Appendix K – Public Services & Utilities

TECHNICAL MEMORANDUM

EIR SUPPORT INFRASTRUCTURE

City of Clearlake

Airport “Concept Development” Project

Job No. 24-701

7/21/2025

YUBA CITY OFFICE
1110 CIVIC CENTER BLVD. STE 404
YUBA CITY, CA. 95993

CHICO OFFICE
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Introduction

The purpose of this technical memorandum (TM) is to provide project description, anticipated means and calculations of expected flow/needs of water, sewer, drainage, earthwork, and low impact design calculations, for a master planned development located on approximately 54.78 acres of property known as the "Airport" property, which is being planned for a comprehensive use development.

The calculations developed within this study are intended to be used for planning purposes only and provide a reasonable estimate that should be planned for during the EIR process. The current site plan proposes a fully developed project, thus the calculations and impacts developed under this plan will be used for EIR Evaluation, and we consider them to be conservative. Evaluation of this plan under this EIR should be adequate to cover a wide range of development options should a less dense overall project be completed.

This Planning Study is being done in support of an Environmental Impact document, under the California Environmental Quality Act. This study focuses on assessing impacts on water resources, sanitary sewer, and storm drainage. Our focus is ensuring the project meets environmental laws and permitting requirements. This study proposes development strategies which reduce or compensate for environmental impacts. Our work herein will help the EIR team in examining direct, indirect, and cumulative effects of the overall proposed development of this area, and evaluating alternative project designs to minimize impacts.

Site Planning Considerations:

The development site plan shown on Figure 1-1 proposes a very efficient and pedestrian friendly strategy and reduces impacts by minimizing the street network. Nearly the entire project is serviced by two main streets, 18th Ave, and the North-South Market Street. This pedestrian friendly atmosphere has been carried through this master design process, and serves to minimize environmental impacts, by minimizing street construction.

Figure 1-1 Concept Development Plan

Grading and Drainage

Given the architectural street layout, to ensure the grading and site planning would be feasible, we have prepared a rough grading plan establishing building finish floor grades, street, and parking lot grades. This endeavor also allowed us to calculate the earthwork for the project, which helps to assess overall feasibility. Coupled with this effort was the review of past geotechnical work, and performance of additional recently completed geotechnical work on the site. The underlying soils on this site are considered to be very dense, and even solid rock at various depths in a lot of areas. It is important to propose a plan that can actually be built, and to understand the opportunities and constraints provided by the particular geology of this site. There are at least three separate geotechnical studies that examine different areas of the 54.78 acre site. These are as follows:

> Draft Geotechnical Investigation – Home Depot Store – Moore/Twining Associates – February 2008
>
> Geotechnical Engineering Investigation Report Update City of Clearlake Airport Development Project 18th Avenue Extension 18th Avenue and Highway 53 Clearlake, Lake County, California - November 4th, 2022 - **NV5**
>
> Soil Excavation/Rippability Evaluation Report Clearlake Airport Development - Safeway Project 18th Avenue and Highway 53 Clearlake, Lake County, California. February 24th, 2025 - **NV5**

Due to the size and volume of these reports, we have not included herein in any appendices, but have them stored in the project files and they are readily available upon request.

The Geotechnical Report Findings are Summarized as follows:

1.) The soils are highly disturbed as a result of the construction and use of the site previously, as a municipal airport.

2.) The underlying soils consist of a varying condition having some fill, with very large boulders on the north side, and soils ranging down to 10 +/- feet deep, to shallow soils and volcanic rock at or near the ground surface as you move across the site to the south.

3.) The reports all expressed concern with the potential for "blasting" in order to develop or grade to elevation depths where it would be below the volcanic layer strata. It appears that while this layer is very hard, it's of a nature that can be dug, (with special equipment), vs. having to be "blasted" in order to excavate and grade for construction.

4.) The site has a diverse set of characteristics across the 55 acres, but based on research to date does not appear to require any special foundation preparation that would be out of norm for the region, but each building location will need to satisfy it's own development foundation requirements, there may, by chance, be data in the existing reports that can provide guidance, but we would recommend each project employ a geotechnical engineer and perform their own site specific investigations.

5.) Based on the geotechnical reports and previous disturbance on the site, it's, coupled with the current site conditions, the proposed project development grading poses no additional risk of environmental effects. In it's current (as is, undeveloped) condition, the site is subject to high erosion, and poses risk to wildfire in some locations.

Figure 1-2 and 1-3 show the fully developed site with a preliminary grading plan, and street profiles of Market Street and Airport Road, which were used to help establish building finish floor grades, roadway grades and were used to develop a drainage and Low Impact Draft Design Plan, included herein in appendix A. This grading plan demonstrates that the project proposed layout is feasible and pragmatic.

Figure 1-2 Preliminary Grading Plan

Figure 1-3 Preliminary Market Street And Airport Road Profiles

Earthwork:

The entire site has been preliminarily designed in a way which balances earthwork, therefore little to no net import or export is expected. When developing a site, it is much cheaper to have a small amount of export material, vs needing any import material. In this particular case, some of the geologic material is rock from the underlying soils so it would likely be recycled via crusher, and used as either base rock underneath the asphalt paving, or for building foundations. The overall development for this Airport Concept Project is likely to take place in phases and over many years, and so interim construction projects will yield their own earthwork balances along the way. Final grading of the entire development would likely take place over a decade, or however long it takes to fully develop this site. In total, earth moving operations required for complete build-out of the development are approximated to be around 230,000 cubic yards.

Sanitary Sewer and Water:

A separate Water and Sewer Technical Memorandum has been prepared for this project, and we have included it as Appendix A herein.

Storm Drainage:

A separate Drainage Technical Memorandum has been prepared for this project, and we have included it as Appendix B herein.

Appendix A

TECHNICAL MEMORANDUM

EIR SUPPORT WATER AND SEWER

City of Clearlake

Airport “Concept Development” Project

Job No. 24-701

7/21/2025

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Introduction

The purpose of this technical memorandum (TM) is to provide project description, anticipated means and calculations of expected flow/needs of water and sewer for a master planned development located on approximately 54.78 acres of property known as the "Airport" property, which is being planned for a comprehensive use development.

The flows developed within this study are intended to be used for planning purposes and provide an approximation of demand that should be planned for during the EIR process. The current site plan proposes a fully developed project thus the flows developed under this plan are likely to be the highest that would be experienced. Evaluation of this plan under this EIR should be adequate to cover a wide range of development options should a less dense overall project be completed.

This Planning Study is being done in support of an Environmental Impact Document, under the California Environmental Quality Act. This study focuses on assessing impacts on, water resources, sewer, and drainage. Our focus is ensuring the project meets environmental laws and permitting requirements. This study helps to identify ways to reduce or compensate for environmental impacts. Our work herein will help the EIR team in examining direct, indirect, and cumulative effects of the overall proposed development of this area, and evaluating alternative project designs to minimize impacts.

Sewer

1. Treatment Plant Capacity Overview

The City of Clearlake, and thereby this Airport Development project, is served by the Southeast Regional Wastewater Collection System and Southeast Treatment Plant which is also owned and operated by Lake County located at 2485 Old Highway 52, Clearlake, CA. Lake County Special Districts is the agency in charge of operating and maintaining the system. The Southeast system is located within the jurisdiction of the Central Valley Regional Water Quality Control Board (Central Valley Water Board) No. 2022-0103-DWQ "Statewide Waste Discharge Requirements, General Order for Sanitary Sewer Systems" (SSS WDRs). Influent from the region as well as the entire City of Clearlake is transported through a collection system via both gravity and pumping stations to the Southeast Regional Wastewater Treatment Plant. The WWTP utilizes aerated lagoon systems and currently operates with a dry weather flow of approximately 1.9 million gallons per day (MGD). Final effluent discharge from this treatment plant is piped to Cobb Mountain and discharged at Calpine Geysers. According to Special Districts Sanitary Sewer Management Plan for the Southeast Regional Wastewater Collection System, Revised November 2022, the system serves approximately

6,228 connections, equating to 8,094 Single Family Dwelling equivalents (SFDs) with an average calculated wastewater load of 305 gallons per day (GPD) per connection.

Per the 2005 Master Plan, the facility is designed for 14,641 total connections, allowing for 8,413 additional connections beyond current service levels. This represents approximately 2.5 MGD of additional dry weather flow capacity.

Airport Development Project Impact:

The proposed Airport development is projected to contribute 101,185 GPD (dry weather flow) at full build-out, an additional 517 Equivalent Dwelling Units (EDUs) based on a loading estimate of 210 GPD per Equivalent Dwelling Unit (EDU) which is referenced in the Special Districts design standards. EDUs are a different term for the same concept as SFDs, and can be considered interchangeable. This increase of 101,185 GPD represents approximately 4% of the available future capacity.

After accounting for the Airport development, the wastewater treatment plant would maintain approximately 2.4 MGD of remaining capacity.

Conclusion:

Based on this published data, it's our assessment that the WWTP has adequate capacity to serve the proposed Airport Development Project with minimal impact to its capacity.

2. Collection and Transport System

While the treatment plant has sufficient capacity to serve the projected buildout, localized constraints within the collection and transport system—particularly during storm events—necessitate a closer evaluation of conveyance capacity.

The purpose of a capacity assessment is to ensure that adequate capacity exists in all portions of the collection system and that downstream portions are not overwhelmed with new connections. The Network Hydraulic Models (calibrated computer-based hydraulic sewer models) provide the capacity assessment as well as the impact analysis for development.

Pursuant to Lake County Special Districts procedures, new developments exceeding 20 EDUs are reviewed by District engineering staff using the Network Model for the SE system. This model assesses potential impacts on gravity sewer mains, pump stations, and force mains by evaluating storage capacity and flow within the main sections of the trunk line serving the collection system. The model helps to identify areas within the collection system where infrastructure improvements are necessary to accommodate the development, capacity mitigation and costs including shared costs for infrastructure replacement based on relative use.

Growth factor is another element which the District uses to anticipate increase of daily flow within the transport system. In April of 2006, a Build-Out Analysis of Lake County Water and Wastewater systems was completed. This system-wide analysis was created to be a tool for long range planning

by estimating future growth in customer demand, and by preparing system master plans and Capital Improvement Programs (CIPs) to accommodate growth.

Special Districts Strategy for Addressing System limitations:

Capacity assessments reveal collection system locations in need of improvement. The District's strategy to address potential system limitations is not solely reliant on major capital expansion or construction of new trunk lines. While funding is always a consideration, County reserves are used to handle smaller projects. Larger, more expensive projects receive Capital Improvement Plan level funding and attention. Lake County Special Districts has large capital improvement projects in process and some that have been completed.

The District has implemented targeted, accelerated maintenance and rehabilitation programs focused on existing sewer infrastructure located within current public streets and rights-of-way. These targeted programs are primarily designed to aggressively mitigate Infiltration and Inflow (I&I)—the entry of groundwater and stormwater into the sewer system—which reduces available capacity for actual wastewater flows. A 2021 Integrated Regional Water Management (IRWM) grant has been utilized for I&I mitigation of late. Key contributing factors to I&I in the Southeast system include:

- Aging or deteriorated sewer pipes with cracks or open joints
- Unauthorized or illegal stormwater connections
- Resident practices such as removing cleanout caps during wet weather
- Manhole intrusion through lid ventilation or cracks and void spaces
- Overland run-on directly into the lagoon system

These issues result in episodic surcharging during high flow conditions, but are being systematically addressed as part of the District's proactive efforts to improve system reliability.

When looking at total combined daily flow terminating at the Wastewater Treatment Plant, the final stop for wastewater influent, there has historically been a more than 200% increase in flows between the dry weather and wet weather flows (1.9 MGD versus 6.1 MGD). While Infiltration and Inflow remain a significant challenge, according to the 2023 inspection report the district is making significant progress, up to a stated 40%, at reducing I&I through their efforts (See Attachment 1).

As a consequence of this project, new off-site facilities may or may not need to be installed. Only a study modelling Special Districts sewer infrastructure can reveal potential need for off-site upgrades. This Technical Memorandum does not cover the capacity of existing or future off-site sanitary sewer infrastructure, such a study can only be performed by Lake County Special Districts. Individual phases of the overall Airport Concept Development, as they occur, will pay development impact fees to Special Districts, and a determination of whether any upgrades or maintenance will be needed shall be made by the District at that time.

3. Development Coordination and CEQA Compliance

To ensure that future development is supported by adequate infrastructure, the District evaluates each proposed project on an individual basis. We assume this evaluation includes:

- Locational analysis, recognizing that not all sub-areas of the Southeast system experience surcharging
- Flow projection reviews, based on project-specific EDU counts
- Site-specific impact assessments using the District's modeling system

Where infrastructure enhancements are required to accommodate project flows, the District prepares and provides developers with a detailed plan/report and cost estimate for necessary improvements. These improvements are typically implemented by the developer and financed through impact fees or direct project investment such as public infrastructure improvements.

This approach is consistent with CEQA's requirements to identify, disclose, and mitigate significant environmental impacts related to public services. Because improvements are confined to existing utility corridors and rights-of-way, and primarily involve the repair or replacement of existing pipelines, environmental impacts are typically minor, temporary, and construction-related. As such, these upgrades often qualify for categorical exemptions or result in less-than-significant impacts with mitigation, pursuant to CEQA Guidelines Sections 15301 (Existing Facilities) and 15302 (Replacement or Reconstruction).

4. Airport Concept Development

The on-site sewer system for the new Airport Development will connect to existing sewer infrastructure which is located both adjacent to and on certain portions of the site. See fig. 1.

The new Airport Development on-site sewer collection and transport system will be sized for anticipated uses on each parcel of the development concept plan. We have categorized the land or building uses shown on the preferred concept Architectural plan by "program", then calculated anticipated sewer flows. Wastewater drainage fixture units were used, total wet weather flow, peak gallons per minute flow, and EDUs (Equivalent Dwelling Units) were then derived. These calculations are shown in the attached spreadsheet along with our assumptions. Because this is plan is currently a concept, these calculations are considered approximate. Based on California Plumbing Code, new on-site sewer mains have been sized, with mains ranging from 6 to 10 inches in diameter. Manholes, and 4-6 inch sewer service laterals for all new buildings have been anticipated. Additionally, a 6-inch sewer lateral will be installed specifically for the hospital to accommodate its higher usage. These components are designed to meet the anticipated demands of the development, ensuring that all waste is efficiently managed and transported.

5. Conclusion

The Southeast Regional Wastewater Treatment Plant has adequate treatment capacity to support planned development, including the Airport project. Potential constraints in the collection system are being addressed through an accelerated maintenance program focused on rehabilitation of existing infrastructure, coordinated with development timelines and impact mitigation strategies. The District's approach ensures that new growth is responsibly integrated into the system, in alignment with CEQA compliance standards and public service planning best practices.

A proposed sewer system and water system has been sized and designed for the development project and is shown here:

Figure 1 - Special Districts Existing Infrastructure Mapping

Water

Currently the project boundary lies within the limits of the Highlands Mutual Water Company district boundaries and the Konocti Water District Boundaries. The boundary between the two districts is drawn along 18th Avenue. Konocti District lies north of 18th.

Figure 2 - Konocti Water Map of Facilities in the Area

Figure 3 - Highlands Water Company Facilities Map in the Area

Water supply will be required for both domestic and firefighting. In estimating water supplies for large commercial projects in Clearlake, we have consulted the fire department, and City codes. Based on our research we would recommend a water system design that could meet the maximum day demand plus a 2-hour fire flow of at least 1500 gallons per minute. These rates are then used to design a transport system to supply water throughout the project area. In addition, it's recommended and we have proposed that the system have at least two connection points on the main lines so that in the event there is a line failure, the system can be charged from an alternate direction.

Estimation of needed water supply and flows:

Based on the Architectural concept plan (see attached), we have developed estimates of average day demand for each building defined by proposed use. We created a tabular estimate of each structure, and assigned an average day demand, and then applied a factor established on documented published engineering data to arrive at the maximum day demand. The result shows estimated/predicted maximum day demands on the future needs of the entire development cumulatively (See attached Spreadsheet). When you add fire flow demand, total flow rates can then be used to size the transport system, and to ensure that the development has adequate supply and pressure.

We have calculated a peak demand flow rate of 127.5 GPM for Konocti Water District, and 174.5 for Highlands Mutual Water Company. With fire flow added, 1627.5 GPM is the result for Konocti, and 1674.5 for Highlands. The proposed Konocti loop will experience an approximate head loss of less than 11 psi if a 10" main is installed, with Highlands anticipating a loss of about 11 psi. Please see head loss calculation sheets (attached).

Based on estimates, calculations, and experience with numerous municipal water systems and for the purpose of preparation of the EIR document we are comfortable with estimating that the Highlands Water District portion of the development will be served with a 10" diameter water main line through the center of the project extending the project limits north – south. This new 10" main will make a double loop, connecting to Old Hwy 53 at 18th Avenue, Airport Road, and the proposed South Market Street. The portion of project area north of 18th Avenue, Konocti Water District territory, will be served by a proposed 10" water main loop including Victor Street, Spruce, and Manzanita. All water mains will have valves, fire hydrants, meters, fire service connections, fire sprinkler connections, and other necessary components per Highlands Water Company's and Konocti's Standard Plans and Specifications.

Both districts have water infrastructure adjacent to the project boundaries and indicate that extension and connection to their systems are available. Neither system report that they have supply or capacity issues that would require large upgrades to accommodate this development project. It's assumed that if some upgrades are required by either of the water companies, it will be focused on existing infrastructure and not likely required any new lines be installed outside of the project boundary region.

Attachment 1

Name/Location of Facility Inspected:
Lake County Southeast Regional Waste Disposal Facility Collection System
230 North Main Street
Lakeport, CA 95453

Inspected By:
German Myers[1], WRCE[2], SWRCB[3]
Jamie Johnson, WRCE, SWRCB
Justin Shen, WRCE, SWRCB
Kenny Croyle, WRCE, CVRWQCB[4]

Date:
11-08-2023 Field Inspection
Start: 0852
End: 1433
Consent given by Scott Harter at 0856

Prepared By:
German Myers, WRCE

Reviewed By:
Tomas Eggers, Senior WRCE

WDID Number: 5SSO11055
Water Quality Order No: 2022-0103-DWQ
Legally Responsible Official (LRO): Scott Harter, Special Districts Administrator

FACILITY REPRESENTATIVES

Name:	Title:	Email:
Scott Harter	Administrator	scottharter@lakecountyca.gov
Scott Hornung	Deputy Administrator	scott.hornung@lakecountyca.gov
Steve Phillips	Utility Systems Compliance Coordinator	steven.phillips@lakecountyca.gov
Phillip Spooner	Superintendent	phillip.spooner@lakecountyca.gov
Jesus Salmeron	Deputy Administrator Fiscal	jesus.salmeron@lakecountyca.gov

FACILITY DESCRIPTION

Lake County owns and operates the Southeast Regional Waste Disposal Facility Collection System (hereafter, Southeast CS) which has approximately 95.77 miles of gravity sewers, 16.4 miles of force mains, and 21 pump stations, serving approximately 13,176 customers. All wastewater collected within the Southeast CS is discharged into the Southeast Regional Wastewater Treatment Plant (WWTP) which is also owned and operated by Lake County. The Southeast CS is located within the jurisdiction of the Central Valley Regional Water Quality Control Board (Central Valley Water Board) and operates under State Water Resources Control Board (State Water Board) Water Quality Order

[1] Lead Inspector
[2] Water Resource Control Engineer
[3] State Water Resources Control Board
[4] Central Valley Regional Water Quality Control Board

PURPOSE OF INSPECTION

On September 22, 2023, the Office of Enforcement (OE) sent a Notice of Inspection (Notice) to Mr. Scott Harter, Special Districts Administrator for Lake County **(Attachment A Notice of Inspection)**. The Notice informed Lake County that OE staff would be conducting a compliance evaluation inspection (CEI) of the Southeast CS to evaluate overall compliance with SSS WDRs. The Notice also requested Lake County to fill out a Pre-Inspection Questionnaire, which Lake County returned on October 23, 2023 **(Attachment B Pre-Inspection Questionnaire)**. OE reached out to Mr. Harter on October 18, 2023, to schedule a field inspection of the Southeast CS for November 8, 2023.

