.030	0.000
4.7778	0.104	0.317	7.305	0.000
4.8333	0.105	0.323	7.525	0.000
4.8889	0.106	0.328	7.737	0.000
4.9444	0.107	0.334	7.943	0.000

5.0000	0.108	0.340	8.143	0.000
5.0556	0.109	0.346	8.337	0.000

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 2.52
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.96
Total Impervious Area: 1.56

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.206127
5 year	0.58384
10 year	0.780548
25 year	0.875875

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.13451
5 year	0.451886
10 year	0.715042
25 year	0.949653

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1960	0.193	0.074
1961	0.007	0.017
1962	0.241	0.168
1963	0.393	0.577
1964	0.001	0.019
1965	0.155	0.086
1966	0.048	0.020
1967	0.875	0.941
1968	0.021	0.162
1969	0.608	0.459
1970	0.408	0.121
1971	0.277	0.313
1972	0.001	0.019
1973	0.486	0.424

1974	0.190	0.017
1975	0.124	0.017
1976	0.000	0.014
1977	0.000	0.014
1978	0.437	0.103
1979	0.259	0.135
1980	0.391	0.278
1981	0.001	0.282
1982	0.856	0.943
1983	0.613	0.668
1984	0.212	0.137
1985	0.016	0.017
1986	0.888	1.017
1987	0.002	0.210
1988	0.001	0.014
1989	0.000	0.015
1990	0.001	0.017
1991	0.206	0.019
1992	0.186	0.122
1993	0.408	0.201
1994	0.028	0.018
1995	0.736	0.426
1996	0.868	0.401
1997	0.496	0.300
1998	0.710	0.689
1999	0.198	0.019
2000	0.249	0.341
2001	0.001	0.014
2002	0.040	0.019
2003	0.300	0.605
2004	0.740	0.764

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.8876	1.0167
2	0.8748	0.9433
3	0.8681	0.9410
4	0.8558	0.7644
5	0.7404	0.6887
6	0.7364	0.6680
7	0.7096	0.6054
8	0.6126	0.5774
9	0.6081	0.4590
10	0.4963	0.4263
11	0.4859	0.4238
12	0.4370	0.4010
13	0.4081	0.3408
14	0.4078	0.3125
15	0.3930	0.3000
16	0.3912	0.2824
17	0.2997	0.2782
18	0.2769	0.2098
19	0.2586	0.2014
20	0.2492	0.1682
21	0.2411	0.1621
22	0.2121	0.1373
23	0.2061	0.1345

24	0.1978	0.1217
25	0.1933	0.1214
26	0.1902	0.1027
27	0.1865	0.0863
28	0.1548	0.0739
29	0.1244	0.0197
30	0.0478	0.0194
31	0.0402	0.0193
32	0.0282	0.0190
33	0.0209	0.0189
34	0.0155	0.0187
35	0.0073	0.0180
36	0.0023	0.0174
37	0.0011	0.0174
38	0.0006	0.0170
39	0.0005	0.0167
40	0.0005	0.0166
41	0.0005	0.0150
42	0.0005	0.0143
43	0.0005	0.0140
44	0.0002	0.0139
45	0.0000	0.0138

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0206	1043	867	83	Pass
0.0283	880	681	77	Pass
0.0360	763	586	76	Pass
0.0436	693	523	75	Pass
0.0513	616	472	76	Pass
0.0590	571	424	74	Pass
0.0667	522	381	72	Pass
0.0743	484	346	71	Pass
0.0820	447	327	73	Pass
0.0897	413	298	72	Pass
0.0974	369	278	75	Pass
0.1050	345	250	72	Pass
0.1127	327	235	71	Pass
0.1204	306	214	69	Pass
0.1281	281	197	70	Pass
0.1358	263	185	70	Pass
0.1434	245	171	69	Pass
0.1511	234	165	70	Pass
0.1588	223	159	71	Pass
0.1665	210	149	70	Pass
0.1741	197	136	69	Pass
0.1818	185	127	68	Pass
0.1895	173	116	67	Pass
0.1972	157	110	70	Pass
0.2048	148	107	72	Pass
0.2125	143	98	68	Pass
0.2202	131	94	71	Pass
0.2279	122	87	71	Pass
0.2355	114	85	74	Pass
0.2432	103	79	76	Pass
0.2509	100	71	71	Pass
0.2586	95	67	70	Pass
0.2662	89	64	71	Pass
0.2739	87	64	73	Pass
0.2816	81	60	74	Pass
0.2893	78	58	74	Pass
0.2970	76	55	72	Pass
0.3046	71	52	73	Pass
0.3123	69	52	75	Pass
0.3200	67	50	74	Pass
0.3277	61	46	75	Pass
0.3353	59	43	72	Pass
0.3430	56	41	73	Pass
0.3507	50	41	82	Pass
0.3584	48	38	79	Pass
0.3660	47	37	78	Pass
0.3737	47	36	76	Pass
0.3814	46	36	78	Pass
0.3891	44	33	75	Pass
0.3967	41	30	73	Pass
0.4044	41	29	70	Pass
0.4121	39	29	74	Pass
0.4198	39	28	71	Pass