RECORD REVIEW

Prior to the inspection, OE staff reviewed information uploaded to the California Integrated Water Quality System (CIWQS) database and information provided by Lake County. OE Staff reviewed the documents and information described below and compiled a list of key items noted to prepare for the inspection.

Lake County has installed 210 manhole barrier lids to address inflow and infiltration (I/I) issues and plans to install 500-700 more.

Lake County is using the acoustic inspection tool Sewer Line Rapid Assessment Tool (SL-RAT) to inspect pipelines.

Lake County conducts smoke testing for I/I.

Pump stations are inspected weekly and cleaned annually.

Lake County owns and operates four other collection systems.

There is one pump station that does not have an autodialing or supervisory control and data acquisition (SCADA) system.

Lake County does not currently use a computerized maintenance management system (CMMS) but are in the process of using CivicSpark to create a geographic information system (GIS) asset management system.

Service requests are issued from the cost accounting management system and are based on historical knowledge of problem areas.

There is no current method of inspecting air relief valves (ARVs).

A system-wide closed-circuit television (CCTV) inspection was done in 2019 but 0% was reviewed and ranked.

There are 30-40 miles of planned inspections and 4-5 miles of planned cleaning for the next fiscal year (FY).

There are 54 food service establishments (FSEs).

There were 59 complaints in the previous FY.

Historically, there has been significant I/I during the winter season.

Upgrades to the pump stations and efforts to reduce I/I have alleviated stress on the system.

Lake County is developing a GIS to maintain system history and records.
The fats, oil, and grease (FOG) program is enforced by the sewer use ordinance.
The operation and maintenance (O/M) program consist of system mapping, preventative O/M, rehabilitation and replacement, training, and contingency equipment and replacement inventory.
System capacity and funding for capital improvement projects has historically been an issue.
Short- and long-term improvements projects would be identified once capacity assessments are completed.

Accomplishments in the previous 12 months from the audit were as follows:
Lake County surveyed 58 miles using the SL-RAT.
Lake County cleaned 1.2 miles of pipelines.
Lake County performed three-point repairs.
Lake County installed 210 manhole lid barriers.
Lake County inspected 54 manholes.
Lake County inspected 8 FSEs.
There were 31 sanitary sewer overflows (SSOs) from 2016-2021, 18 of which were caused by roots or capacity exceedances.
Lake County has been unable to fill the capacity management operation and maintenance coordinator position.
Lake County has not performed FOG inspections at the desired interval.
Lake County has a goal of inspecting all FSEs annually.
The SSMP updates and audits have not been performed in the past until the most recent update and audit.

The annual report was last updated on September 28, 2022.
Approximately $5.7 million is the annual budget for O/M.
Approximately $2.8 million is the annual budget for capital expenditures.
The Southeast CS is 95% residential and 5% commercial.
Lake County is responsible for lower laterals in the Southeast CS.
1 mile of pipeline was cleaned, and 55 miles were inspected in 2021.
The Southeast CS has a peaking factor of 6.2.
There are 73 aerial/underground gravity sewer crossings and 24 force main aerial/underground crossings of water bodies.

There have been 27 reported SSOs since 2019.
The last reported SSO was in March 2023.
Approximately 50% of the SSOs since 2019 were caused by roots or capacity exceedances.
The No Spill Reports for July and August of 2023 have not been submitted.

A 600,000-gallon SSO occurred on March 21, 2023, due to a pump station failure.

Large volume SSOs occurred in 2019 due to natural disasters.

The FOG Program is implemented by site visits to FSEs, educating the public and FSEs on best management practices (BMPs), coordinating with the building and health department, and tracking compliance and inspections.

Lake County has BMPs for commercial and residential FOG on their website.[5]

The ordinance prevents illicit discharges, limits FOG and other debris, and gives Lake County the ability to enforce and inspect FSEs.

The FOG Program requires grease interceptors for FSEs.

PRE-FIELD INSPECTION CONFERENCE

The inspection team arrived at the Southeast WWTP, located at 2485 Old Highway 52, Clearlake, CA 95422, at approximately 0852 and met with the Lake County representatives listed above. I, German Myers, began with introductions and passed around a sign-in sheet **(Attachment C Sign-In Sheet)**. I stated that the purpose of the inspection was to evaluate the Southeast CS and compliance with the SSS WDRs. At 0856, Mr. Harter verbally gave consent to conduct the inspection, which included asking questions, taking notes, and taking photos.

I started by asking Lake County about staffing and whether the Southeast CS operates out of Utility Area 1. Mr. Harter confirmed that the Southeast CS operates out of Utility Area 1 and that Lake County has three utility areas located throughout the county. Mr. Harter stated that Lake County owns and operates four other collection systems, which are the Kelseyville, Middletown, Lake County Sanitation District, and Northwest collection systems. Mr. Phillip Spooner, Superintendent for Utility Area 1, stated that there are eight maintenance positions, three electro-mechanical technicians (EMTs), and two treatment plant operators. Mr. Spooner added that they are looking to convert one of the open maintenance positions into another operator position. I asked if Utility Area 1 covers any of the other collection systems. Mr. Spooner stated that Utility Area 1 covers two other collection systems, and that staff and equipment are shared throughout the three systems within Utility Area 1.

maintenance (CMOM) coordinator. Mr. Harter explained that they have not had a CMOM coordinator for about four years and they have posted the position multiple times but have not had any luck in - by getting rid of some requirements and adding others. Mr. Harter added that he hopes to start recruiting for the position in January or February 2024. I then asked what the duties would be for the CMOM coordinator. Mr. Harter explained that they would oversee the collection system duties such as cleaning, CCTV, SL-RAT, and so forth, and would also oversee planning. Mr. Harter stated that currently, planning is shared by management and that hiring a CMOM coordinator would take some strain off existing staff and improve productivity.

[5] : https://www.lakecountyca.gov/1015/Fats-Oils-Grease-FOG

I then asked what the typical duties for the operation and maintenance crew are. Mr. Spooner explained that the crew does weekly checks at the pump stations, uses SL-RAT to determine cleanings, and makes water system repairs. Mr. Spooner added that the treatment plant operators have their own daily routines at the WWTP.

I asked what type of training is done. Mr. Harter explained that they have training on SSOs, equipment, pump stations, and so forth. Mr. Harter stated that he wants to develop a formal standard operator procedure (SOP) for training. Mr. Spooner explained that their operators must obtain their Water Distribution and Treatment Grade II certificates within the first year of being hired and are provided ongoing training to increase their certification level or get continuing education units (CEUs) to recertify. Mr. Spooner added that the maintenance crew must obtain a Water Distribution Grade II certificate to assist with water system repairs.

I then asked about recurrent training versus training for new employees. Mr. Harter explained that when new staff are trained, existing staff can attend the training as a refresher. Mr. Spooner stated that they have training on forklift operations, traffic control, confined space entry, electronics training, and so forth. I then asked how Lake County does their SSO training. Mr. Hornung explained that they

containing the SSO, volume estimations, and so forth. Mr. Hornung added that they just updated their Spill Emergency Response Plan (SERP) which has guidelines for estimating spill volumes.

I then moved onto the next topic and stated that based on my document review, funding had appeared to be an issue in the past. Mr. Harter stated that Lake County has a healthy budget and that there are no current budget issues. Mr. Harter explained that they have a CIP reserve for capital improvement projects. Mr. Harter stated that their rates go up annually to keep up with operating and reserves were so healthy that they decided not to implement the rate increase and the last rate increase was in January of 2022. Mr. Jesus Salmeron, Fiscal Deputy Administrator for Lake County, stated that their final budget for this year just wrapped up and they need to analyze the numbers and decide on whether to implement a rate increase for 2024.

I then asked about short- and long-term projects and how they are identified. Mr. Harter stated that they do not have a formal CIP but work with their field staff to identify where there are known or suspected problems. Mr. Harter explained that there is not a lot of new development in Lake County but that if there is a new development that exceeds 20 single family dwelling units, the developer must model the flows and identify potential impacts to the system.

I then asked if there are any current or upcoming projects. Mr. Harter stated that they are looking to do a force main bypass project in a low-lying area to relieve pressure. Mr. Harter also stated that they have slip lining coming up that is Integrated Regional Watershed Management (IRWM) funded. Mr. Harter explained that they secured $5 million from IRMW grant funding to address I/I. Mr. Harter stated that the system is old, but they have seen around a 40 percent reduction in I/I due to improvements they have made.

I then asked where I/I is still an issue within the system. Mr. Harter stated that the Meadowbrook area still has some problems, but they have done a lot of work there. Mr. Spooner stated that 12-13 years ago they re-piped some areas. Mr. Harter explained that they re-piped Pump Station No. 4 to be routed directly to the WWTP to take some burden off the system. Mr. Steve Phillips, Utility System

Compliance Coordinator for Lake County, stated that the prior superintendent would use SCADA and rain forecasts to be proactive about getting in the field and pumping out manholes during rain events.

I then moved onto O/M and asked whether Lake County uses a CMMS. Mr. Harter stated that they had a license for City Works at one point but never fully implemented it. Mr. Harter explained that they have all the underlying GIS, they just need to issue a request for proposal (RFP) to get a system in place and fully develop the system. I then asked how work orders are generated. Mr. Harter explained that they use their cost accounting management system and historical knowledge of problem areas for service requests.

try to get to things before they become an issue. Mr. Harter explained that they do small projects in-house, such as point repairs, but larger issues are contracted out. I then asked about routine inspections and cleanings. Mr. Spooner stated that they conduct maintenance on rotating basis and that the system is broken into sections. Mr. Spooner explained that they start by using SL-RAT and then do cleaning or CCTV if needed. I asked how long it takes to inspect the entire system. Mr. Spooner stated that they are currently on a three-year cycle but are hoping to reduce that. Mr. Phillips added that they are working with the City of Clearlake (City), since the City is doing a lot of road improvements. He said CCTV or SL-RAT prior to the City resurfacing the roads, in order to address any issues. Mr. Spooner stated that they currently have one section that is on a higher cleaning frequency because there is an offset which is letting debris in, but that the section is waiting to be repaired.

productivity and noted that according to the CIWQS Annual Report, only one mile of the system was cleaned but the Pre-Inspection Questionnaire stated that the goal was 40-50 miles a year. Mr. Hornung clarified that the 40-50-mile goal is of inspection using SL-RAT, while CCTV and cleaning is done as needed. Mr. Spooner added that around 10 percent of what they inspect they find to need cleaning. I then asked about how the SL-RAT has performed and how Lake County determines when to SL-RAT or to CCTV. Mr. Spooner stated that they initially use SL-RAT and then use CCTV to verify the results. Mr. Harter added that the initial ground-truthing of the SL-RAT worked very well and that the SL-RAT data integrates into their GIS system.

I then asked about the system-wide CCTV in 2019 and asked why none of the video footage was reviewed and ranked. Mr. Harter explained that the system-wide inspection in 2019 was all CCTV since it was prior to Lake County using SL-RAT. Mr. Harter stated that the CCTV was only reviewed during the actual inspections and the operator noted what was seen when performing the CCTV, it was not reviewed a second time. I then asked if Lake County has a ranking system for defects. Mr. Hornung stated that the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) ratings are built into their pipeline observation system management (POSM) software. Mr. Spooner stated that a lot of their I/I efforts stemmed from the system-wide 2019 CCTV.

Mr. Spooner explained that they have issues with residents wanting to connect gutters to the collection system so every three years they will go out and smoke test to verify cleanouts have caps on them and the gutters are not connected to the collection system. Mr. Spooner stated that if they detect I/I as an issue they will get the issue scheduled for repairs. Mr. Spooner added that they have two point-repairs coming up for an offset and a broken section that were identified with CCTV. Mr.

Harter added that the offset location is inaccessible since there is a pier where the pipe is, so they are contracting the repair out.

I then asked about the three hot spot locations noted in the Pre-Inspection Questionnaire. Mr. Harter stated that one of the hot spots is the offset currently being contracted out for repair. Another is the Meadowbrook area, due to capacity issues. The third used to be an issue on Uhl Avenue, but is no longer an issue. Mr. Spooner stated that for the Meadowbrook area, they usually go out prior to the wet weather season to ensure that area is cleaned.

I then asked Lake County to elaborate on their pump station and force main risk assessments as the Pre-Inspection Questionnaire stated that Lake County did not have any formal assessments. Mr. Harter explained that the assessments are just based on staff being out in the field weekly and staying aware of what issues are developing. I then asked about any SOPs that are used for O/M. Mr. Spooner stated that they do not have SOPs and O/M
Mr. Spooner added that they are looking to develop SOPs for regular activities, such as cleanings and manhole inspections, and will be doing so this year.

I then asked about the pump stations and why one of the pump stations did not have an autodialing or SCADA system. Mr. Spooner stated that Pump Station No. 20 is a small station developed inside a manhole and only services one street. Mr. Spooner explained that the pump station is still on their weekly checks and that they replaced the pump about two and a half weeks ago. Mr. Spooner added that they do not see any issues at the pump station and because of its location they cannot develop it any more than it is. I then asked about the ARVs and why there currently is no plan to exercise and clean the ARVs. Mr. Spooner stated that he is developing a program to maintain the ARVs. I then asked about the aerial and underground crossings. Mr. Spooner stated that there is only one aerial crossing, and the rest are underground. Mr. Spooner added that they inspected the aerial crossing last year. I then asked if there have been any issues with the aerial and underground crossings. Mr. Spooner stated that there was a force main break under a creek around 20 years ago, but they have not had any issues with the aerial crossing.

I then asked about the 59 complaints they received in the previous FY, as stated in the Pre-Inspection Questionnaire. Mr. Harter stated that a lot of their complaints are driven by laterals. He confirmed that Lake County is responsible for the lower laterals if there is a lower lateral cleanout. Mr. Harter explained that they have a lateral replacement program where property owners can obtain funding for inspections and replacements if there are issues. Mr. Harter stated that the program is listed on their website but that no one takes advantage of the program.

I then asked for a general overview of the FOG program. Mr. Harter stated that the CMOM coordinator would normally handle the program but since the position is vacant, they have had to distribute the duties. Mr. Phillips explained that new FSEs need approval for a grease trap and Lake County will help determine the sizing of the grease trap. Mr. Phillips added that FSE inspections consist of inspecting the sinks, venting, and the grease traps. Mr. Phillips stated that once they hire the CMOC coordinator, they will get back into an aggressive inspection program. Mr. Phillips explained that they did some inspections in Kelseyville last year since they were having issues with FOG but have not looked at other areas since they do not have the staff. Mr. Phillips stated that they require FSEs to submit pump out and inspection records and encourage the FSEs to follow the 25 percent rule.

Mr. Harter stated that they work closely with the County Environmental Health Department and coordinate with them on changes in ownership and businesses. Mr. Harter explained that their Board

adopted a micro-home kitchen ordinance a few years ago that allows small food services out of homes. Mr. Harter added that the small food services must be licensed and coordinate with Lake County to ensure they have appropriately sized grease traps. Mr. Harter explained that it is difficult to get vendors to pump out the grease traps, but Lake County works with the businesses and helps them find vendors.

I then asked who currently does the FSE inspections. Mr. Phillips stated that the technicians do the FSE inspections and use a Sludge Judge to measure the solids content in the grease traps. Mr. Phillips explained that the technicians bring the inspection report to him, and he would write a Notice of Compliance or Notice of Correction and then follow up to ensure the issues are addressed. Mr. Harter added that once they hire the CMOM coordinator, their goal is to inspect all FSEs annually. I then asked what further action can be taken if an FSE fails to address issues following a Notice of Correction. Mr. Harter stated that in theory they could disconnect the FSE from their system, but it has never come to that point and the Notice of Correction is usually sufficient.

Ms. Jamie Johnson then asked if flushable wipes are an issue. Mr. Harter explained that flushable wipes are an issue, and they have a couple pump stations that rag up a lot, so they must pull the pumps out, clear them, and then reinstall the pumps. Mr. Harter stated that they have a pilot project with a direct in-line pumping system that is replacing Pump Station No. 6, eliminating the need for a wet well. Mr. Harter explained that the system will have a lower retention time, reduced odors, and reduced hydrogen sulfide issues. Mr. Harter added that if the pilot project goes well, they will look to implement the system at the other pump stations.

I then moved onto discussing SSOs and asked about the 600,000-gallon SSO that occurred in March of 2023. Mr. Harter stated that a coupler between two pipes at Pump Station No. 1 was dislodged and staff had noticed water at the pump station. Mr. Harter explained that they had dug into the ground and identified the leak and ordered the replacement part prior to the large SSO occurring, but that the part did not arrive in time to prevent the 600,000-gallon SSO. I then asked about the 200,000-gallon spill that occurred in March of 2023. Mr. Harter explained that there was an illegal dumping in a mobile home park where locals had popped open the manholes and dumped large amounts of debris into the manhole. Mr. Harter stated that he is in the process of writing a Notice of Violation to the mobile home park.

gram as a lot of the SSOs seem to be caused by roots. Mr. Harter stated that they use mechanical tools such as hydro jetters, flails, nozzles, and so forth for root control. Mr. Spooner explained that if roots are found in a mainline, then they will go in and remove the roots and make repairs to the pipe. Mr. Spooner added that if the roots are found in the laterals, they will still perform mechanical rodding. I then asked how Lake County targets locations for root control. Mr. Spooner stated that when roots are found to be an issue, they will remove the roots and put the section of pipe on a 30-day to one-year cycle depending on the root growth.

I then asked about the SSOs caused by natural disasters in 2019. Mr. Spooner stated that the SSOs were caused by the fires in 2019. Mr. Spooner explained that many homes were destroyed during the fires and that the loss of homes created open holes in the collection system causing rain to infiltrate into the system. Mr. Harter added that they are now proactive during fires and will go out and cap the laterals. I then mentioned that the No Spill Reports were not certified for July and August of 2023. Mr. Phillips stated that they have had a couple of Category 4 SSOs and acknowledged that he is behind on the reporting requirements. I reminded Lake County that the SSS WDRs require the No Spill Reports and Category 4 Spills to be certified within 30 calendar days. I then noted that one of the

SSOs from March of 2023 is still in its draft form and has not been certified yet and reminded Lake County of the reporting requirements to certify the SSO within 15 calendar days and make any amendments within 90 calendar days.