0.4274	34	25	73	Pass
0.4351	32	25	78	Pass
0.4428	31	24	77	Pass
0.4505	31	24	77	Pass
0.4582	28	22	78	Pass
0.4658	28	20	71	Pass
0.4735	27	18	66	Pass
0.4812	27	17	62	Pass
0.4889	24	16	66	Pass
0.4965	22	15	68	Pass
0.5042	21	15	71	Pass
0.5119	21	15	71	Pass
0.5196	21	15	71	Pass
0.5272	20	15	75	Pass
0.5349	20	15	75	Pass
0.5426	20	15	75	Pass
0.5503	19	14	73	Pass
0.5579	19	13	68	Pass
0.5656	19	13	68	Pass
0.5733	19	13	68	Pass
0.5810	17	11	64	Pass
0.5886	17	11	64	Pass
0.5963	17	11	64	Pass
0.6040	16	11	68	Pass
0.6117	15	10	66	Pass
0.6193	14	10	71	Pass
0.6270	14	10	71	Pass
0.6347	14	10	71	Pass
0.6424	14	10	71	Pass
0.6501	14	10	71	Pass
0.6577	13	10	76	Pass
0.6654	13	10	76	Pass
0.6731	13	9	69	Pass
0.6808	13	8	61	Pass
0.6884	13	8	61	Pass
0.6961	12	7	58	Pass
0.7038	11	7	63	Pass
0.7115	10	7	70	Pass
0.7191	10	7	70	Pass
0.7268	10	7	70	Pass
0.7345	9	6	66	Pass
0.7422	7	6	85	Pass
0.7498	7	6	85	Pass
0.7575	6	6	100	Pass
0.7652	5	5	100	Pass
0.7729	5	5	100	Pass
0.7805	5	5	100	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