I then went over what assets the inspection team would like to look at and ended the pre-field inspection conference at approximately 1025.

FIELD INSPECTION

The first location we traveled to was Pump Station No. 1, located on Burns Valley Road near Turner Avenue, where we arrived at approximately 1059. We were joined by one of the field crew members, Paul Higdon. I observed emergency signage on the fence surrounding the pump station **(Photo 1)**. Mr. Phillips explained that this pump station was the location of the failed coupler on the 16-inch pipe that caused the 600,000-gallon SSO in March of 2023. Mr. Harter stated that they were able to redirect the flows through the 8- and 10-inch pipes, in addition to using pumper trucks, to handle the flows during the SSO.

The wet well on the south side of the pump station had a minor FOG mat, minimal corrosion, a coated barrel, and some rags on the components **(Photo 2)**. The wet well on the north side of the pump station had minimal FOG and a lot of rags on the components **(Photo 3)**. Both dry wells were not covered, had minimal debris, and some chipping on the painted components **(Photos 4 & 5)**. A logbook was kept on site and showed that a monthly load test and maintenance was done the day prior on November 7, 2023 **(Photo 6)**.

I then asked if the alarms could be tripped. Mr. Higdon tripped an alarm, and an audible alarm was heard. I asked if there were any visible alarms and Mr. Spooner stated that there were no visible alarms at any of the pump stations. Mr. Spooner explained that a third-party company gets the alarm and will then call and inform the standby operator that an alarm was triggered. Mr. Spooner received the call that an alarm was triggered at the pump station. I then asked what is typically done during the weekly checks. Mr. Higdon stated that they trigger alarms, check the batteries, regulators, oil, coolant and so forth, weekly, and put the pump station under a load test once a month. I then asked about the onsite generator. Mr. Spooner stated that all the big pump stations have a backup generator, but they also have portable generators that they can use at the other pump stations. The generator s fuel level was just over half full at the time of the inspection **(Photo 7)**. I asked how often the fuel gets filled. Mr. Spooner stated that they refill the fuel as needed but will fill the tank before the wet weather season. Mr. Higdon explained that under normal circumstances, the generators can last three to four days and during high flow they can last one to two days. Mr. Higdon added that they typically schedule fuel deliveries when the fuel level gets to half full.

I then asked about odor control. Mr. Harter stated that there is an elderly home and apartments nearby, so they sometimes receive odor complaints. Mr. Spooner explained that they use a carbon filter for odor control and are looking to upgrade the system **(Photo 8)**. Mr. Spooner added that they use carbon filters for odor control at all their big pump stations.

Photo 1: A photo of emergency signage posted at Pump Station No. 1.

Photo 2: A photo of the wet well on the south side of Pump Station No. 1 with minor FOG, rags, and corrosion.

Photo 3: A photo of the wet well on the north side of Pump Station No. 1 with rags, minor FOG, and minor corrosion.

Photo 4: A photo of the one of the uncovered dry wells with minimal debris and paint chippings.

Photo 5: A photo of the one of the uncovered dry wells with minimal debris and paint chippings.

Photo 6: A photo of the logbook at Pump Station No. 1 showing maintenance and a monthly load test was done on November 7, 2023.

Photo 7: A photo of the fuel level of the generator at Pump Station No. 1 showing over 50 percent full.

Photo 8: A photo of the carbon filter system at Pump Station No. 1 for odor control.

We then traveled to Pump Station No. 2, located at the intersection of Lakeshore Drive and Division Avenue, where we arrived at approximately 1131. Emergency signage was not on the fence surrounding the pump station but was located on the building inside the fence **(Photo 9)**. I asked why the sign was not on the outside of the fence and Mr. Spooner stated that the sign was previously on the outside of the fence but that it had been stolen, so they put the sign on the inside to prevent further vandalism. Mr. Harter added that residents will typically call the sheriff s office if they see issues, and the sheriff s office will then call Lake County.

The dry well on the south side of the pump station was uncovered, contained debris, and was missing a cap on one of the connections **(Photo 10)**. The dry well on the north side was uncovered and had debris and minor trash in it **(Photo 11)**. Mr. Spooner stated that they need to order a new cap and would think about installing a mesh covering over the dry wells to prevent debris and trash from getting in.

The wet well on the south side of the pump station had a disconnected pipe, staining on the walls, and minor FOG and debris **(Photo 12)**. Mr. Higdon stated that the disconnect is currently being repaired and they had just replaced the coupler on the other pipe as seen in the photo. The wet well on the north side of the pump station had minor corrosion, debris, and staining on the walls **(Photo 13)**. The logbook for the pump station showed that staff was there two days prior, on November 6, 2023, and Lake County is currently getting quotes for a variable frequency drive (VFD) control board to repair the interface screen **(Photo 14)**. A check sheet for pump station maintenance was filled out on November 6, 2023 **(Photo 15)**.

I then asked if an alarm could be triggered. Mr. Higdon triggered an alarm, and an audible alarm was heard. Mr. Spooner explained that the alarm-answering, third-party company is staffed 24/7 and has a list of people to call. Mr. Spooner received the call that an alarm was triggered approximately five minutes after the alarm. Mr. Spooner stated that they typically receive the alarm call within five to ten minutes but that it previously had been up to two hours. Mr. Spooner added that they are looking into a better backup alarm system that will call Lake County directly. I checked the generators fuel level which showed the fuel level to be a little over half full **(Photo 16)**.

At approximately 1150, we broke for lunch.

Photo 9: A photo of emergency signage located on the building inside the fence of Pump Station No. 2.

Photo 10: A photo of the uncovered south dry well at Pump Station No. 2 showing debris and a missing cap on one of the connections.

Photo 11: A photo of the uncovered north dry well at Pump Station No. 2 showing debris and minor trash.

Photo 12: A photo of the south wet well at Pump Station No. 2 showing minor debris, FOG, and staining on the walls. The disconnected pipe in the photo is currently under repairs.

Photo 13: A photo of the north wet well at Pump Station No. 2 showing minor debris, trash, and staining on the walls.

Photo 14: A photo of the logbook at Pump Station No. 2.

Photo 15: A photo of the November 6, 2023 maintenance check sheet at Pump Station No. 2.

Photo 16: A photo of the fuel level of the generator at Pump Station No. 2 showing the fuel level to be over half full.

After lunch, the inspection team traveled to Pump Station No. 3, located near the end of Wayland Avenue, where we arrived at approximately 1258. We were joined by field crew members Vince Myrick and Donald Beets. The wet well had a FOG mat, rags on the pipes, corrosion, and staining on the walls **(Photo 17)**. There was a storm drain with a grate over the drain that ran directly through the pump station. Mr. Harter stated that the storm drain is owned by the City. I asked if there is odor control at the pump station and Mr. Spooner stated that carbon is used **(Photo 18)**. The pumps and piping were located above ground and appeared to be freshly painted **(Photo 19)**. The logbook and maintenance check sheet were on site and showed that staff had been there two days prior on November 6, 2023 **(Photo 20)** at approximately 75 percent full. Mr. Myrick stated that they run the generator under full load for one hour once a month.

Photo 17: A photo of the wet well at Pump Station No. 3 showing a FOG mat, rags on the pipes, corrosion, and staining on the walls.

Photo 18: A photo of the carbon odor control system at Pump Station No. 3.

Photo 19: A photo of the recently painted aboveground pumps and piping system at Pump Station No. 3.

Photo 20: A photo of the November 6, 2023, maintenance check sheet at Pump Station No. 3.

We then traveled to one of the hot spot locations, located at the intersection of Bay Street and Lakeview Way, where we arrived at approximately 1312. The manhole had a manhole barrier lid, to protect from I/I, and had fast flow through the manhole channel **(Photo 21)**. The manhole rim had corrosion around the rim and staining in the barrel **(Photo 22)**. Mr. Spooner stated that this location was cleaned approximately one and a half weeks ago, and they clean the area prior to a storm event.

Photo 21: A photo on the manhole located at the intersection of Bay Street and Lakeview Way with fast flow.

Photo 22: A photo on the manhole located at the intersection of Bay Street and Lakeview Way with corrosion around the rim and staining in the barrel.

We then traveled to a manhole in the Meadowbrook area, located in front of 6825 Meadowbrook Drive, where we arrived at approximately 1319. The manhole had corrosion around the rim **(Photo 23)**, low flow, and FOG on the sides of the channel **(Photo 24)**. I asked about the inspections versus cleanings and Mr. Spooner stated that they aim to inspect 30 percent of the system annually and typically 10 percent of what is inspected will need cleaning or repairs. Ms. Johnson asked if the

manholes are labeled, and Mr. Spooner stated that they have the manhole numbers on the master map. Mr. Harter added that they are looking into acquiring tablets for mobile GIS while out in the field.

Photo 23: A photo on the manhole located in front of 6825 Meadowbrook Drive with corrosion around the rim.

Photo 24: A photo on the manhole located in front of 6825 Meadowbrook Drive low flow and FOG on the sides of the manhole channel.

We then traveled to another manhole in the Meadowbrook area, located in front of 6925 Meadowbrook Drive, where we arrived at approximately 1328. The manhole had a manhole barrier lid and cracks in the concrete around the manhole **(Photo 25)**. The manhole had a vertical crack in the barrel, no flow, and standing water in the channel **(Photo 26)**.

Photo 25: A photo on the manhole located in front of 6925 Meadowbrook Drive with a manhole barrier lid and cracking in the concrete around the manhole.

Photo 26: A photo on the manhole located in front of 6925 Meadowbrook Drive with a vertical crack in the manhole barrier and no flow in the channel.

We then traveled to the manhole in the canal on Stonybrook Drive and arrived at approximately 1335. The canal was dry the day of the inspection and the manhole was elevated above the top of the canal **(Photo 27)**. Mr. Spooner stated that all the manholes in canals and creeks are above the banks so that flood water does not enter the manholes.

Photo 27: A photo of the manhole in the canal on Stonybrook Drive.

We then traveled to Pump Station No. 6, located at the east end of Lower Lakeshore Drive, and arrived at approximately 1348. The pump station was under construction as the direct in-line pumping system was currently being put into place **(Photo 28)**. A portable bypass system was set up while construction was occurring **(Photo 29)**. One of the Hudson Mechanical Inc. crew members installing the system stated that the system should be up and running next week. Mr. Spooner stated that the system would be fully sealed and contained and Mr. Harter explained that they are also setting up the system with a bypass on the inlet and outlet side so they can bypass the system if needed. Mr. Harter added that they would be doing the pilot project for six months to one year and if all goes well, they will look at implementing the direct in-line pumping systems at their other pump stations.

Photo 28: A photo of the direct in-line pumping system being put into place at Pump Station No. 6.

Photo 29: A photo of the portable bypass system being used while Pump Station No. 6 is under construction.

We then traveled to the aerial crossing over Burns Valley Creek, located at the intersection of Rumsey Road and Pamela Lane, and arrived at approximately 1406 **(Photo 30)**. Mr. Harter stated that the aerial crossing is a force main and does not have any secondary encasement. The lock on the ARV was broken and was replaced by Mr. Spooner at the time of the inspection. Mr. Spooner

opened the encasement around the ARV and the ARV had a lot of cobwebs around it **(Photo 31)**. There was no emergency signage for the aerial crossing or the ARV.

Photo 30: A photo of the force main aerial crossing located at the intersection of Rusmey Road and Pamela Lane with no secondary encasement.

Photo 31: A photo of the ARV located at the aerial crossing with cobwebs around the ARV.

We then traveled to the last location, the utility yard, located at the Southeast WWTP, where we arrived at approximately 1419. Mr. Spooner showed us where they keep spare parts, including manhole barrier lids, couplers, pipes, and so forth, portable generators, bypass equipment, and SSO equipment, including waddles and absorption pads **(Photos 32-35)**.

The inspection ended at approximately 1433.

Photo 32: A photo of spare parts at the utility yard.

Photo 33: A photo of the portable generators at the utility yard.

Photo 34: A photo of spare manhole barrier lids at the utility yard.

Photo 35: A photo of waddles for SSO response at the utility yard.

FINDINGS

The review of all requested documents as well as the inspection itself resulted in the following areas of concern:

- Lake County does not currently use a CMMS and relies on historical knowledge of problem areas.
- Lake County does not currently have a method in place to inspect and maintain ARVs.
- Lake County only reviews CCTV footage during the CCTV inspections and does not re-review or rank issues.
- Lake County has had difficulties obtaining a CMOM coordinator which has strained resources, especially when implementing the FOG program.
- Lake County does not have a formal CIP.
- Lake County does not have formal SOPs for training and O/M.
- Lake County does not have emergency signage for aerial crossings or ARVs.
- Lake County has failed to submit and certify some No Spill Reports, Category 4 Spill Reports, and SSO reports.
- Alarm notification from the third-party company has taken up to two hours.

				Multifamily		Commercial/Healthcare	Multiply	Wastewater	LF of Service	Inflow&Infiltration	Total Wet	W A S T E W A T E R Peaking	Peak Gallons	Wastewater	Wastewater		Multiply	Water	Fixture Units	W A T E R Water	
Lot #	Program	Note	Floors	Units	Bedrooms	Tot BR Square Feet	Factor	GPD	plus Main	(2 GPD per LF)	Weather Flows	Factor	Per Minute	DFU	EDU	Wastewater Generation Notes	factor	GPD	FU	EDU	Water Demand Notes
NP-1	Multifamily		3	14	2	28	120	3360	840	1680	5040	4	*14.0*	336	16.0	120 gal per bedroom per day	120	3360	224	16	120 Gallons per bedroom per day
NP-2	Multifamily		4	4	Studio	4	120	480	400	800	1280	4	*3.6*	85	2.3	120 gal per bedroom per day	120	480	32	2	120 gal per bedroom per day
	Multifamily		4	40	1	40	120	4800	0	0	4800	4	*13.3*	320	22.9	120 gal per bedroom per day	120	4800	320	23	120 gal per bedroom per day
	Multifamily		4	16	2	32	120	3840	0	0	3840	4	*10.7*	256	18.3	120 gal per bedroom per day	120	3840	256	18	120 gal per bedroom per day
NP-3	Multifamily		4	6	Studio	6	120	720	380	760	1480	4	*4.1*	99	3.4	120 gal per bedroom per day	120	720	48	3	120 gal per bedroom per day
	Multifamily		4	52	1	52	120	6240	0	0	6240	4	*17.3*	416	29.7	120 gal per bedroom per day	120	6240	416	30	120 gal per bedroom per day
	Multifamily		4	18	2	36	120	4320	0	0	4320	4	*12.0*	288	20.6	120 gal per bedroom per day	120	4320	288	21	120 gal per bedroom per day
	Commercial	Restaurant	1			4000	1.00	4000	0	0	4000	4	*11.1*	267	19.0	40 gallons per seat full serve restaurant, 20 sq feet per seat. Half of bldg square feet assumption for dining room	1.00	4000	267	19	40 gallons per seat per day
NP-4	Multifamily		4	8	Studio	8	120	960	310	620	1580	4	*4.4*	105	4.6	120 gal per bedroom per day	120	960	64	5	120 Gallons per bedroom per day
	Multifamily		4	32	1	32	120	3840	0	0	3840	4	*10.7*	256	18.3	120 gal per bedroom per day	120	3840	256	18	120 gal per bedroom per day
	Multifamily		4	6	2	12	120	1440	0	0	1440	4	*4.0*	96	6.9	120 gal per bedroom per day	120	1440	96	7	120 gal per bedroom per day
NP-5	Commercial	Drivethru Rest.	1			2000	1600	1600	150	300	1900	4	*5.3*	127	7.6	50 gallons per car space, 32 spaces (half of 64 shared)	1600	1600	107	8	50 gallons per car space
	Commercial	In-line restaurant	1			2000	0.5	1000	250	500	1500	4	*4.2*	100	4.8	Carry-out restaurant 50 gal per 100 sf floor	0.5	1000	67	5	50 gallons per 100 sf floor space
NP-15A	Hotel	75 rooms	4			44158	120	9000	90	180	9180	4	*25.5*	612	42.9	120 gallons per room (no in-room cooking)	120	9000	600	43	120 gallons per room (no in-room cooking)
NP-15B	Office		1			4244	25	250	70	140	390	4	*1.1*	26	1.2	25 gallons per employee per day (10 assumed)	25	250	17	1	25 gallons per employee per day (5 assumed)
						Wastewater Dry Weather Gallons Per Day:		**45,850**		**Wastewater Wet Weather GPD:**	**50,830**		**141**	**3389**	**218**	**<-- Equivalent Dwelling Units (EDU)**	**Water GPD:**	**45,850**	**3057**	**218**	**<-- Equivalent Dwelling Units (EDU)**
													^GPM^	**^Total DFU^**					**^Total FU^**		
NP-6	Commercial	Drivethru Rest.	1			2000	2500	2500	90	180	2680	4	*7.4*	179	11.9	50 gallons per car space, 50 spaces	2500	2500	167	12	50 gallons per car space
	Commercial	Retail/Rec/Rest.	1			20000	0.13	2600	525	1050	3650	4	*10.1*	243	12.4	Shopping center/mall with food service, 130 gal per 1000 SF	0.13	2600	173	12	Shopping center/mall with food service, 130 gal per 1000 SF
NP-7a	Open Space		1				350	1750	300	600	2350	4	*6.5*	157	8.3	3 toilets, two urinals (5 fixtures), 350 gal per fixture	350	1750	117	8	3 toilets, two urinals (5 fixtures), 350 gal per fixture
NP-7b	Commercial	Market Food Hall	1			12000	0.5	6000	180	360	6360	4	*17.7*	424	28.6	food market, specialty: 50 gal per 100 sf floor space	0.5	6000	400	29	food market, specialty: 50 gal per 100 sf floor space
	Commercial	Event Space	1			6000	0.33	2000	150	300	2300	4	*6.4*	153	9.5	Community center: 5 gal per seat, 15 square feet per seat, half area for seating assumed	0.33	2000	133	10	Community center: 5 gal per seat, 15 square feet per seat, half area for seating assumed
NP-8	Commercial	Retail	1			68400	0.1	6840	565	1130	7970	4	*22.1*	531	32.6	Stores/shopping center w/o food service: 100 gal per 1000 sf floor space	0.1	6840	456	33	Stores/shopping center w/o food service: 100 gal per 1000 sf floor space
NP-9	Commercial	Retail	1			62000	0.1	6200	460	920	7120	4	*19.8*	475	29.5	Stores/shopping center w/o food service: 100 gal per 1000 sf floor space	0.1	6200	413	30	Stores/shopping center w/o food service: 100 gal per 1000 sf floor space
NP-10	Commercial	Drivethru Rest.	1			2000	1350	1350	200	400	1750	4	*4.9*	117	6.4	50 gallons per car space, 27 spaces	1350	1350	90	6	50 gallons per car space, 27 spaces
NP-11a	Commercial Retail		1			5600	0.1	560	255	510	1070	4	*3.0*	71	2.7	Stores/shopping center w/o food service: 100 gal per 1000 sf floor space	0.1	560	37	3	Stores/shopping center w/o food service: 100 gal per 1000 sf floor space
NP-11b	Auto Fueling		1			5000	250	2000	120	240	2240	4	*6.2*	149	9.5	250 gallons per plumbing fixture (8 fixtures assumed)	2000	2000	133	10	250 gallons per plumbing fixture (8 assumed)
NP-11c	Commercial	Drivethru Rest.	1			4400	1300	1300	240	480	1780	4	*4.9*	119	6.2	50 gallons per car space, 26 spaces (half of 52 shared)	1300	1300	87	6	50 gallons per car space
NP-12	Commercial		1			40600	0.1	4060	520	1040	5100	4	*14.2*	340	19.3	Stores/shopping center w/o food service: 100 gal per 1000 sf floor space	0.1	4060	271	19	Stores/shopping center w/o food service: 100 gal per 1000 sf floor space
NP-13	MultiFamily		3	15	Studio	15	120	1800	165	330	2130	4	*5.9*	142	8.6	120 gal per bedroom per day	120	1800	120	9	120 Gallons per bedroom per day
	MultiFamily		3	24	1	24	120	2880	0	0	2880	4	*8.0*	192	13.7	120 gal per bedroom per day	120	2880	192	14	120 gal per bedroom per day
	MultiFamily		3	15	2	30	120	3600	0	0	3600	4	*10.0*	240	17.1	120 gal per bedroom per day	120	3600	240	17	120 gal per bedroom per day
	MultiFamily		3	1	0	0	120	0	0	0	0	4	*0.0*	0	0.0	120 gal per bedroom per day	120	0	0	0	120 gal per bedroom per day
	Commercial	Retail	1			14579	0.1	1458	0	0	1458	4	*4.0*	97	6.9	Stores/shopping center w/o food service: 100 gal per 1000 sf floor space	0.1	1458	97	7	Stores/shopping center w/o food service: 100 gal per 1000 sf floor space
NP-14a	Wellness Office		3			67500	0.125	8438	260	520	8958	4	*24.9*	597	40.2	250 gallons per practicioner per shift, 1 practitioners per 2000 square feet	0.125	8438	563	40	250 gallons per practicioner per shift, 1 practitioners per 2000 square feet
NP-14b	Wellness Facili	25 Hospital Beds	3			70000	300	7500	420	840	8340	4	*23.2*	556	35.7	Medical hospital, 300 gal per bed, 25 beds	300	7500	500	36	Medical hospital, 300 gal per bed, 25 beds
						Wastewater Dry Weather Gallons Per Day:		**55,335**		**Wastewater Wet Weather GPD:**	**71,735**		**157**	**4782**	**299**	**<-- Equivalent Dwelling Units (EDU)**	**Water GPD:**	**62,835**	**4189**	**299**	**<-- Equivalent Dwelling Units (EDU)**
													^GPM^	**^Total DFU^**					**^Total FU^**		