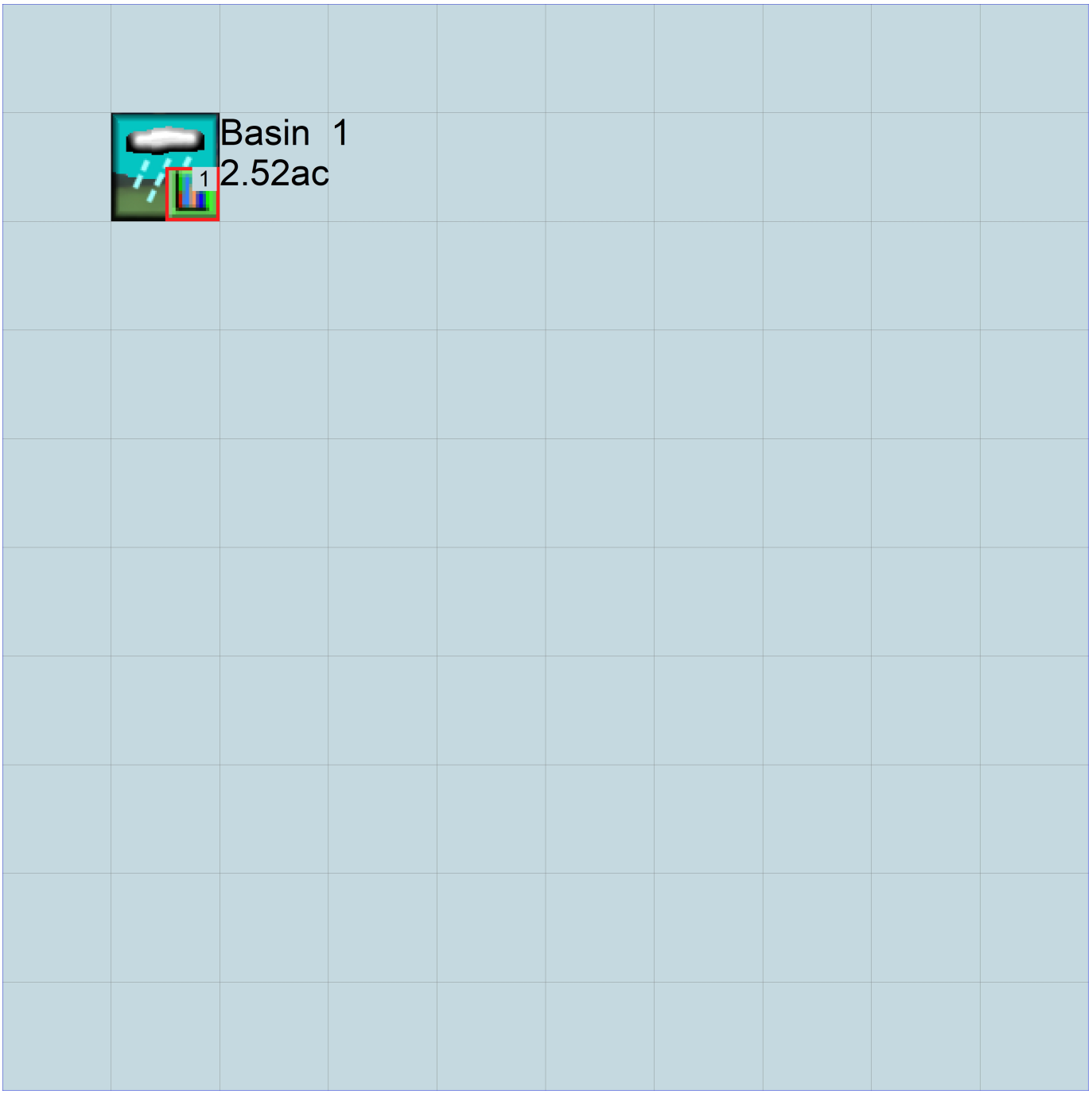
PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic

Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   default.wdm
MESSU       25   Predefault.MES
            27   Predefault.L61
            28   Predefault.L62
            30   POCdefault1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND      41
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                   MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                         User  t-series Engl Metr ***
                                      in  out           ***
   41     C/D,Grass,Flat(0-5%)    1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   41         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   41         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   41         0    0    0    1    0    0    0    0    1    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   41             0         4      0.04       400      0.05         2      0.95
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   41            40        35         3         2      0.15      0.15         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   41             0       0.3      0.25       0.7       0.5         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   41       0.4  0.4  0.4 0.45  0.5 0.55 0.55 0.55 0.55 0.55 0.45  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   41      0.12 0.12 0.12 0.11  0.1  0.1  0.1  0.1  0.1  0.1 0.11 0.12
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   41             0         0      0.01         0       0.5       0.3      0.01
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2
```

```
  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  41                        2.52     COPY   501     12
PERLND  41                        2.52     COPY   501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                          in  out                            ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                      ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *     *  *  *  *  *        *  *  *  *  *          ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit       for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES
```

```
SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    0.933          PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.933          IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   default.wdm
MESSU       25   Mitdefault.MES
            27   Mitdefault.L61
            28   Mitdefault.L62
            30   POCdefault1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:60
      PERLND      41
      IMPLND       5
      IMPLND      10
      IMPLND      14
      RCHRES       1
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Trapezoidal Pond  1         MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   41     C/D,Grass,Flat(0-5%)    1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   41         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
```

```
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   41         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   41         0    0    0    1    0    0    0    0    1    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   41              0         4      0.04       400      0.05         2      0.95
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   41             40        35         3         2      0.15      0.15         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                 ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   41              0       0.3      0.25       0.7       0.5         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   41       0.4  0.4  0.4 0.45  0.5 0.55 0.55 0.55 0.55 0.55 0.45  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   41      0.12 0.12 0.12 0.11  0.1  0.1  0.1  0.1  0.1  0.1 0.11 0.12
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   41              0         0      0.01         0       0.5       0.3      0.01
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    5     Roof Area                1    1    1   27    0
   10     Sidewalks,Flat(0-5%)     1    1    1   27    0
   14     Parking,Flat(0-5%)       1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    5         0    0    1    0    0    0
   10         0    0    1    0    0    0
   14         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    5         0    0    4    0    0    0    1    9
```

```
   10         0    0    4    0    0    0    1    9
   14         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    5         0    0    0    0    0
   10         0    0    0    0    0
   14         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    5            100      0.05       0.1       0.1
   10            100      0.05       0.1       0.1
   14            100      0.05       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    5              0         0
   10              0         0
   14              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    5              0         0
   10              0         0
   14              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK    ***
<Name>   #                 <-factor->     <Name>   #   Tbl#    ***
Basin  1***
PERLND  41                       0.96     RCHRES   1      2
PERLND  41                       0.96     RCHRES   1      3
IMPLND   5                        0.3     RCHRES   1      5
IMPLND  10                       0.09     RCHRES   1      5
IMPLND  14                       1.17     RCHRES   1      5

******Routing******
PERLND  41                       0.96     COPY     1     12
IMPLND   5                        0.3     COPY     1     15
IMPLND  10                       0.09     COPY     1     15
IMPLND  14                       1.17     COPY     1     15
PERLND  41                       0.96     COPY     1     13
RCHRES   1                          1     COPY   501     16
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
```

```
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                        in  out                             ***
    1     Trapezoidal Pond-006    1    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
    1        0  1  0  0    4  0  0  0  0       0  0  0  0  0        2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN      DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><--------><--------> ***
    1               1      0.01       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><--------> <---><---><---><---><---> *** <---><---><---><---><--->
    1            0      4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   91    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.034555  0.000000  0.000000
  0.055556  0.035151  0.001936  0.002507
  0.111111  0.035753  0.003906  0.003545
  0.166667  0.036359  0.005909  0.004341
  0.222222  0.036971  0.007946  0.005013
  0.277778  0.037588  0.010017  0.005605
  0.333333  0.038210  0.012122  0.006140
  0.388889  0.038836  0.014263  0.006632
  0.444444  0.039469  0.016438  0.007090
  0.500000  0.040106  0.018648  0.007520
  0.555556  0.040748  0.020894  0.007926
  0.611111  0.041395  0.023176  0.008313
  0.666667  0.042048  0.025494  0.008683
  0.722222  0.042705  0.027848  0.009037
  0.777778  0.043368  0.030239  0.009379
  0.833333  0.044036  0.032667  0.009708
  0.888889  0.044708  0.035132  0.010026
  0.944444  0.045386  0.037635  0.010335
  1.000000  0.046069  0.040175  0.010634
  1.055556  0.046758  0.042753  0.010926
  1.111111  0.047451  0.045370  0.011209
  1.166667  0.048149  0.048026  0.011486
```