KONOCTI WATER DISTRICT

HIGHLANDS MUTUALWATER COMPANY

PROPOSED KONOCTI WATER DISTRICT MAIN LOOP

Hazen-Williams Equation for Pressure Loss in Pipes

Supply PSI: 60.00 Final PSI:
PSI Drop: Okay

Imperial Units

Specified Data	Length 1	Length 2	Length 3	Length 4	Length 5
l = length of pipe (ft)	1500				
c = Hazen-Williams roughness constant	130				
q = volume flow (gal/min)	1627.50				
dh = inside or hydraulic diameter (inches)	10.02				
Initial PSI	60	49.69			
Elevation Head Loss (ft)	0	0			
Calculated Pressure Loss					
f = friction head loss in feet of water per 100 feet of pipe (ft H20 per 100 ft pipe)	**1.53**	**0.00**	**0.00**	**0.00**	**0.00**
f = friction head loss in psi of water per 100 feet of pipe (psi per 100 ft pipe)	**0.66**	**0.00**	**0.00**	**0.00**	**0.00**
Pipe Head loss (ft H_2O)	**23.00**	**0.00**	**0.00**	**0.00**	**0.00**
Pipe Head loss (psi)	**9.89**	**0.00**	**0.00**	**0.00**	**0.00**
Fittings					
Regular 90° elbow	2				
Long radius 90° elbow					
Regular 45° elbow	2				
Tee (line flow)	1				
Tee (branch flow)					
Meter					
Gate valve	4				
Angle Valve					
Fittings Head loss (ft H_2O) by equivalent pipe length	**0.98**	**0.00**	**0.00**	**0.00**	**0.00**
Fittings Head loss (psi)	**0.42**	**0.00**	**0.00**	**0.00**	**0.00**
Final Head (psi)	**49.69**				
PSI Drop Okay? (residual must be > 25)					
Calculated Flow Velocity					
v = flow velocity (ft/s)	**6.63**				

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PROPOSED HIGHLANDS MUTUAL WATER COMPANY MAIN LOOP

Hazen-Williams Equation for Pressure Loss in Pipes

Supply PSI: 60.00 Final PSI:
PSI Drop: Okay

Imperial Units

Specified Data	Length 1	Length 2	Length 3	Length 4	Length 5
l = length of pipe (ft)	1500				
c = Hazen-Williams roughness constant	130				
q = volume flow (gal/min)	1674.50				
dh = inside or hydraulic diameter (inches)	10.02				
Initial PSI	60	49.00			
Elevation Head Loss (ft)	0	0			
Calculated Pressure Loss					
f = friction head loss in feet of water per 100 feet of pipe (ft H20 per 100 ft pipe)	1.62	0.00	0.00	0.00	0.00
f = friction head loss in psi of water per 100 feet of pipe (psi per 100 ft pipe)	0.70	0.00	0.00	0.00	0.00
Pipe Head loss (ft H_2O)	**24.25**	**0.00**	**0.00**	**0.00**	**0.00**
Pipe Head loss (psi)	**10.43**	**0.00**	**0.00**	**0.00**	**0.00**
Fittings					
Regular 90° elbow	2				
Long radius 90° elbow					
Regular 45° elbow	4				
Tee (line flow)	1				
Tee (branch flow)					
Meter					
Gate valve	4				
Angle Valve					
Fittings Head loss (ft H_2O) by equivalent pipe length	**1.33**	**0.00**	**0.00**	**0.00**	**0.00**
Fittings Head loss (psi)	**0.57**	**0.00**	**0.00**	**0.00**	**0.00**
Final Head (psi)	**49.00**				
PSI Drop Okay? (residual must be > 25)					
Calculated Flow Velocity					
v = flow velocity (ft/s)	**6.82**				

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Appendix B

DRAINAGE TECHNICAL MEMORANDUM

CITY OF CLEARLAKE AIRPORT COMMERCIAL DEVELOPMENT

Highway 53 and Old Hwy 53

CLEARLAKE, CALIFORNIA 95422

7/21/2025

Prepared By:

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PROJECT DESCRIPTION:

The proposed project nearly 55 acres in size will be located west of Old Highway 53 and east of State Route (SR) 53, on the former Pearce Airport site. The project site is primarily undeveloped and is zoned General Commercial (GC). The majority of the site is vegetated by native grasses. There are existing trees and brush primarily at the northern and southern ends of the development. The site is bounded on the west by Old Highway 53, to the north by 21st Avenue, and to the east by California State Route 53. A few active businesses exist within the development boundaries including a glass installer and some storage facilities.

Accessible routes to all facilities and commercial entrances will be provided as part of the project infrastructure, complete with ADA accessible ramps, marking, and detectable warning surfaces.

The former Pearce Field Airport site within the City of Clearlake gives way to approximately 49 acres of mixed-use phased development, including hotel, healthcare, multifamily housing, retail and restaurants of various scales, public open space in form of a park, plaza, and pedestrian routes on tree-lined streets, a cross-over to the future transit center at SR 53, and related parking on the new streets and adjacent parking lots. The Airport Site Redevelopment Project would include development of the project site within the General Commercial (GC) zoning district. Project phasing is sequenced through and dependent on the City's acquisition of adjacent properties as they become available.

A number of existing trees would be removed in order to develop the proposed Airport Site Redevelopment. The proposed project would provide landscaping improvements, including the planting of new trees and shrubs throughout the project site.

Central to this development is a plaza adjacent the Market building and park that spans a vegetated bluff. Overlooks, connecting trails, play space, and performance spaces are designed as a destination for the area. An overlook point at the top of the bluff will be adjacent commercial space and parking, providing a additional retail amenity and spill-out seating options.

All future vegetation is California native, drought-tolerant, or native adaptive, highlighting the beauty of the surrounding hills and landscape of the region.

Existing mature trees are mapped in the site plan and will be incorporated into parking lot screening and recreational space where possible to retain them. Additional specimen trees are

planned for pocket-park locations to act as both gateways to the site and screens to parking areas.

The existing site slopes generally toward the west at varying slopes ranging up to about 2:1. The USGS Web Soil Survey is utilized to identify existing soil conditions within each of the four disconnected zones. Zone 1, the largest at 35.34 acres and centrally located, is composed of 68.5% Benridge-Sodabay loams, by area, with slopes of 8% to 15%. Loam and gravelly clay loam exist down to a depth of 21 to 26 inches. Gravelly clay lies below the loam, and it is expected that this soil will exist down to a depth of 63-68 inches. The site has soils belonging to hydrologic soil group C. There are more than 80 inches of depth to any restrictive layer or water table, and the soil is naturally well drained. 31.5% of zone 1 by area is comprised of Asbill clay loam with slopes of 5 to 8 percent. Clay loam is present down to a depth of 13 inches, with silty clay occurring from 13 to 39 inches in depth. Below this lies bedrock. There are more than 80 inches to groundwater, and the soil is naturally well drained, belonging to hydrologic soil group D.

Zone 2, located in the northwest, is 5.65 acres in size and is composed of three different soil types by area. The largest, Asbill clay loam, covers 37.6% of area and occurs at slopes of 5 to 8 percent. From 0 to 13 inches occurs clay loam, from 13 to 39 inches silty clay, with bedrock below this. There are more than 80 inches to groundwater, and the soil is naturally well drained belonging to hydrologic soil group D. Asbill clay loam with slopes of 8 to 15 percent cover 30.2% of Zone 2, with the same profile; clay loam down to 13 inches, silty clay down to 39 inches, and bedrock below. Again; well-drained soil with no water table above 80 inches and hydrologic soil group D. Benridge-Sodabay loams cover the final 32.2%, by area, with slopes of 8% to 15%. Loam and gravelly clay loam exist down to a depth of 21 inches. Gravelly clay lies below the loam, and it is expected that this soil will exist down to a depth of 63 inches. The site has soils belonging to hydrologic soil group C. There are more than 80 inches of depth to any restrictive layer or water table, and the soil is naturally well drained.

Zone 3, which is located at the north end of the project site, is 5.73 acres in size. Two soil types comprise the zone area, with Benridge-Sodabay soil over 87.5% of the zone. With a similar profile of previous areas; loam and gravelly clay loam appear down to a depth of 21 or 26 inches. Gravelly clay lies below the loam down to a depth of 63 to 68 inches. A well-drained soil belonging to group C, there are more than 80 inches to any potential water table. Asbill clay loam with slopes of 8 to 15 percent cover the final 12.5% of Zone 3; clay loam down to 13 inches, silty clay down to 39 inches, and bedrock below. Asbill is a well-drained soil with water table below 80 inches and belonging to hydrologic soil group D.

Zone 4, the smallest at only 1.87 acres comprises the 18th Avenue corridor running east/west. A single soil type; Benridge-Sodabay loam, covers the entire zone. Existing at slopes of 8% to 15%, loam and gravelly clay loam exist down to a depth of 21 inches. Gravelly clay lies below the loam, and it is expected that this soil will exist down to a depth of 63-68 inches. The site has soils belonging to hydrologic soil group C. There are more than 80 inches of depth to any restrictive layer or water table, and the soil is naturally well drained.

Out of caution regarding true locations and boundaries of the different soil groups located on-site, soils will be considered as Type D for all Drainage Management Areas.

This project falls into the categories of *regulated project*, as well as *hydromodification management project* requirements because it creates over one acre of impervious surface which is a significant increase over pre-development conditions.

LOW IMPACT DEVELOPMENT DESIGN

Pollution Prevention Measures:

Downspouts from roof gutters will be disconnected from the storm drain system through the use of impervious area disconnection. On-site stormwater will be retained and infiltrated, or filtered and released as dictated by intensity of the rain event. A number of deciduous interceptor trees will be planted throughout the project site. The total tributary area used for treatment and volume capture calculations has been reduced by taking credit for these measures.

Trash collector screens will be installed in the final manholes before outlet pipe, if necessary.

Types of BMPs

Tree Planting and Preservation will be utilized in the form of new trees in accordance with common geographical species. Rooftop Impervious Area Disconnection will be utilized to direct rooftop runoff into landscaped areas (Bioretention Facility). BMPs will be designed and constructed as detailed in the Lake County Storm Low Impact Development Standards Manual.

Level of Treatment and Volume Capture

The requirement of 100% Treatment will be achieved, and the design goal of 100% Water Quality Volume Capture will be achieved using the combination of tributary area reduction due

to Pollution Prevention Measures, and volume capture via Volume Based Infiltrating Bioretention Measures.

Maintenance and Funding

BMPs shall be inspected and maintained as described in this report and also per BMP Fact Sheets found in Lake County Storm Low Impact Development Standards Manual. The maintenance of selected BMPs is recommended as follows:

Interceptor Trees

At a minimum inspection and maintenance shall include the following:

- Annual inspection prior to the rainy season.
- Annual proper watering and application of mulch.
- Routine pruning and weeding as needed.
- Replacement of trees as needed.

Impervious area disconnection

At a minimum inspection and maintenance shall include the following:

- Routinely inspect for ponding water near building foundation
- Annually inspect for undercutting/washouts at the outlet of pipe
- Annually inspect for splash blocks or rain chain damage
- Annually inspect for vegetation or debris blocking outlet of pipe

Bioretention

At a minimum maintenance shall include the following:

- Dry street sweeping upon completion of construction
- Dry street sweeping annually, and
    - o When water is observed flowing in the gutter or swale during a low intensity storm.
    - o Algae is observed in the gutter or swale.
    - o Sediment/debris covers 1/3 of the gutter or swale width, or more.
- Inspect twice annually for sedimentation and trash accumulation in the gutter.

Obstructions and trash shall be removed and properly disposed of.

- Inspect twice during the rainy season for ponded water.
- Pesticides and fertilizers shall not be used in the bioretention area.
- Plants should be pruned, weeds pulled and dead plants replaced as needed.

All associated costs for the BMP installation and maintenance shall be provided by the property owners.

FLOOD CONTROL HYDROLOGIC DESIGN

Pre and Post Development

Pre-development and post-development 10- and 100-year peak flow and hydrographs were calculated using Hydraflow Hydrographs, an AutoCAD extension. Hydrographs uses the SCS Runoff method to calculate peak runoff rate and the time during which this peak occurs. Hydrographs also calculates total volume for the given storm, and when Post-Development runoff condition is modeled, the difference in volumes is the volume which must be stored as detention and/or retention in order for the Post-Development condition to be effective in not exceeding the Predevelopment condition.

Pre-Development and Post-Development calculations are performed to serve as design guidance for development related proposed flood control features, for example bioswale soil retention or detention ponds. Note that based on the calculations contained within this report, Post-Development drainage volumes will not exceed Pre-Development drainage volumes as long as proposed LID measures are constructed, properly, in their entirety, and are maintained in an ongoing basis. See attachments HYD-2, HYD-3, and WQ-1 attachments to this Drainage Technical Memorandum.

Multi-hydrograph plots for 10- and 100-year storms can be found as attachments in the appendix. Independently, Pre- and Post-development hydrologic calculations were performed for each hydrologic zone plus the overall project area using Rational Method in accordance with Clearlake Drainage Design Standards. In this method peak flow in cubic feet per second (CFS) is determined. For total storm volume, Six-hour SCS storm was selected in Hydrographs because, as a stormwater volume model, it corresponds most closely with the Rational Method peak flow rate calculations already performed. Note that Rational Method flow rates in cubic feet per second are considered more accurate than flow rates calculated with Hydrographs, and will be the ones presented. The following is a summary of the multi-hydrograph plots for 10 and 100-year storms, and is the basis for retention/detention volumes provided for the project.

10 Year Predevelopment peak flow rate of 20.63 cfs, with a time to peak of 154 minutes. Predevelopment hydraulic volume equals 100,505 cubic feet.

10 Year Post-Development peak flow rate of 111.58 cfs, with a time to peak of 184 minutes. Post-Development hydraulic volume equals 348,422 cubic feet.

Difference in hydraulic volume for 10-year event, Post minus Pre equals 247,917 cubic feet. Delta Q (Post minus Pre) flow rate equals 90.95 cfs.

100 Year Predevelopment peak flow rate of 46.34 cfs, with a time to peak of 152 minutes. Predevelopment hydraulic volume equals 206,935 cubic feet.

100 Year Post-Development peak flow rate of 188.87 cfs, with a time to peak of 184 minutes. Post-Development hydraulic volume equals 592,340 cubic feet.

Difference in hydraulic volume for 100-year event, Post minus Pre equals 385,405 cubic feet to store. Delta Q (Post minus Pre) flow rate equals 142.53 cfs.

386,600 cubic feet of retention and detention has been provided for the purposes of flood control, breakdown per zone has been tabulated and can be seen in the appendix, and is discussed in more detail below. "Flood retention" on the exhibit refers to ponded water capacity above provided BMP features. In the future final design, this will most likely amount to a combination of retention and detention when at that time more detailed analysis will be performed in accordance with construction-level design and with appropriate draw-down as another consideration.

The project has been divided into different hydrologic drainage zones. These zones correspond with previously determined LID zones, identified as DMA "A", etc. Runoff from each zone will flow into collector swales and inlets to be concentrated in Bioretention features. These features will be utilized two-fold. They satisfy LID requirements of stormwater treatment and retention, and will also provide permanent retention and temporary detention for the purposes of flood control. Ponding over the top of LID features (bioretention areas) will make up the difference of stormwater detention requirements as calculated for 100-year flood control, from the limited LID volumes provided. Areas scattered throughout the project's different drainage zones will be used to retain and detain stormwater runoff for these two purposes. In addition, storm drain inlets and pipes will be provided at each LID/flood control feature to collect any potential overflow and convey it westward, connecting to existing storm drain infrastructure to cross Old Highway 53 and on with eventual release in Clearlake.

Two locations with existing storm drain underground piping will be utilized as release points for on-site storm drainage overflow. The first, located on Old Highway 53 just north of the proposed 18th Avenue intersection consists of a large structure flush with existing grade. This structure amounts to a junction box (or two) which currently accepts piped stormwater from

the northeast and conveys it under Old Highway 53 to the west side of the road to another flush junction box with surface grate. The existing underground crossing pipes are sized at 36" and 24". It is approximated that existing 100-year flows are around 200 cfs at this juncture (Laco, 2024). Hydrologic zones "A", "A-1", "I", and portion of "C" will connect here.

Hydrologic zones "B", a portion of "C", all of "D", "E", "F", and "G", and "H" will all overflow to the second release point, at a future storm drain manhole to be located on Airport Road where an existing storm drain (likely 30" diameter) currently conveys runoff westerly and under Old Highway 53.

METHODOLOGY

The methodologies used in this report to prepare drainage analysis were Lake County Storm Low Impact Development Standards Manual and Rational Method per City of Clearlake Design and Construction Standards rev 2012 section 2 Drainage Design Standards. TR-55 is the basis of SCS (Soil Conservation Service) Runoff Method calculations performed, and is utilized by Autodesk Hydraflow Hydrographs.

Attachments:

1. Stormwater Control Plan For Regulated Projects
2. Polutant Source Controls Checklist
3. Predevelopment Conditions (HYD-1)
4. Post-Development Hydrology (HYD-2)
5. Flood Control Exhibit (HYD-3)
6. Post-Development DMAs (WQ-1)
7. Bioretention Details and Checklist
8. BMP Fact Sheets
9. BMP Operation and Maintenance Plan
10. Websoilsurvey Soil Report
11. Geotracker LUST Cleanup Site Report
12. C-Values, Tc, Intensity, Manning's Q Hydrologic Zone Tabulation
13. Hydraflow Tabulations and Flood Control Volumes
14. Multi-Hydrograph Plots – Predevelopment Vs. Post-Development

Storm Water Control Plan for Regulated Projects

For Office Use Only
Application No.
Received By:

Project Name: City of Clearlake Airport Commercial Center Project

Physical Site Address and/or APN: 18th Avenue APNs: 10-031-001 & -00

Project Applicant: Alan Flora, City of Clearlake

Mailing Address: aflora@clearlake.ca.us

Phone: 530-218-1059

Project Description: Street and Parcel Infrastructure

Instructions
Based on the answers that you provided in the Construction and Post Construction Storm Water Stormwater Runoff Control Checklist, you have determined that your project is classified as "regulated" for the purposes of the County of Lake MS4 Permit. Use this form to assist you in designing your project to comply with the County of Lake MS4 Permit design standards for regulated projects. The completed, signed SCP for Regulated Projects, plus any applicable, approved BMP Fact Sheets, must be submitted with your application to Lake County Community Development Department.

Type of Application/Project:
What type of application is this checklist accompanying?

	Subdivision		Grading Permit
	Building Permit		Design Review
X	Use Permit		Other (please specify)

A. Project Description

Project Site Size (square feet or acres): 54.78 acres

Area of new or replaced impervious surface (square feet): 44.35 acres
*Please note if your project will create 1-acre or more of impervious surface then it should consider hydromodification management guidelines

Name and address of project consultant, if any (e.g., engineer, architect, designer):

_

_

_

Storm Water Control Plan for Regulated Projects

If your project includes more than 5,000 square feet in new or replaced impervious area, is your project one of the following project types?

- Detached single family homes that create and/or replace 2,500 square feet or more and are not part of a larger plan of development
- Interior remodels
- Routine maintenance or repair, such as exterior wall surface replacement or pavement resurfacing within an existing footprint
- Linear Underground/Overhead Projects (LUPs), unless the project has a discrete location that has 5,000 square feet or more of newly constructed contiguous impervious surface.
- Sidewalks built as part of new streets or roads and built to direct storm water runoff to adjacent vegetated areas
- Bicycle lanes that are built as part of new streets or roads that direct storm water runoff to adjacent vegetated areas
- Impervious trails built to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas
- Sidewalks, bicycle lanes, or trails constructed with permeable surfaces
- Trenching excavation and resurfacing associated with LUPs
- Grinding and resurfacing of existing roadways and parking lots
- Construction of new sidewalks, pedestrian ramps, or bike lanes on existing roadways
- Routine replacement of damaged pavement such as pothole repair, or replacement of short, non-contiguous sections of roadway

Yes X No

If you answered "Yes" above, your project is a small project or a single family home under the definitions in the County of Lake MS4 Permit. Please use the Checklist for Small Project and Single Family Homes *to assist you in your project design and application submittal.*

B. Site Assessment (Opportunities and Constraints)

1. Soil Characteristics

I. Soil characterization method Websoilsurvey.com

II. Were infiltration rates assessed for the site? Yes X No

If Yes, please attach soils testing report

2. Depth to Groundwater

I. What is the depth (below ground surface) to groundwater (in feet)? more than 6.7 feet

II. How was this determined? Websoilsurvey map unit description

Storm Water Control Plan for Regulated Projects

3. Existing Vegetation and Natural Areas

I. Are there any key natural vegetation areas, sensitive habitats, or mature trees on the site?

Yes X No

If yes, please draw and label these features on the existing conditions site plan map, and attach to this document a description of them.

4. Drainage and Hydrograph

I. Are there any natural drainage features or modified natural drainage features on the site or directly adjacent to the site?

Yes X No

If yes, follow hydromodification management requirements contained in Section E.12.f of the MS4 Permit (directly adjacent is defined as, "within 100-feet of the top of bank").

5. Potential Contamination

I. Is the project site within or near to a registered contaminated site, according to the State Water Resources Control Board Geotracker Website (http://geotracker.waterboards.ca.gov/)?

X Yes No

If yes, please attach the applicable contaminated site report from the Geotracker website, and note the location of the contaminated site on the existing conditions site plan map. Please attach a description how this contamination will affect your project design.

"Project design will not be impacted since the cleanup occured in 1995 and the case is closed."

C. Project Layout Optimization

Optimizing the site layout can be done through the following methods:

1. Define the development envelope and protected areas, identifying areas that are most suitable for development and areas to be left undisturbed.
2. Concentrate development on portions of the site with less permeable soils and preserve areas that can promote infiltration.
3. Limit overall impervious coverage of the site from paving and roofs.
4. Set back development from creek, wetlands, and riparian habitats, to maximize vegetative buffer widths.
5. Preserve significant trees.
6. Conform the site layout along natural landforms.
7. Avoid excessive grading and disturbance of vegetation and soils.
8. Replicate the site's natural drainage patterns.
9. Detain and retain runoff throughout the site.

Based on the features included in the existing conditions site plan, please ensure your project site plan applies project layout optimization measures to the greatest extent practicable, while still meeting the objectives of your project. Please attach a short description on how the project has utilized site optimization methods.

"The site has been designed with many significant open and permeable areas with which to be able to detain and treat stormwater as well as minimize runoff by minimizing impermeable areas. The site's natural drainage patterns will be maintained to the greatest extent possible, and there will be no encroachment on creeks or wetlands."

Storm Water Control Plan for Regulated Projects

D. Source Controls

Does your project contain potential pollutant-generating activities or sources?

X Yes No

If Yes, please complete the Source Control Worksheet available as Appendix 4 of the County of Lake Low Impact Development Technical Design Manual; and, list and identify, using a simple table format, the source or treatment control measure and locations as an attachment to the SCP document.

E. Drainage Management Areas

On the project site plan please delineate and label all drainage management areas (refer to Sec. 4 of the manual). Record the DMA names and Areas in the table below.

Table 1. DMAs

DMA name	Area (square feet)
DMA "A"	83,060
DMA "A-1"	162,850
DMA "B"	249,730
DMA "C"	541,600
DMA "D"	404,840
DMA "E"	113,950
DMA "F"	475,200
DMA "G"	140,100
DMA "H"	129,900
DMA "I"	81,400

F. Site Design Measures

Please identify the site design measures incorporated into the project design and attach the applicable, approved BMP Fact Sheet or equivalent to this checklist. These measures must be discussed in the SCP and shown on the site design map.

X Rooftop and Impervious Area Disconnection

X Tree Planting and Preservation

Rain Barrels and Cisterns

Porous Pavement

X Flow-Through Planter

X Bioretention

Storm Water Control Plan Worksheet for Regulated Projects

Table 2. Area Calculations of *Self-retaining Areas* Used to Treat Impervious Areas

1	2
DMA a	Area (sq.

Table 3. Runoff Factor (surface type)

Roofs and Paving	1.0
Landscaped Area	0.1
Bricks or solid pavers- grouted	1.0
Bricks or solid Pavers-on sand base	0.5
Pervious Concrete Asphalt	0.1
Turfblock or gravel	0.1
Open or Porous pavers	0.1

Tables 4-6 below should be used to quantify the amount of runoff that is reduced by using site design measures. Using the tables in chronological order will calculate the minimum size for your bioretention facility in order to meet the MS4 permit requirements. Several iterations may be need to size facilities according to the site design.

Table 4. Area draining to self-retaining areas

1	2	3	4	5	6
DMA Name (must correspond to area on the site map and on Table 1)	DMA Area (sq. ft.) (Table 1)	Type of Surface (Runoff Factor Table 3)	Surface with Runoff Factor Column **2** X Column **3**	Area of Self-retaining Area Receiving the Runoff (Table 2, Col. 2)	Ratio Col. **5** : Col. **4** Not to exceed 2:1 ratio (if number exceeds 2:1 use table 5 - 6 to reduce tributary area and recalculate or go directly to Table 7)
Example	700	Roof (1.0)	700	100	7:1 (must use site design measures, bioretention or both)

Storm Water Control Plan Worksheet for Regulated Projects

Table 5. Tree Planting and Preservation (if not planting trees go to Table 6)

1	2	3	4	5	6
DMA Name (must correspond to area on the site map)	DMA sq. ft. (from Table 4. Col. 6)	Deciduous (Input 100 for each deciduous tree)	Evergreen (Input 200 for each evergreen tree)	Total Tree Credit (Col. **4** + Col. **5**) (DMA runoff reduction)	New DMA Area Col. **2** – Col. **5** (for use in Table 6 - 8)
DMA "A"	83,060	800	-	800	82,260
DMA "A-1"	162,850	1200	-	1200	161,650
DMA "B"	249,730	1500	-	1500	248,230
DMA "C"	541,600	800		800	540,800
DMA "D"	408,840	1500	-	1500	407,340
DMA "E"	113,950	800		800	113,150
DMA "F"	475,200	1500	-	1500	473,700
DMA "G"	140,100	500		500	139,600
DMA "H"	129,900	500	-	500	129,400
DMA "I"	81,400	0		0	81,400

Table 6. Rain Barrels and Cisterns (if not using Rain Barrels or Cisterns go to Table 8)

1	2	3	4	5	6
DMA Name (must correspond to area on the site map)	New DMA sq. ft. (Table 5 Col. 7 or if no trees used, value from Table 4 Col. 2)	Number of Rain Barrels	Runoff Reduction from using a standard 55 gallon Rain Barrel = 200 sq. ft. Use the following if size is other than the standard (for every gallon of storage approx.. 3.65 sq. ft. of reduction is achieved)	Col. **3** **X** Col. **4** (DMA runoff reduction)	New DMA Area Col. **2** - Col. **5**
Example	500	1	200	200	300 (go to Table 7 to recalculate Ratio)

Storm Water Control Plan Worksheet for Regulated Projects

Table 7. New Tabulation of areas draining to self-retaining area after use of site design measures (must achieve a 2:1 ratio; if not achievable, use table 8 to calculate the size of bioretention required)

1	**2**	**3**	**4**
DMA Name (must correspond to area on the site map)	New Square footage of DMA (Col 6, Table 4,5,6)	Area of Self-retaining Area Receiving the Runoff (Table 2, Col. 2)	Ratio Column **2 :** Column **3** Not to exceed 2:1
Example	300 (Table 6)	100	3:1 (still exceeds 2:1 go back, add more trees, rain barrels, or use bioretention – example uses bioretention, Table 8)

Storm Water Control Plan Worksheet for Regulated Projects

Table 8. Tabulation of areas draining to Bioretention Facility

1	2	3	5	6		
DMA Name (must correspond to area on the site map)	DMA sq. ft. (Table 1, Col 2) or new DMA sq. ft. Table 7, Col. 2)	Runoff Factor Table 6a (skip if coming from Table 1)	DMA Area Col. **2** x Col. **3**	Standard Sizing Factor	**Minimum facility size** Col. **5** X Col. **6**	If site does not allow for the minimum size, recalculate DMA using additional Site Design Measures to further reduce the tributary size PROVIDED BMP SIZE
DMA "A"	82,260	Roof & pvmt 1.0	82,260	0.04	3290	4,000
DMA "A-1"	161,650	Roof & pvmt 1.0	161,650	0.04	6,466	7,270
DMA "B"	250,700	Roof & pvmt 1.0	250,700	0.04	10,028	11,500
DMA "C"	540,800	Roof & pvmt 1.0	540,800	0.04	21,632	45,400
DMA "D"	402,500	Roof & pvmt 1.0	402,500	0.04	16,100	25,230
DMA "E"	113,100	Roof & pvmt 1.0	113,100	0.04	4524	8000
DMA "F"	478,400	Roof & pvmt 1.0	478,400	0.04	19,136	20,400
DMA "G"	139,600	Roof & pvmt 1.0	139,600	0.04	5584	6200
DMA "H"	129,350	Roof & pvmt 1.0	129,350	0.04	5,174	7,440
DMA "I"	81,400	Pavement 1.0	81,400		3,256	3,300

Table 6a. Runoff Factors

Roofs and Paving	1.0
Landscaped Area	0.1
Bricks or solid pavers- grouted	1.0
Bricks or solid Pavers-on sand base	0.5
Pervious Concrete Asphalt	0.1
Turfblock or gravel	0.1
Open or Porous pavers	0.1

Storm Water Control Plan Worksheet for Regulated Projects

G. Operation and Maintenance in Perpetuity

Indicate whether an *Operation and Maintenance Plan* is accompanying this document (Appendix 9).

X Yes No

H. Stormwater Control Plan

A Stormwater Control Plan is required for all Regulated Projects. This worksheet is designed to be the SCP if all requested descriptions and site plans have been attached. This document will be used by the plan checker to confirm that adequate storm water control measures are being implemented on the project.

Indicate whether all supporting descriptions and worksheets are accompanying this document, Stormwater Control *Plan*

X Yes No

I. Signature and Certification:

I, the below signed, confirm that I have accurately described my project to the best of my ability, and that I have not purposely omitted any detail affecting my project's classification for storm water regulation. I hereby certify that the site design measures and storm water flow treatment measures identified herein as being incorporated into my project have been designed in accordance with the approved BMP Fact Sheet or equivalent, which is attached to this checklist, and is included in the final site plans submitted to Lake County Community Development Department. I also hereby certify that my project meets the storm water runoff reduction criteria identified in the County of Lake MS4 Permit as determined through approved means.

Signature Date

Print Name

I am the:

Property Owner Contractor Applicant

Stormwater Control Plan Checklist for Regulated Projects

Applicant Checklist for Regulated Projects; items that must be included in the Permit Packet

Items that must be on the Project Site Map

- ☐ Exiting natural hydrological features (depressions watercourses, wetlands, riparian areas, undisturbed natural areas, significant natural resource areas)
- ☐ Existing and proposed site drainage network and connections to MS4 conveyances off-site
- ☐ Proposed design features and surface treatments used to minimize imperviousness and reduce runoff
- ☐ DMAs are delineated for the entire site and each is labeled with a unique identifier and is characterized as draining to self-retaining, self-treating, or draining to a bioretention facility
- ☐ Proposed locations and footprints of bioretention facilities
- ☐ Pollutant-generating source areas, including loading docks, food service areas, refuse areas, outdoor processes and storage, vehicle cleaning, repair or maintenance, fuel dispensing, equipment washing, etc… (Appendix 5)

Contents of Storm Water Control Plan (SCP)

- ☐ Narrative or description of site features and conditions that constrain or provide opportunities for stormwater control
- ☐ Narrative of Site Design characteristics, building features, and pavement selections that reduce imperviousness of the site including the quantified runoff reduction.
- ☐ Completed tables showing square footage of proposed pervious and impervious areas, self-treating areas, self-retaining areas, areas draining to bioretention facilities,
- ☐ Preliminary designs, including calculations, for each bioretention facility. Elevations should show sufficient hydraulic head for each bioretention facility.
- ☐ General Maintenance requirements for bioretention facilities
- ☐ Statement accepting responsibility for interim operation and maintenance of facilities
- ☐ Bioretention Checklist submitting indicates all requirements were met
- ☐ Certification/stamped Site Plan by professional civil engineer, architect, or landscape architect

Storm water Pollutant Sources/Source Controls Checklist

How to use this worksheet (also see instructions on Checklist for Regulated Projects):

1. Review Column 1 and identify which of these potential sources of storm water pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable Structural Source Control BMPs in your Storm water Control Plan drawings.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable Structural Source Control BMPs and Operational Source Control BMPs in a table in your Storm Water Control Plan. Use this table and an accompanying narrative in the SCP, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs.

IF THESE SOURCES WILL BE ON THE PROJECT SITE…	**… THEN YOUR STORM WATER CONTROL PLAN (SCP) SHOULD INCLUDE THESE SOURCE CONTROL BMPS**		
1 **Potential Sources of Runoff Pollutants**	2 **Structural Source Controls – Show on SCP Drawings**	3 **Structural Source Control – List in SCP Table and Narrative**	4 **Operational Source Control BMPs – Include in SCP Table and Narrative**
☒ **A.** On-site storm drain inlets (unauthorized non-storm water discharges and accidental spills or leaks)	☐ Location of inlets	☐ Mark all inlets with the words "No Dumping! Flows to River/Ocean" or similar.	☐ Maintain and periodically repaint or replace inlet markings. ☐ Provide storm water pollution prevention information to new site owners, lessees, or operators. See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Storm water Quality Handbooks at www.casqa.org/resources/bmp¬handbooks ☐ Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."

IF THESE SOURCES WILL BE ON THE PROJECT SITE…	**… THEN YOUR STORM WATER CONTROL PLAN (SCP) SHOULD INCLUDE THESE SOURCE CONTROL BMPS**		
1 **Potential Sources of Runoff Pollutants**	2 **Structural Source Controls – Show on SCP Drawings**	3 **Structural Source Control – List in SCP Table and Narrative**	4 **Operational Source Control BMPs – Include in SCP Table and Narrative**
☒ **B.** Interior floor drains and elevator shaft sump pumps	☐ Show drain and pump locations	☐ State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer	☐ Inspect and maintain drains to prevent blockages and overflow.
☐ **C.** Interior parking garages	☐ Show drain locations	☐ State that parking garage floor drains will be plumbed to the sanitary sewer	☐ Inspect and maintain drains to prevent blockages and overflow.
☒ **D_1.** Need for future indoor & structural pest control		☐ Note building design features that discourage entry of pests	☐ Provide Integrated Pest Management information to owners, lessees, and operators.
☒ **D_2.** Landscape/ Outdoor Pesticide Use/Building and Grounds Maintenance	☐ Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained. ☐ Show self-retaining landscape areas, if any. ☐ Show bioretention facilities. (See instructions in Chapter 4.)	State that final landscape plans will accomplish all of the following. ☐ Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. ☐ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to storm water pollution. ☐ Where landscaped areas are used to retain or detain storm water, specify plants that are tolerant of saturated soil conditions. ☐ Consider using pest-resistant plants, especially adjacent to hardscape. ☐ To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	☐ Maintain landscaping using minimum or no pesticides. ☐ See applicable operational BMPs in Fact Sheet SC-41, “Building and Grounds Maintenance,” in the CASQA Storm water Quality Handbooks at www.casqa.org/resources/bmp¬handbooks ☐ Provide IPM information to new owners, lessees and operators.