```
1.222222  0.048853  0.050720  0.011757
1.277778  0.049561  0.053454  0.012021
1.333333  0.050275  0.056227  0.012279
1.388889  0.050994  0.059040  0.012533
1.444444  0.051717  0.061893  0.012781
1.500000  0.052446  0.064787  0.013024
1.555556  0.053181  0.067721  0.013263
1.611111  0.053920  0.070696  0.013498
1.666667  0.054664  0.073712  0.013729
1.722222  0.055413  0.076770  0.013956
1.777778  0.056168  0.079869  0.014179
1.833333  0.056927  0.083011  0.014399
1.888889  0.057692  0.086195  0.014615
1.944444  0.058462  0.089421  0.014829
2.000000  0.059237  0.092691  0.015039
2.055556  0.060017  0.096003  0.015247
2.111111  0.060802  0.099359  0.015451
2.166667  0.061592  0.102759  0.015653
2.222222  0.062387  0.106203  0.015853
2.277778  0.063188  0.109691  0.016050
2.333333  0.063993  0.113224  0.016244
2.388889  0.064804  0.116802  0.016436
2.444444  0.065619  0.120425  0.016626
2.500000  0.066440  0.124093  0.016814
2.555556  0.067266  0.127807  0.017000
2.611111  0.068097  0.131567  0.017184
2.666667  0.068933  0.135373  0.017366
2.722222  0.069774  0.139226  0.017546
2.777778  0.070621  0.143126  0.017724
2.833333  0.071472  0.147073  0.017900
2.888889  0.072329  0.151068  0.018075
2.944444  0.073190  0.155110  0.018248
3.000000  0.074057  0.159200  0.018419
3.055556  0.074929  0.163339  0.018589
3.111111  0.075806  0.167526  0.018757
3.166667  0.076688  0.171762  0.018924
3.222222  0.077575  0.176047  0.019089
3.277778  0.078467  0.180381  0.019253
3.333333  0.079364  0.184765  0.019415
3.388889  0.080267  0.189200  0.019577
3.444444  0.081174  0.193684  0.019736
3.500000  0.082087  0.198219  0.019895
3.555556  0.083004  0.202805  0.053312
3.611111  0.083927  0.207442  0.122142
3.666667  0.084855  0.212130  0.212527
3.722222  0.085788  0.216870  0.320169
3.777778  0.086726  0.221662  0.442639
3.833333  0.087670  0.226507  0.578319
3.888889  0.088618  0.231404  0.726028
3.944444  0.089571  0.236353  0.884853
4.000000  0.090530  0.241356  1.054066
4.055556  0.091494  0.246412  1.262484
4.111111  0.092462  0.251522  1.642164
4.166667  0.093436  0.256686  2.128774
4.222222  0.094415  0.261904  2.691594
4.277778  0.095399  0.267177  3.303628
4.333333  0.096388  0.272504  3.937454
4.388889  0.097382  0.277887  4.564996
4.444444  0.098382  0.283325  5.158849
4.500000  0.099386  0.288818  5.694448
4.555556  0.100396  0.294368  6.152848
4.611111  0.101410  0.299973  6.523974
4.666667  0.102430  0.305636  6.810264
4.722222  0.103455  0.311355  7.030666
4.777778  0.104485  0.317131  7.305895
4.833333  0.105520  0.322964  7.525389
4.888889  0.106560  0.328855  7.737685
4.944444  0.107605  0.334805  7.943447
5.000000  0.108656  0.340812  8.143244
END FTABLE  1
```

```
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    0.933          PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.933          IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    0.933          RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    1              RCHRES   1     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   1 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1001 STAG     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK   16