IF THESE SOURCES WILL BE ON THE PROJECT SITE…	… THEN YOUR STORM WATER CONTROL PLAN (SCP) SHOULD INCLUDE THESE SOURCE CONTROL BMPS		
1 **Potential Sources of Runoff Pollutants**	2 **Structural Source Controls – Show on SCP Drawings**	3 **Structural Source Control – List in SCP Table and Narrative**	4 **Operational Source Control BMPs – Include in SCP Table and Narrative**
☐ **E.** Pools, spas, ponds, decorative fountains, and other water features	☐ Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet.	☐ If the local municipality requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	☐ See applicable operational BMPs in Fact Sheet SC-72, "Fountain and Pool Maintenance," in the CASQA Storm water Quality Handbooks at www.casqa.org/resources/bmp¬handbooks ☐ The sanitary sewer operator must be notified and a clean out identified when pools are to be drained to the sanitary sewer.
☒ **F.** Food Service	☐ For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. ☐ On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer	☐ Describe the location and features of the designated cleaning area. ☐ Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.	☐ State maintenance schedule for grease interceptor
☒ **G.** Refuse areas	☐ Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas. ☐ If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area. ☐ Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.	☐ State how site refuse will be handled and provide supporting detail to what is shown on plans. ☐ State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	☐ State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Storm water Quality Handbooks at www.casqa.org/resources/bmp-handbooks

IF THESE SOURCES WILL BE ON THE PROJECT SITE…	… THEN YOUR STORM WATER CONTROL PLAN (SCP) SHOULD INCLUDE THESE SOURCE CONTROL BMPS		
1 **Potential Sources of Runoff Pollutants**	2 **Structural Source Controls – Show on SCP Drawings**	3 **Structural Source Control – List in SCP Table and Narrative**	4 **Operational Source Control BMPs – Include in SCP Table and Narrative**
☐ **H.** Industrial Process area	☐ Show process area.	☐ If industrial processes are to be located on site, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."	☐ See Fact Sheet SC-10, "Non-Storm water Discharges" in the CASQA Storm water Quality Handbooks at www.casqa.org/resources/bmp¬handbooks
☐ **I.** Outdoor storage of equipment or materials (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)	☐ Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area. ☐ Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. ☐ Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	☐ Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. ☐ Where appropriate, reference documentation of compliance with the requirements of programs for: • Hazardous Waste Generation • Hazardous Materials Release Response and Inventory • California Accidental Release (CalARP) • Aboveground Storage Tank • Uniform Fire Code Article 80 Section 103(b) & (c) 1991 • Underground Storage Tank	☐ See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Storm water Quality Handbooks at www.casqa.org/resources/bmp¬handbooks

IF THESE SOURCES WILL BE ON THE PROJECT SITE…	… THEN YOUR STORM WATER CONTROL PLAN (SCP) SHOULD INCLUDE THESE SOURCE CONTROL BMPS		
1 **Potential Sources of Runoff Pollutants**	2 **Structural Source Controls – Show on SCP Drawings**	3 **Structural Source Control – List in SCP Table and Narrative**	4 **Operational Source Control BMPs – Include in SCP Table and Narrative**
☐ **J.** Vehicle and Equipment Cleaning	☐ Show on drawings as appropriate: (1) Commercial/industrial facilities having vehicle/ equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses. (2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use). (3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer. (4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.	☐ If a car wash area is not provided, describe measures taken to discourage on-site car washing and explain how these will be enforced.	☐ Describe operational measures to implement the following (if applicable): Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system. Car dealerships and similar may rinse cars with water only. ☐ See Fact Sheet SC-21, “Vehicle and Equipment Cleaning,” in the CASQA Storm water Quality Handbooks at www.casqa.org/resources/bmp-handbooks

IF THESE SOURCES WILL BE ON THE PROJECT SITE…	… THEN YOUR STORM WATER CONTROL PLAN (SCP) SHOULD INCLUDE THESE SOURCE CONTROL BMPS		
1 **Potential Sources of Runoff Pollutants**	2 **Structural Source Controls – Show on SCP Drawings**	3 **Structural Source Control – List in SCP Table and Narrative**	4 **Operational Source Control BMPs – Include in SCP Table and Narrative**
☐ **K.** Vehicle and Equipment Repair and Maintenance	☐ Accommodate all vehicle equipment designate an outdoor work area and design the area to prevent run-on and runoff of storm water. ☐ Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas. ☐ Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.	☐ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. ☐ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements. ☐ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.	In the Storm water Control Plan, note that all of the following restrictions apply to use the site: ☐ No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains. ☐ No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately. ☐ No person shall leave unattended parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.

IF THESE SOURCES WILL BE ON THE PROJECT SITE…	… THEN YOUR STORM WATER CONTROL PLAN (SCP) SHOULD INCLUDE THESE SOURCE CONTROL BMPS		
1 **Potential Sources of Runoff Pollutants**	2 **Structural Source Controls – Show on SCP Drawings**	3 **Structural Source Control – List in SCP Table and Narrative**	4 **Operational Source Control BMPs – Include in SCP Table and Narrative**
☐ **L.** Fuel Dispensing Areas	☐ Fueling areas shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of storm water to the maximum extent practicable. ☐ Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area1.] The canopy [or cover] shall not drain onto the fueling area	☐ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. ☐ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements. ☐ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.	☐ The property owner shall dry sweep the fueling area routinely. ☐ See the Business Guide Sheet, "Automotive Service—Service Stations" in the CASQA Storm water Quality Handbooks at www.casqa.org/resources/bmp-handbooks

IF THESE SOURCES WILL BE ON THE PROJECT SITE…	… THEN YOUR STORM WATER CONTROL PLAN (SCP) SHOULD INCLUDE THESE SOURCE CONTROL BMPS		
1 **Potential Sources of Runoff Pollutants**	2 **Structural Source Controls – Show on SCP Drawings**	3 **Structural Source Control – List in SCP Table and Narrative**	4 **Operational Source Control BMPs – Include in SCP Table and Narrative**
☒ **M.** Loading Docks	☐ Show the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct storm water away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer. ☐ Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. ☐ Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		☐ Move loaded and unloaded items indoors as soon as possible. ☐ See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Storm water Quality Handbooks at www.casqa.org/resources/bmp¬handbooks
☒ **N.** Fire Sprinkler Test Water		☐ Provide a means to drain fire sprinkler test water to the sanitary sewer	☐ See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Storm water Quality Handbooks at www.casqa.org/resources/bmp¬handbooks

IF THESE SOURCES WILL BE ON THE PROJECT SITE…	… THEN YOUR STORM WATER CONTROL PLAN (SCP) SHOULD INCLUDE THESE SOURCE CONTROL BMPS		
1 **Potential Sources of Runoff Pollutants**	2 **Structural Source Controls – Show on SCP Drawings**	3 **Structural Source Control – List in SCP Table and Narrative**	4 **Operational Source Control BMPs – Include in SCP Table and Narrative**
O. Miscellaneous Drain or Wash Water or Other Sources ☒ Boiler drain lines ☒ Condensate drain lines ☒ Rooftop equipment ☒ Drainage sumps ☒ Roofing, gutters, and trim ☒ Other sources	☐ Show drain lines and drainage sumps	☐ Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. ☐ Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. ☐ Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment. ☐ Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water. ☐ Include controls for other sources as specified by local reviewer.	If architectural copper is used, implement the following BMPs for management of rinse water during installation: ☐ If possible, purchase copper materials that have been pre-patinated at the factory. ☐ If patination is done on-site, prevent rinse water from entering storm drains by discharging to landscaping or by collecting in a tank and hauling off-site. ☐ Consider coating the copper materials with an impervious coating that prevents further corrosion and runoff. Implement the following BMPs during routine maintenance: ☐ Prevent rinse water from entering storm drains by discharging to landscaping or by collecting in a tank and hauling off-site.
☒ **P.** Plazas, sidewalks, and parking lots.	☐ Show extent of permeable paving materials		☐ Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. ☐ Collect debris from pressure washing to prevent entry into the storm drain system. ☐ Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.

NOTE:
THE BOUNDARY SHOWN HEREON IS FROM RECORD SOURCES AND DOES NOT CONSTITUTE A BOUNDARY RESOLUTION OR PARCEL MAP.

NO.	DATE	REVISION

DATE: 07-09-2025
SCALE: 1"=150'
DRAWN BY: DEH
DESIGNED BY: DEH
CHECKED BY: DLS

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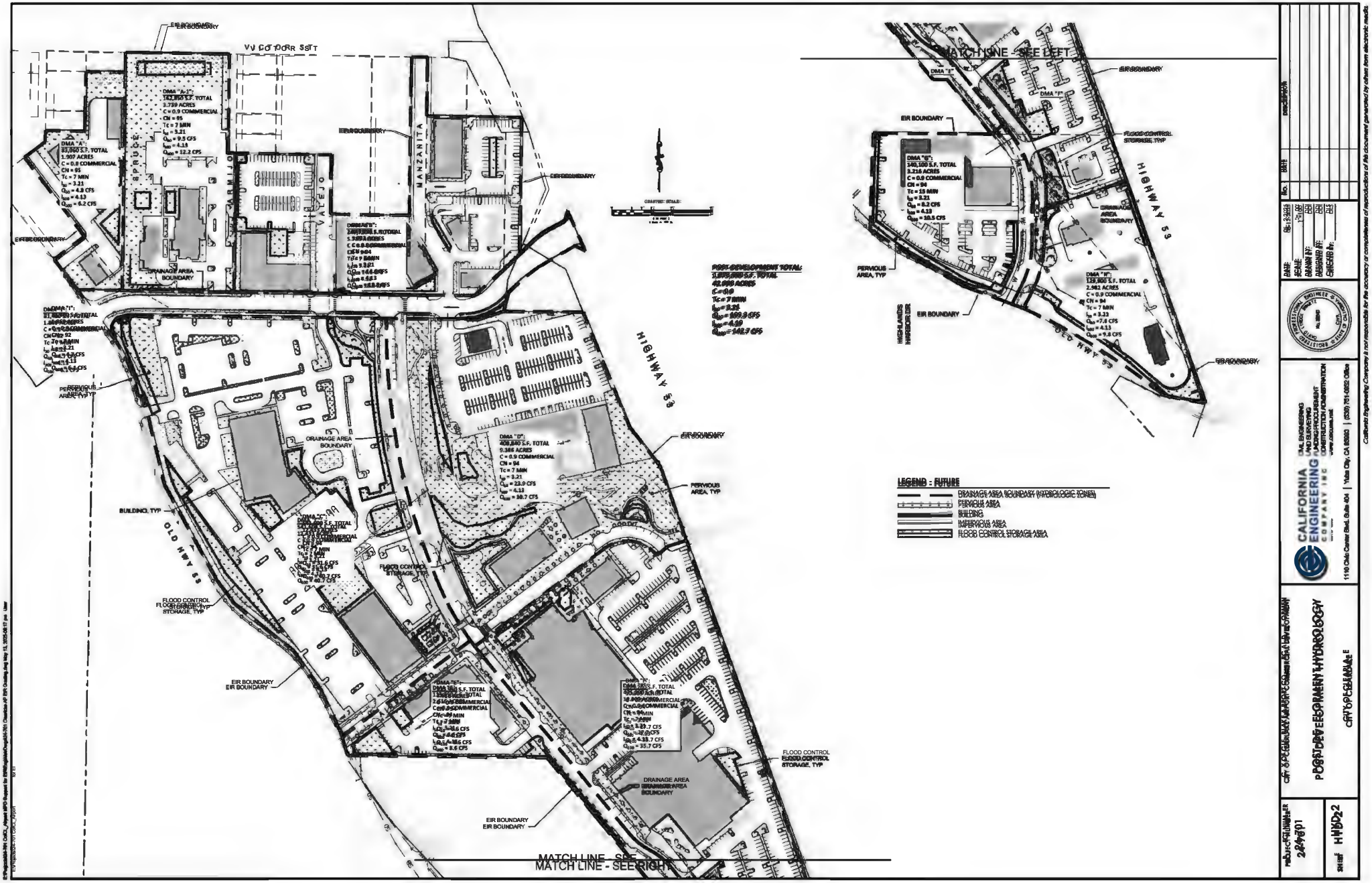
CITY OF CLEARLAKE
CITY OF CLEARLAKE PUBLIC WORKS/COMMUNITY DEVELOPMENT DEPARTMENT

PREDEVELOPMENT CONDITIONS

PROJECT NUMBER: 234-7001

SHEET: HYD1

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CITY OF PLEASANTON
PORTOFINO DEVELOPMENT HYDROLOGY
CITY OF PLEASANTON

PROJECT NUMBER
2247801

SHEET H1 OF 2

NO.	DATE	DESCRIPTION

DATE: 05/12/2025
SCALE: 1"=100'
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DESIGN BY: DSH
CHECKED BY: RHS

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LEGEND - FUTURE

- DRAINAGE AREA BOUNDARY (HYDROLOGIC ZONES)
- DRAINAGE AREA BOUNDARY (HYDROLOGIC ZONES)
- BUILDING
- IMPERVIOUS AREA
- FLOOD CONTROL STORAGE AREA
- FLOOD CONTROL STORAGE AREA

PREDEVELOPMENT HYDROLOGIC VOLUMES TOTAL:
PREDEVELOPMENT HYDROLOGIC VOLUMES TOTAL:
V100 (100 YEAR VOLUME (CF/S)
V10 (10 YEAR VOLUME (CUBIC FEET)
V100 (100 YEAR VOLUME (CUBIC FEET)
(TIME TO PEAK = 2.53 HRS)

POST-DEVELOPMENT HYDROLOGIC VOLUMES TOTAL:
POST-DEVELOPMENT HYDROLOGIC VOLUMES TOTAL:
V100 (100 YEAR VOLUME (CF/S)
V10 (10 YEAR VOLUME (CUBIC FEET)
V100 (100 YEAR VOLUME (CUBIC FEET)
(TIME TO PEAK = 2.47 HRS)

DELTA VOLUME (FLOOD VOLUME TO DETAIN):
100 YR PREDEVELOPMENT VOLUME = 206,900 CF
100 YR POSTDEVELOPMENT VOLUME = 333,900 CF
VOLUME STORAGE REQUIRED = 126,900 CF
100 YR 10 DAY VOLUME = 277,100 CF
VOLUME STORAGE PROVIDED = 281,600 CUBIC FEET
VOLUME STORAGE REQUIRED = 126,900 CF
VOLUME STORAGE PROVIDED = 126,600 CUBIC FEET

FLOOD CONTROL EXHIBIT

CITY OF CLEARLAKE

CITY OF CLEARLAKE AIRPORT COMMERCIAL DEVELOPMENT

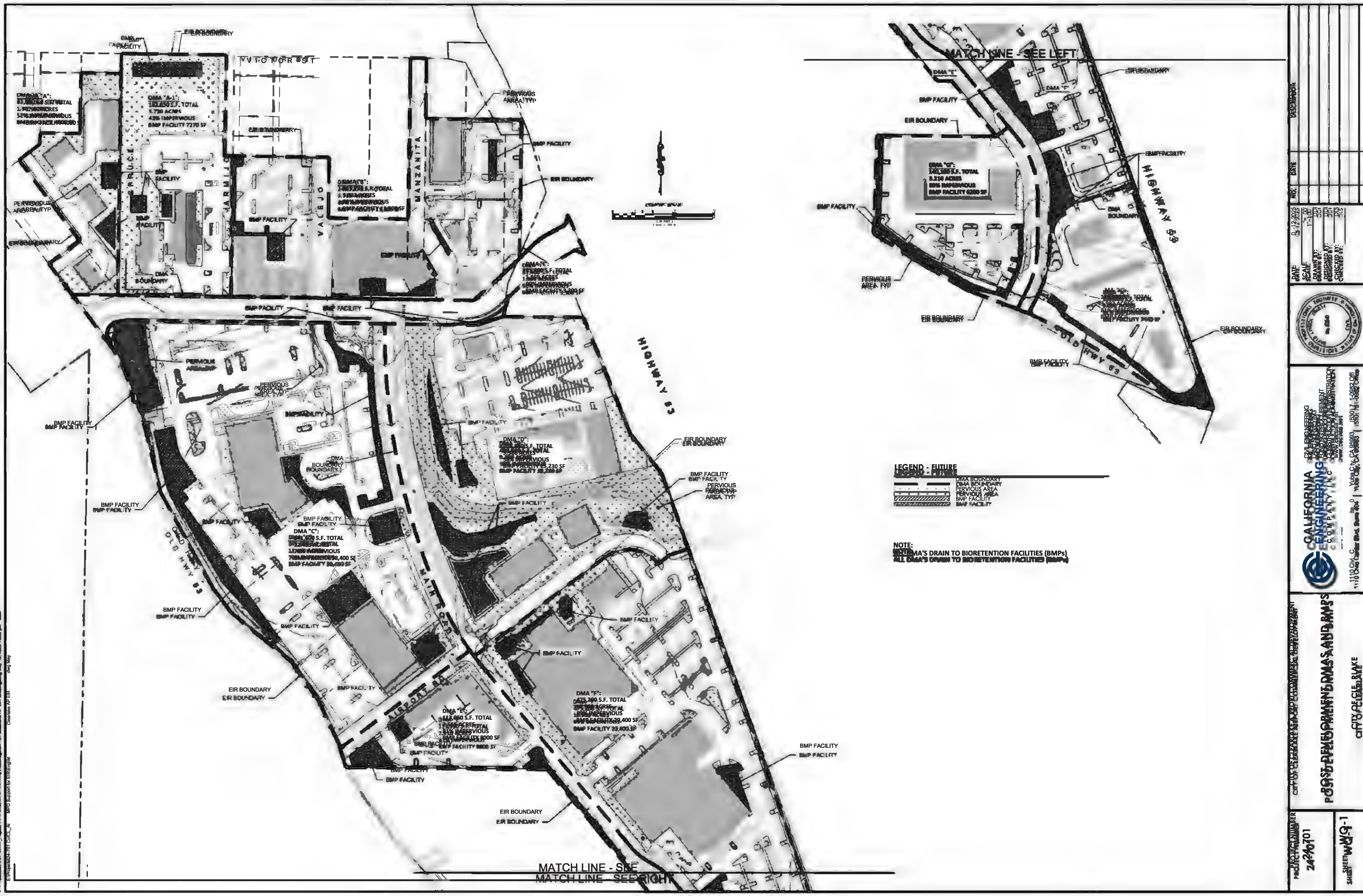
CALIFORNIA ENGINEERING COMPANY, INC.
CIVIL ENGINEERING
LAND DEVELOPMENT
PROJECT MANAGEMENT
CONSTRUCTION ADMINISTRATION
1110 Civil Center Blvd, Suite 404 | Yuba City, CA 95993 | (530) 751-0952 Office
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DATE: 10-17-2025
SCALE: 1" = 100'
DRAWN BY: DR
DESIGNED BY: DR
PREPARED BY: DR
CHECKED BY: DLS

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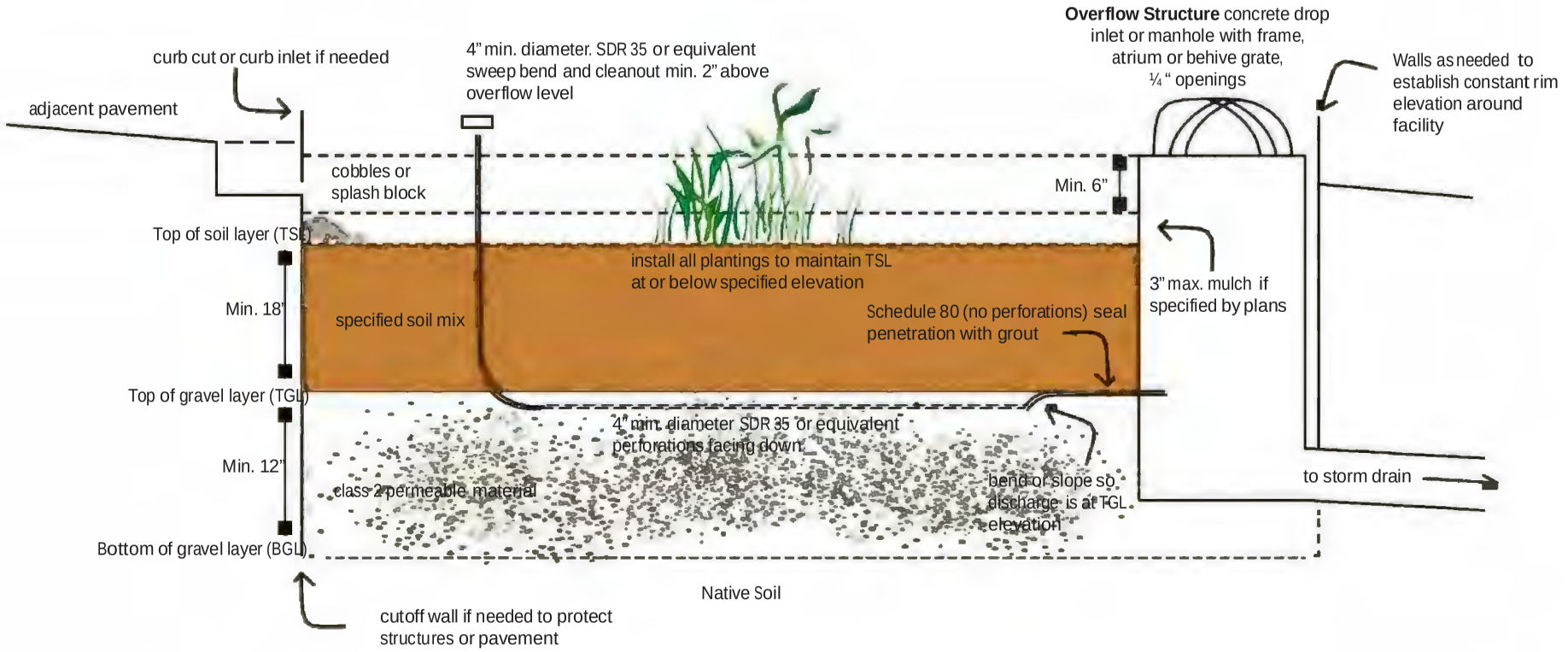
PROJECT NUMBER: 24-701
SHEET: HYD-3

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MATCH LINE - SEE LEFT
MATCH LINE - SEE RIGHT
HIGHWAY 53
OLD HWY 53
MAIN ROAD
AIRPORT RD
MANZANITA
VALLEJO
EIR BOUNDARY
BMP FACILITY
PERVIOUS AREA TYP
DMA BOUNDARY
DMA "A-1":
DMA "G":
DMA "D":
DMA "C":
DMA "E":
DMA "F":
475,300 S.F. TOTAL
LEGEND - FUTURE
DMA BOUNDARY
PERVIOUS AREA
BMP FACILITY
NOTE:
ALL DMA'S DRAIN TO BIORETENTION FACILITIES (BMPs)
CALIFORNIA ENGINEERING COMPANY INC
POST-DEVELOPMENT DMAS AND BMPS
CITY OF CLEARLAKE
PROJECT NUMBER
24-0701
SHEET WQ-1

Bioretention Facility

not to scale



Allowed variations for special site conditions:

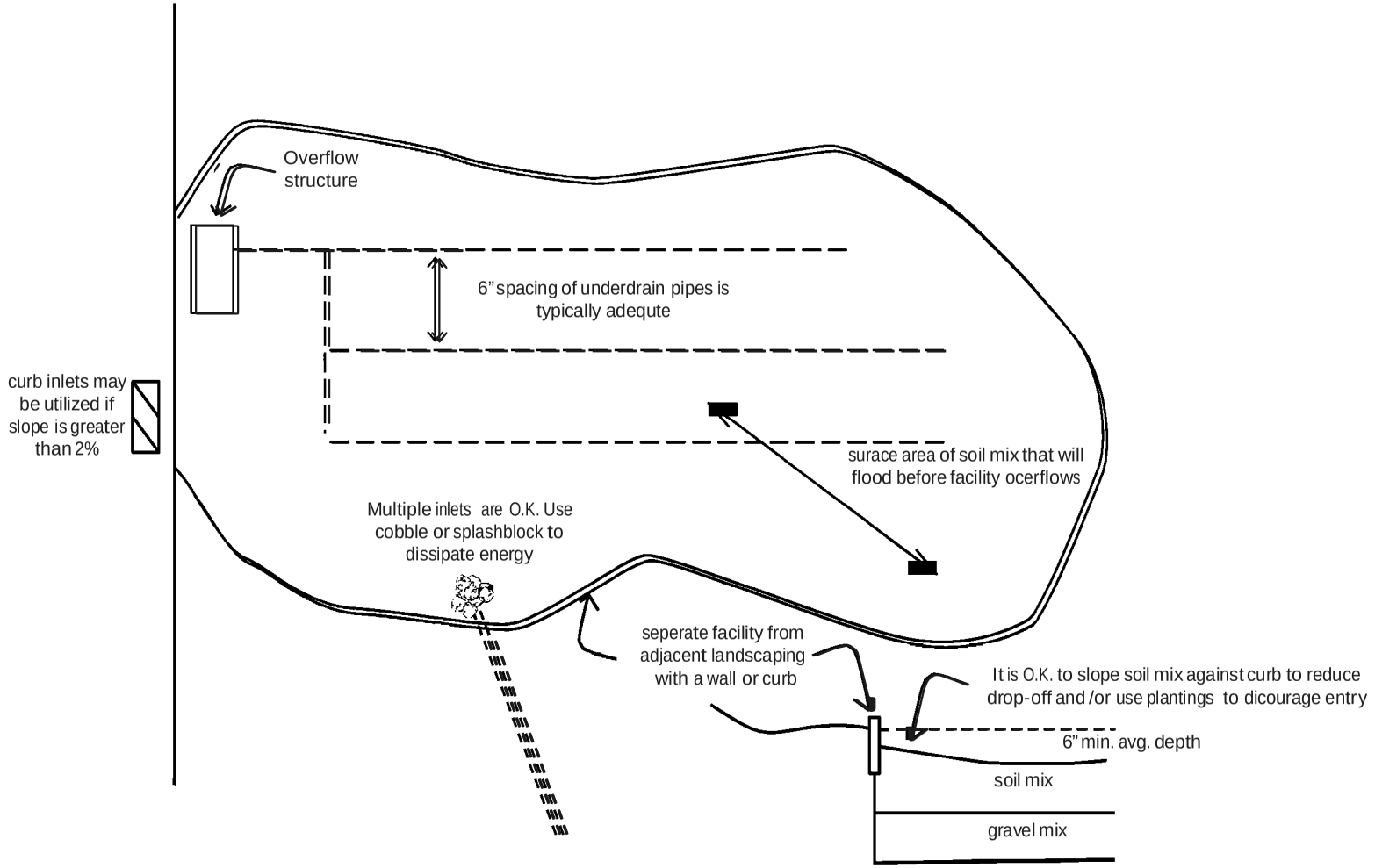
- Facilities located within 10 feet of structures or other potential geotechnical hazards may incorporate an impervious cutoff wall
- Facilities with documented high concentrations of pollutants in underlying soil or groundwater, facilities where infiltration could contribute to a geotechnical hazard, and facilities located on elevated plazas or other s structures may incorporate an impervious liner between the native soil and the BGL and locate the underdrain discharge at the BGL (flow-through planter configuration)
- Facilities located in areas of high groundwater, highly infiltrative soils, or where connection of the underdrain to a surface drain or subsurface storm drain are infeasible may omit the underdrain

Notes:

- No liner, no filter fabric, no landscape cloth.
- Maintain BGL, TGL, TSL throughout facility area at elevations to be specified in plan.
- Class 7 permeable layer may extend below and underneath drop inlet.
- Elevation or underdrain discharge is at top of gravel layer.
- See Chapter X for instructions on facility sizing and additional specifications

Bioretention Facility - Overview

not to scale



Note:

Show all elevations of curb, pavement, inlet, top of soil layer (TSL), top of gravel layer (TGL), and bottom of gravel layer (BGL) at all inlets and outlets and at key points along edge of facility.

Soil/Compost and Gravel Specifications for Bioretention Facility

Compost shall be a well-decomposed, stable, weed-free organic matter source derived from waste materials including yard debris, wood wastes or other organic materials not including manure or biosolids, and shall meet the standards developed by the US Composting Council (USCC). The product shall be certified through the USCC Seal of Testing Assurance (STA) Program (a compost testing and information disclosure program).

Compost Quality Analysis:

Before delivery of the soil, the supplier shall submit a copy of the lab analysis performed by a laboratory that is enrolled in the USCC's Compost Analysis Proficiency (CAP) program and using approved Test Methods for the Evaluation of Composting and Compost (TMECC). The lab report shall verify that the compost parameters are within the limits specified below.

Parameter	Range	Reported as (units)
Organic Matter Content	35-75	%, dry weight basis
Carbon to Nitrogen Ratio	15:1 to 25:1	ratio
Maturity (Seed Emergence and Seedling Vigor)	>80	average % of control
Stability (CO_2 Evolution Rate)	<8	mg $C0_2$-C/g unit OM/day
Soluble Salts (Salinity)	<6.0	mmhos/cm
pH	6.5 - 8.0 May vary with plant species	units
Heavy Metals Content	PASS	PASS/FAIL: US EPA Class A standard, 40 CFR § 503.13, tables 1 and 3.
Pathogens		
Fecal coliform	PASS	PASS/FAIL: US EPA Class A standard, 40 CFR § 503.32(a) levels
Salmonella	PASS	PASS/FAIL: US EPA Class A standard, 40 CFR § 503.32(a) levels
Nutrient Content (provide analysis, including):		
Total Nitrogen (N)	≥0.9	%
Boron (Total B)	<80	ppm
Calcium (Ca)	For information only	%
Sodium (Na)	For information only	%
Magnesium (Mg)	For information only	%
Sulfur (S)	For information only	%

Soil/Compost and Gravel Specifications for Bioretention Facility

Gravel Layer

The gravel layer used in the bioretention facility must consist of *Class 2 Permeable Material* as specified in the State of California's Business, Transportation and Housing Agency, Department of Transportation; Standard Specifications 2010, manual (http://www.dot.ca.gov/hq/esc/oe/construction_contract_standards/std_specs/2010_StdSpecs/2010_StdSpecs.pdf).

The specific section, Subsurface Drains, Sec. 68, of the manual is used because it offers specific specifications for subsurface drains. In addition to the standardized permeable layer, a membrane layer of pea gravel or other intermediate-sized material is recommended at the top of the gravel layer to prevent fines from the soil/compost layer from moving downward into the gravel layer.

68-2.02F(1) General

Permeable material for use in backfilling trenches under, around, and over underdrains must consist of hard, durable, clean sand, gravel , or crushed stone and must be free from organic material, clay balls, or other deleterious substances.

Permeable material must have a durability index of not less than 40.

68-2.02F(3) Class 2 Permeable Material

The percentage composition by weight of Class 2 permeable material in place must comply with the grading requirements shown in the following table:

Class 2 Permeable Material Grading Requirements

Sieve sizes	Percentage passing
1"	100
3/4"	90–100
3/8"	40–100
No. 4	25–40
No. 8	18–33
No. 30	5–15
No. 50	0–7
No. 200	0–3

Class 2 permeable material must have a sand equivalent value of not less than 75.

Bioretention Facility Construction Checklist

Layout (to be confirmed prior to beginning excavation permit approval stage)

☐	Square footage of the facility meets or exceeds minimum shown in Stormwater Control Plan
☐	Site grading and grade breaks are consistent with the boundaries of the tributary Drainage Management Area(s) (DMAs) shown in the Stormwater Control Plan
☐	Inlet elevation of the facility is low enough to receive drainage from the entire tributary DMA
☐	locations and elevations of overland flow or piping, including roof leaders, from impervious areas to the facility have been laid out and any conflicts resolved
☐	Rim elevation of the facility is laid out to be level all the way around, or elevations are consistent with a detailed cross-section showing location and height of interior dams
☐	Locations for vaults, utility boxes, and light standards have been identified so that they will not conflict with the facility
☐	Facility is protected as needed from construction-phase runoff and sediment

Excavation (to be confirmed prior to backfilling or pipe installation)

☐	Excavation conducted with materials and techniques to minimize compaction of soils within the facility area
☐	Excavation is to accurate area and depth
☐	Slopes or side walls protect from sloughing of native soils into the facility
☐	Moisture barrier, if specified, has been added to protect adjacent pavement or structures.
☐	Native soils at bottom of excavation are ripped or loosened to promote infiltration

Overflow or Surface Connection to Storm Drainage (to be confirmed prior to backfilling with any materials)

☐	Grating excludes mulch and litter (beehive or atrium-style grates recommended)
☐	Overflow is connected to storm drain via appropriately sized
☐	No knockouts or side inlets are in overflow riser
☐	Overflow is at specified elevation
☐	Overflow location selected to minimize surface flow velocity (near, but offset from, inlet recommended)
☐	Grating excludes mulch and litter (beehive or atrium-style grates recommended)
☐	Overflow is connected to storm drain via appropriately sized

Bioretention Facility Construction Checklist

Underground connection to storm drain/outlet orifice

☐	Perforated pipe underdrain (PVC SDR 35 or approved equivalent) is installed with holes facing down
☐	Perforated pipe is connected to storm drain at specified elevation (typ. bottom of soil elevation)
☐	Cleanouts are in accessible locations and connected via sweep

Drain Rock/Subdrain (to be confirmed prior to installation of soil mix)

☐	Rock is installed as specified, 12" min. depth. Class 2 permeable, Caltrans specification 68-2.02F(3) recommended
☐	Rock is smoothed to a consistent top elevation. Depth and top elevation are as shown in plans
☐	Slopes or side walls protect from sloughing of native soils into the facility
☐	No filter fabric is placed between the subdrain and soil mix layers

Soil Mix

☐	Soil mix is as specified.
☐	Mix installed in lifts not exceeding 12"
☐	Mix is not compacted during installation but may be thoroughly wetted to encourage consolidation
☐	Mix is smoothed to a consistent top elevation. Depth of mix (18" min.) and top elevation are as shown in plans, accounting for depth of mulch to follow and required reservoir depth

Irrigation

☐	Irrigation system is installed so it can be controlled separately from other landscaped areas
☐	Smart irrigation controllers and drip emitters are recommended and may be required by local code or ordinance.
☐	Spray heads, if any, are positioned to avoid direct spray into outlet structures

Bioretention Facility Construction Checklist

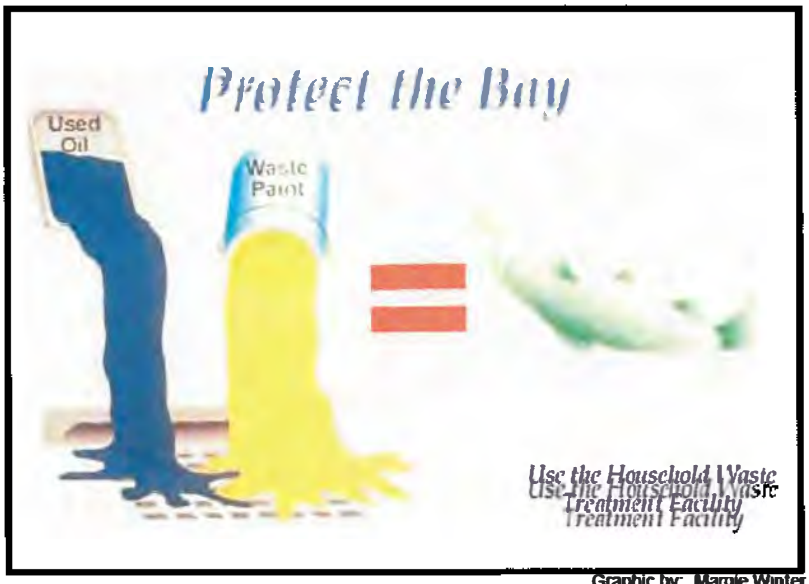
Planting

☐	Plants are installed consistent with approved planting plan, consistent with site water allowance
☐	Any trees and large shrubs are staked securely
☐	No fertilizer is added; compost tea may be used
☐	No native soil or clayey material are imported into the facility with plantings
☐	1"-2" mulch may be applied following planting; mulch selected to avoid floating
☐	Final elevation of soil mix maintained following planting
☐	Curb openings are free of obstructions

Final Engineering Inspection

☐	Drainage Management Area(s) are free of construction sediment and landscaped areas are stabilized
☐	Inlets are installed to provide smooth entry of runoff from adjoining pavement, have sufficient reveal (drop from the adjoining pavement to the top of the mulch or soil mix, and are not blocked
☐	Inflows from roof leaders and pipes are connected and operable
☐	Temporary flow diversions are removed
☐	Rock or other energy dissipation at piped or surface inlets is adequate
☐	Overflow outlets are configured to allow the facility to flood and fill to near rim before overflow
☐	Plantings are healthy and becoming established
☐	Irrigation is operable
☐	Facility drains rapidly; no surface ponding is evident
☐	Any accumulated construction debris, trash, or sediment is removed from facility
☐	Permanent signage is installed and is visible to site users and maintenance personnel

Non-Stormwater Discharges SC-10



Graphic by: Margie Winter

Objectives

- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

Sediment	☐
Nutrients	☐
Trash	☐
Metals	☐
Bacteria	☐
Oil and Grease	☐
Organics	☐
Oxygen Demanding	☐

Description

Non-stormwater discharges are those flows that do not consist entirely of stormwater. For municipalities non-stormwater discharges present themselves in two situations. One is from fixed facilities owned and/or operated by the municipality. The other situation is non-stormwater discharges that are discovered during the normal operation of a field program. Some non-stormwater discharges do not include pollutants and may be discharged to the storm drain. These include uncontaminated groundwater and natural springs. There are also some non-stormwater discharges that typically do not contain pollutants and may be discharged to the storm drain with conditions. These include car washing and surface cleaning. However, there are certain non-stormwater discharges that pose environmental concern. These discharges may originate from illegal dumping or from internal floor drains, appliances, industrial processes, sinks, and toilets that are connected to the nearby storm drainage system. These discharges (which may include: process waste waters, cooling waters, wash waters, and sanitary wastewater) can carry substances (such as paint, oil, fuel and other automotive fluids, chemicals and other pollutants) into storm drains. The ultimate goal is to effectively eliminate non-stormwater discharges to the stormwater drainage system through implementation of measures to detect, correct, and enforce against illicit connections and illegal discharges.