END MASS-LINK

END RUN
```

Disclaimer

Legal Notice

This program and accompanying documentation are provided 'as-is' without warranty of any kind.The entire risk regarding the performance and results of this program is assumed by End User. Clear Creek Solutions Inc. and the governmental licensee or sublicensees disclaim all warranties, either expressed or implied, including but not limited to implied warranties of program and accompanying documentation. In no event shall Clear Creek Solutions Inc, Applied Marine SciencesIncorporated, the Alameda County Flood Control and Water Conservation District, EOA Incorporated, member agencies of the Alameda Countywide Clean Water Program, member agencies of the San Mateo Countywide Water Pollution Prevention Program, member agencies of the Santa Clara Valley Urban Runoff Pollution Prevention Program or any other LOU Participants or authorized representatives of LOU Participants be liable for any damages whatsoever (including without limitation to damages for loss of business profits, loss of business information,business interruption, and the like) arising out of the use of, or inability to use this programeven if Clear Creek Solutions Inc., Applied Marine Sciences Incorporated, the Alameda County Flood Control and Water Conservation District, EOA Incorporated or any member agencies of the LOU Participants or their authorized representatives have been advised of the possibility of such damages. Software Copyright © by Clear Creek Solutions, Inc. 2005-2018; All Rights Reserved.

Clear Creek Solutions, Inc.
6200 Capitol Blvd. Ste F
Olympia, WA. 98501
Toll Free 1(866)943-0304
Local (360)943-0304

www.clearcreeksolutions.com

G:\17-121 - livermore\Eng\MatlDwgs\17-121_DRAINAGE_2015.dwg Mar 22, 2018-09:46 cm AVasquez

CONCEPTUAL GRADING & DRAINAGE PLAN

LIVERMORE, STATE OF CALIFORNIA

GREENVILLE PLAZA

PROJECT NUMBER
17-121

SHEET
1 OF 1

PREPARED UNDER THE DIRECTION OF
ALBERTO VASQUEZ
No. 78171
EXP. 09-30-19
CIVIL
STATE OF CALIFORNIA
REGISTERED PROFESSIONAL ENGINEER

NOTE: DO NOT USE FOR CONSTRUCTION UNLESS SIGNED BY THE ENGINEER

SCALE: 1" = 40'
0 20 40 80

BENCHMARK

THE BENCHMARK FOR THIS PROJECT IS A SURVEY DISC STAMPED "ALA. CO. B.M. NO. 95" SET ON THE NORTHWEST CORNER OF THE WESTERN FOUNDATION OF RAILROAD BRIDGE. Elevation = 605.02 (NAVD 88)

LEGEND

DESCRIPTIONS	(P) PROPOSED	(E) EXISTING
STORM DRAIN	12"D	12"D
SANITARY SEWER	6"S	6"S
WATER MAIN	8"W	8"W
FIRE SERVICE	8"FS	8"FS
CENTERLINE		
RIGHT OF WAY LINE		
BOUNDARY LINE		
ELECTRICAL LINE	ELEC	OH
EDGE OF PAVEMENT		
IMPROVEMENTS		
JOINT TRENCH		U/T
FENCE		X
MANHOLE		
DRAIN INLET		
SEWER CLEANOUT		
WATER SERVICE		
METERED WATER SERVICE		
POST INDICATOR VALVE		
FIRE HYDRANT		
FIRE DEPT. CONNECTION		
BLOWOFF VALVE		
GATE VALVE		

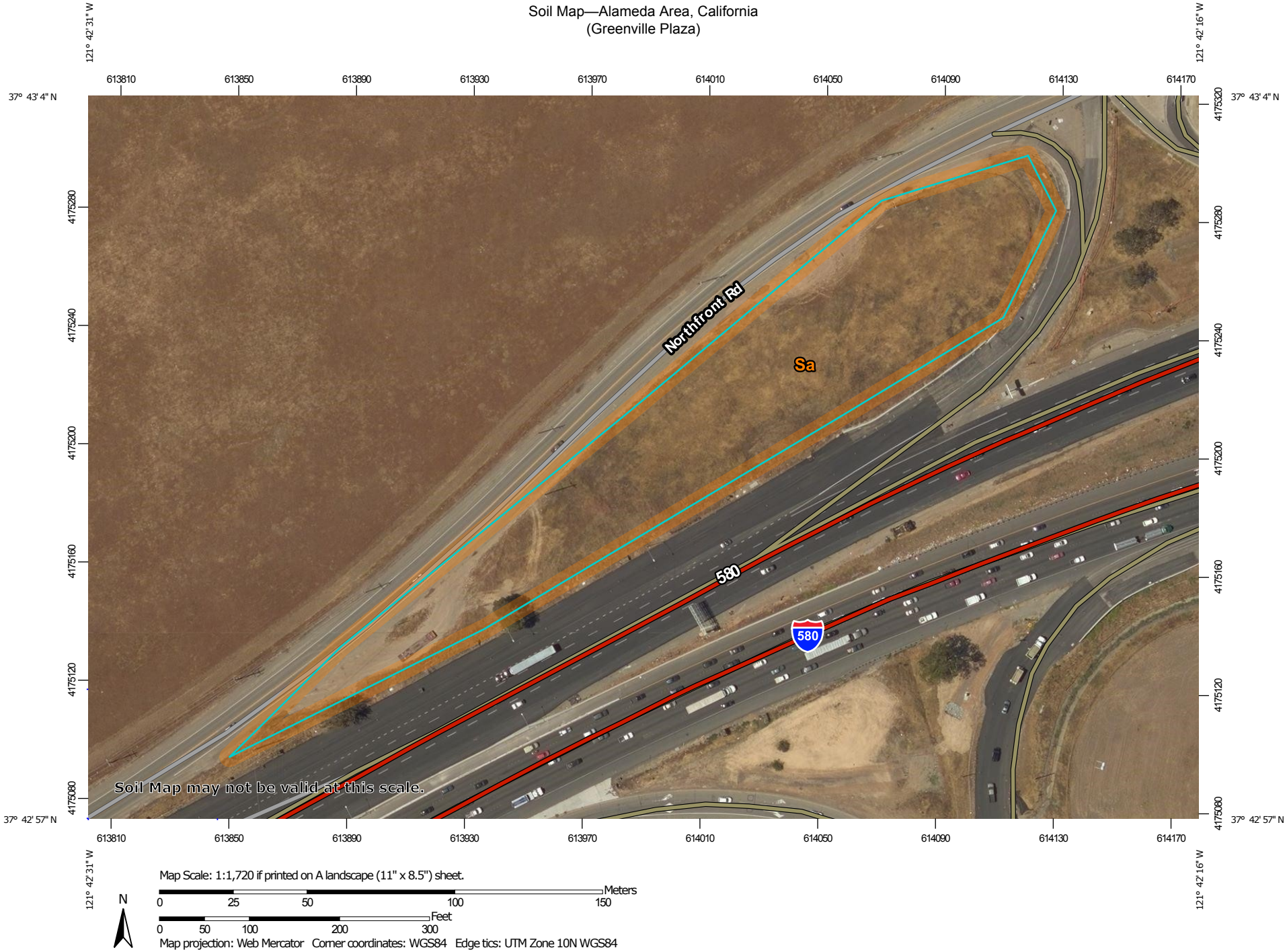
NORTHFRONT ROAD

PROPOSED RETAIL BUILDING 4,800 SF
FF = 559.9
PROPOSED RESTAURANT 2,427 SF
FF = 560.0
PROPOSED C-STORE 4,742 SF
DETENTION BASIN
TREATMENT BASIN
LIFT STATION
553.2 INV
SSMH
RIM=562.1
INV=556.31 (IN)
SDDI
GR=561.8
INV=556.56 (12", IN/OUT)
SSMH
RIM=562.0
INV=554.73 (OUT)
INV=554.78 (IN)
SSMH
RIM=565.0
INV=556.18 (OUT)
INV=556.23 (IN)
INV=556.28 (IN)
SDDI
GR=563.9
INV=558.65 (IN/OUT)
SSMH
RIM=567.0
INV=557.63 (OUT)
INV=556.68 (IN)
INV=557.73 (IN)
SSMH
RIM=567.7
INV=558.49 (OUT)
INV=558.54 (IN)
SDDI
GR=566.0
INV=561.37 (OUT)

DATE:	03-09-2018	
SCALE:	1"=40'	
DRAWN BY:	AV	
DESIGNED BY:	AV	
CHECKED BY:	AV	

NO.	DATE	DESCRIPTION

Soil Map—Alameda Area, California
(Greenville Plaza)



Map Scale: 1:1,720 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 25 50 100 150

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Alameda Area, California
Survey Area Data: Version 11, Sep 13, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 11, 2015—Jun 17, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Sa	San Ysidro loam, 0 to 2 percent slopes, MLRA 14	2.8	100.0%
Totals for Area of Interest		**2.8**	**100.0%**

Map Unit Description

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named, soils that are similar to the named components, and some minor components that differ in use and management from the major soils.

Most of the soils similar to the major components have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Some minor components, however, have properties and behavior characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. Soils of a given series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Additional information about the map units described in this report is available in other soil reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the soil reports define some of the properties included in the map unit descriptions.

Alameda Area, California

Sa—San Ysidro loam, 0 to 2 percent slopes, MLRA 14

Map Unit Setting

National map unit symbol: 2tyys
Elevation: 70 to 1,990 feet
Mean annual precipitation: 13 to 22 inches
Mean annual air temperature: 59 to 61 degrees F
Frost-free period: 300 to 360 days

Farmland classification: Not prime farmland

Map Unit Composition

San ysidro and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of San Ysidro

Setting

Landform: Alluvial fans, terraces, valley floors
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock

Typical profile

A - 0 to 23 inches: loam
B1 - 23 to 38 inches: clay loam
Bt2 - 38 to 64 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 16 to 24 inches to abrupt textural change
Natural drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: LOAMY CLAYPAN (R014XE029CA)
Hydric soil rating: No

Minor Components

Arbuckle

Percent of map unit: 6 percent
Hydric soil rating: No

Rincon

Percent of map unit: 2 percent
Hydric soil rating: No

Pleasanton, loam
Percent of map unit: 2 percent
Hydric soil rating: No

Solano
Percent of map unit: 2 percent
Hydric soil rating: No

Cropley, clay
Percent of map unit: 1 percent
Hydric soil rating: No

Pescadero
Percent of map unit: 1 percent
Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Palexeralfs
Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Alameda Area, California
Survey Area Data: Version 11, Sep 13, 2017