Approach

The municipality must address non-stormwater discharges from its fixed facilities by assessing the types of non-stormwater discharges and implementing BMPs for the discharges determined to pose environmental concern. For field programs

the field staff must be trained to now what to look for regarding non-stormwater discharges and the procedures to follow in investigating the detected discharges.

Suggested Protocols

Fixed Facility

General

- Post "No Dumping" signs with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Stencil storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Landscaping and beautification efforts of hot spots might also discourage future dumping, as well as provide open space and increase property values.
- Lighting or barriers may also be needed to discourage future dumping.

Illicit Connections

- Locate discharges from the fixed facility drainage system to the municipal storm drain system through review of "as-built" piping schematics.
- Use techniques such as smoke testing, dye testing and television camera inspection (as noted below) to verify physical connections.
- Isolate problem areas and plug illicit discharge points.

Visual Inspection and Inventory

- Inventory and inspect each discharge point during dry weather.
- Keep in mind that drainage from a storm event can continue for several days following the end of a storm and groundwater may infiltrate the underground stormwater collection system. Also, non-stormwater discharges are often intermittent and may require periodic inspections.

Review Infield Piping

- Review the "as-built" piping schematic as a way to determine if there are any connections to the stormwater collection system.
- Inspect the path of floor drains in older buildings.

Smoke Testing

- Smoke testing of wastewater and stormwater collection systems is used to detect connections between the two systems.

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- During dry weather the stormwater collection system is filled with smoke and then traced to sources. The appearance of smoke at the base of a toilet indicates that there may be a connection between the sanitary and the stormwater system.

Dye Testing

- A dye test can be performed by simply releasing a dye into either your sanitary or process wastewater system and examining the discharge points from the stormwater collection system for discoloration.

TV Inspection of Storm Sewer

- TV Cameras can be employed to visually identify illicit connections to the fixed facility storm drain system.

Illegal Dumping

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Clean up spills on paved surfaces with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.
- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- Use absorbent materials on small spills rather than hosing down the spill. Remove the absorbent materials promptly and dispose of properly.
- For larger spills, a private spill cleanup company or Hazmat team may be necessary.
- See fact sheet SC-11 Spill Prevention, Control, and Clean Up.

Field Program

General

- Develop clear protocols and lines of communication for effectively prohibiting non-stormwater discharges, especially ones that involve more than one jurisdiction and those that are not classified as hazardous, which are often not responded to as effectively as they need to be.
- Stencil storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- See SC-74 Stormwater Drainage System Maintenance for additional information.

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Field Inspection

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- During routine field program maintenance field staff should look for evidence of illegal discharges or illicit connection:
  - Is there evidence of spills such as paints, discoloring, etc.
  - Are there any odors associated with the drainage system
  - Record locations of apparent illegal discharges/illicit connections and notify appropriate investigating agency.
- If trained, conduct field investigation of non-stormwater discharges to determine whether they pose a threat to water quality.

Recommended Complaint Investigation Equipment

- Field Screening Analysis
  - pH paper or meter
  - Commercial stormwater pollutant screening kit that can detect for reactive phosphorus, nitrate nitrogen, ammonium nitrogen, specific conductance, and turbidity
  - Sample jars
  - Sample collection pole
  - A tool to remove access hole covers
- Laboratory Analysis
  - Sample cooler
  - Ice
  - Sample jars and labels
  - Chain of custody forms.
- Documentation
  - Camera
  - Notebook
  - Pens
  - Notice of Violation forms

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- Educational materials

Reporting

- A database is useful for defining and tracking the magnitude and location of the problem.
- Report prohibited non-stormwater discharges observed during the course of normal daily activities so they can be investigated, contained and cleaned up or eliminated.
- Document that non-stormwater discharges have been eliminated by recording tests performed, methods used, dates of testing, and any onsite drainage points observed.
- Maintain documentation of illicit connection and illegal dumping incidents, including significant conditionally exempt discharges that are not properly managed.

Enforcement

- Educate the responsible party if identified on the impacts of their actions, explain the stormwater requirements, and provide information regarding Best Management Practices (BMP), as appropriate. Initiate follow-up and/or enforcement procedures.
- If an illegal discharge is traced to a commercial, residential or industrial source, conduct the following activities or coordinate the following activities with the appropriate agency:
  - Contact the responsible party to discuss methods of eliminating the non-stormwater discharge, including disposal options, recycling, and possible discharge to the sanitary sewer (if within POTW limits).
  - Provide information regarding BMPs to the responsible party, where appropriate.
  - Begin enforcement procedures, if appropriate.
  - Continue inspection and follow-up activities until the illicit discharge activity has ceased.
- If an illegal discharge is traced to a commercial or industrial activity, coordinate information on the discharge with the jurisdiction's commercial and industrial facility inspection program.

Training

- Train technical staff to identify and document illegal dumping incidents.
- Well-trained employees can reduce human errors that lead to accidental releases or spills. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur. Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- Train employees to identify non-stormwater discharges and report them to the appropriate departments.
- Train staff who have the authority to conduct surveillance and inspections, and write citations for those caught illegally dumping.

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- Train municipal staff responsible for surveillance and inspection in the following:
  - OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).
  - OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and federal OSHA 29 CFR 1910.146).
  - Procedural training (field screening, sampling, smoke/dye testing, TV inspection).
- Educate the identified responsible party on the impacts of his or her actions.

Spill Response and Prevention

- See SC-11 Spill Prevention Control and Clean Up

Other Considerations

- The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal. The cost of fees for dumping at a proper waste disposal facility are often more than the fine for an illegal dumping offense, thereby discouraging people from complying with the law. The absence of routine or affordable pickup service for trash and recyclables in some communities also encourages illegal dumping. A lack of understanding regarding applicable laws or the inadequacy of existing laws may also contribute to the problem.
- Municipal codes should include sections prohibiting the discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.
- Many facilities do not have accurate, up-to-date schematic drawings.
- Can be difficult to locate illicit connections especially if there is groundwater infiltration.

Requirements

Costs

- Eliminating illicit connections can be expensive especially if structural modifications are required such re-plumbing cross connections under an existing slab.
- Minor cost to train field crews regarding the identification of non-stormwater discharges. The primary cost is for a fully integrated program to identify and eliminate illicit connections and illegal dumping. However, by combining with other municipal programs (i.e. pretreatment program) cost may be lowered.
- Municipal cost for containment and disposal may be borne by the discharger.

Maintenance

Not applicable

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Supplemental Information

Further Detail of the BMP

What constitutes a "non-stormwater" discharge?

- Non-stormwater discharges are discharges not made up entirely of stormwater and include water used directly in the manufacturing process (process wastewater), air conditioning condensate and coolant, non-contact cooling water, cooling equipment condensate, outdoor secondary containment water, vehicle and equipment wash water, landscape irrigation, sink and drinking fountain wastewater, sanitary wastes, or other wastewaters.

Permit Requirements

- Current municipal NPDES permits require municipalities to effectively prohibit non-stormwater discharges unless authorized by a separate NPDES permit or allowed in accordance with the current NPDES permit conditions. Typically the current permits allow certain non-stormwater discharges in the storm drain system as long as the discharges are not significant sources of pollutants. In this context the following non-stormwater discharges are typically allowed:
  - Diverted stream flows;
  - Rising found waters;
  - Uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20));
  - Uncontaminated pumped ground water;
  - Foundation drains;
  - Springs;
  - Water from crawl space pumps;
  - Footing drains;
  - Air conditioning condensation;
  - Flows from riparian habitats and wetlands;
  - Water line and hydrant flushing ;
  - Landscape irrigation;
  - Planned and unplanned discharges from potable water sources;
  - Irrigation water;
  - Individual residential car washing; and
  - Lawn watering.

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SC-10 Non-Stormwater Discharges

Municipal facilities subject to industrial general permit requirements must include a certification that the stormwater collection system has been tested or evaluated for the presence of non-stormwater discharges. The state's General Industrial Stormwater Permit requires that non-stormwater discharges be eliminated prior to implementation of the facility's SWPPP.

Illegal Dumping

- **Establish a system for tracking** incidents. The system should be **designed to identify the following:**
  - **Illegal dumping hot spots**
  - **Types and quantities** (in some cases) of wastes
  - **Patterns in time of occurrence** (time of day/night, month, or year)
  - **Mode of dumping** (abandoned containers, "midnight dumping" from moving vehicles, **direct dumping of materials, accidents/spills**)
  - **Responsible parties**

Outreach

One of the keys to success of reducing or eliminating illegal dumping is increasing the number of people on the street who are aware of the problem and who have the tools to at least identify the incident, if not correct it. There we a number of ways of accomplishing this:

- **Train municipal staff from all departments (public works, utilities, street cleaning, parks and recreation, industrial waste inspection, hazardous waste inspection, sewer maintenance) to recognize and report the incidents.**
- **Deputize municipal staff who may come into contact with illegal dumping with the authority to write illegal dumping tickets for offenders caught in the act (see below).**
- **Educate the public. As many as 3 out of 4 people do not understand that in most communities the storm drain does not go to the wastewater treatment plant. Unfortunately, with the heavy emphasis in recent years on public education about solid waste management, including recycling and household hazardous waste, the sewer system (both storm and sanitary) has been the likely recipient of cross-media transfers of waste.**
- **Provide the public with a mechanism for reporting incidents such as a hot line and/or door hanger (see below).**
- **Help areas where incidents occur more frequently set up environmental watch programs (like crime watch programs).**
- **Train volunteers to notice and report the presence and suspected source of an observed pollutant to the appropriate public agency.**

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What constitutes a "non-stormwater" discharge?

- Non-stormwater discharges are discharges not made up entirely of stormwater and include water used directly in the manufacturing process (process wastewater), air conditioning condensate and coolant, non-contact cooling water, cooling equipment condensate, outdoor secondary containment water, vehicle and equipment wash water, landscape irrigation, sink and drinking fountain wastewater, sanitary wastes, or other wastewaters.

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  - Diverted stream flows;
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  - Uncontaminated pumped ground water;
  - Foundation drains;
  - Springs;
  - Water from crawl space pumps;
  - Footing drains;
  - Air conditioning condensation;
  - Flows from riparian habitats and wetlands;
  - Water line and hydrant flushing ;
  - Landscape irrigation;
  - Planned and unplanned discharges from potable water sources;
  - Irrigation water;
  - Individual residential car washing; and
  - Lawn watering.

Municipal facilities subject to industrial general permit requirements must include a certification that the stormwater collection system has been tested or evaluated for the presence

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of non-stormwater discharges. The state's General Industrial Stormwater Permit requires that non-stormwater discharges be eliminated prior to implementation of the facility's SWPPP.

Storm Drain Stenciling

- Stencil storm drain inlets with a message to prohibit illegal dumpings, especially in areas with waste handling facilities.
- Encourage public reporting of improper waste disposal by a HOTLINE number stenciled onto the storm drain inlet.
- See Supplemental Information section of this fact sheet for further detail on stenciling program approach.

Oil Recycling

- Contract collection and hauling of used oil to a private licensed used oil hauler/recycler.
- Comply with all applicable state and federal regulations regarding storage, handling, and transport of petroleum products.
- Create procedures for collection such as; collection locations and schedule, acceptable containers, and maximum amounts accepted.
- The California Integrated Waste Management Board has a Recycling Hotline, (800) 553-2962, that provides information and recycling locations for used oil.

Household Hazardous Waste

- Provide household hazardous waste (HHW) collection facilities. Several types of collection approaches are available including permanent, periodic, or mobile centers, curbside collection, or a combination of these systems.

Training

- Train municipal employees and contractors in proper and consistent methods for waste disposal.
- Train municipal employees to recognize and report illegal dumping.
- Train employees and subcontractors in proper hazardous waste management.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

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Other Considerations

- Federal Regulations (RCRA, SARA, CERCLA) and state regulations exist regarding the disposal of hazardous waste.
- Municipalities are required to have a used oil recycling element and a HHW element within their integrated waste management plan.
- Significant liability issues are involved with the collection, handling, and disposal of HHW.

Examples

The City of Palo Alto has developed a public participation program for reporting dumping violations. When a concerned citizen or public employee encounters evidence of illegal dumping, a door hanger (similar in format to hotel "Do Not Disturb" signs) is placed on the front doors in the neighborhood. The door hanger notes that a violation has occurred in the neighborhood, informs the reader why illegal dumping is a problem, and notes that illegal dumping carries a significant financial penalty. Information is also provided on what citizens can do as well as contact numbers for more information or to report a violation.

The Port of Long Beach has a state of the art database incorporating storm drain infrastructure, potential pollutant sources, facility management practices, and a pollutant tracking system.

The State Department of Fish and Game has a hotline for reporting violations called CalTIP (1-800-952-5400). The phone number may be used to report any violation of a Fish and Game code (illegal dumping, poaching, etc.).

The California Department of Toxic Substances Control's Waste Alert Hotline, 1-800-69TOXIC, can be used to report hazardous waste violations.

References and Resources

http://www.stormwatercenter.net/

California's Nonpoint Source Program Plan http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Stormwater Pollution Control Manual - http://dnr.metrokc.gov/wlr/dss/spcm.htm

Orange County Stormwater Program, http://www.ocwatersheds.com/stormwater/swp_introduction.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (http://www.projectcleanwater.org)

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp-w2k.com/pdf%20documents/PS_ICID.PDF

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Outdoor Loading/Unloading SC-30



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

The loading/unloading of materials usually takes place outside on docks or terminals; therefore, materials spilled, leaked, or lost during loading/unloading may collect in the soil or on other surfaces and have the potential to be carried away by stormwater runoff or when the area is cleaned. Additionally, rainfall may wash pollutants from machinery used to unload or move materials. Loading and unloading of material may include package products, barrels, and bulk products. Implementation of the following protocols will prevent or reduce the discharge of pollutants to stormwater from outdoor loading/unloading of materials.

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Approach

Pollution Prevention

- Keep accurate maintenance logs to evaluate materials removed and improvements made.
- Park tank trucks or delivery vehicles in designated areas so that spills or leaks can be contained.
- Limit exposure of materials with the potential to contaminate stormwater.
- Prevent stormwater runon.
- Regularly check equipment for leaks.

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Suggested Protocols

Loading and Unloading – General Guidelines

- Develop an operations plan that describes procedures for loading and/or unloading.
- Do not conduct loading and unloading during wet weather, whenever possible.
- Cover designated loading/unloading areas to reduce exposure of materials to rain.
- A seal or door skirt between delivery vehicles and building can reduce or prevent exposure to rain.
- Design loading/unloading area to prevent stormwater runon which would include grading or berming the area, and positioning roof downspouts so they direct stormwater away from the loading/unloading areas.
- If feasible, load and unload all materials and equipment in covered areas such as building overhangs at loading docks.
- Load/unload only at designated loading areas.
- Use drip pans underneath hose and pipe connections and other leak-prone spots during liquid transfer operations, and when making and breaking connections. Several drip pans should be stored in a covered location near the liquid transfer area so that they are always available, yet protected from precipitation when not in use. Drip pans can be made specifically for railroad tracks. Drip pans must be cleaned periodically, and drip collected materials must be disposed of properly.
- Pave loading areas with concrete instead of asphalt.
- Avoid placing storm drains in the area.
- Grade and/or berm he loading/ unloading area to a drain that is connected to a dead-end sump.

Inspection

- Check loading and unloading equipment regularly for leaks, including valves, pumps, flanges and connections.
- Look for dust or fumes during loading or unloading operations.

Training

- Train employees (e.g. fork lift operators) and contractors on proper spill containment and cleanup.
- Employees trained in spill containment and cleanup should be present during the loading/unloading.
- Train employees in proper handling techniques during liquid transfers to avoid spills.

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- Make sure forklift operators are properly trained on loading and unloading procedures.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup
- Keep your spill prevention Control and countermeasure (SPCC) Plan up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- Space, material characteristics and/or time limitations may preclude all transfers from being performed indoors or under cover.

Requirements

Costs

- Should be low except when covering a large loading/unloading area.

Maintenance

- Conduct regular inspections and make repairs as necessary. The frequency of repairs will depend on the age of the facility.
- Check loading and unloading equipment regularly for leaks.
- Regular broom dry-sweeping of area.
- Conduct major clean-out of loading and unloading area and sump prior to October 1 of each year.

Supplemental Information

Further Detail of the BMP

Special Circumstances for Indoor Loading/Unloading of Materials

As appropriate loading or unloading of liquids should occur indoors so that any spills that are not completely retained can be discharged to the sanitary sewer, treatment plant, or treated in a manner consistent with local sewer authorities and permit requirements.

- For loading and unloading tank trucks to above and below ground storage tanks, the following procedures should be used:
  - The area where the transfer takes place should be paved. If the liquid is reactive with the asphalt, Portland cement should be used to pave the area.
  - Transfer area should be designed to prevent runon of stormwater from adjacent areas. Sloping the pad and using a curb, like a speed bump, around the uphill side of the transfer area should reduce run-on.

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- Transfer area should be designed to prevent runoff of spilled liquids from the area. Sloping the area to a drain should prevent runoff. The drain should be connected to a dead-end sump or to the sanitary sewer (if allowed). A positive control valve should be installed on the drain.

- For transfer from rail cars to storage tanks that must occur outside, use the following procedures:
  - Drip pans should be placed at locations where spillage may occur, such as hose connections, hose reels, and filler nozzles, Use drip pans when making and breaking connections.
  - Drip pan systems should be installed between the rails to collect spillage from tank cars.

References and Resources

http://www.stormwatercenter.net/

King County - ftp://dnr.metrokc.gov/wlr/dss/spcm/Chapter%203.PDF

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) -
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

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Outdoor Container Storage SC-31



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

Accidental releases of materials from above ground liquid storage tanks, drums, and dumpsters present the potential for contaminating stormwaters with many different pollutants. Tanks may store many potential stormwater runoff pollutants, such as gasoline, aviation gas, diesel fuel, ammonia, solvents, syrups, etc. Materials spilled, leaked, or lost from storage tanks may accumulate in soils or on other surfaces and be carried away by rainfall runoff. These source controls apply to containers located outside of a building used to temporarily store liquid materials and include installing safeguards against accidental releases, installing secondary containment, conducting regular inspections, and training employees in standard operating procedures and spill cleanup techniques.

Targeted Constituents

Sediment	
Nutrients	☑
Trash	
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Approach

Pollution Prevention

- Educate employees about pollution prevention measures and goals.
- Keep an accurate, up-to-date inventory of the materials delivered and stored on-site. Re-evaluate inventory needs and consider purchasing alternative products. Properly dispose of outdated products.
- Try to keep chemicals in their original containers, and keep them well labeled.

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Suggested Protocols

General

- Develop an operations plan that describes procedures for loading and/or unloading. Refer to SC-30 Outdoor Loading/Unloading for more detailed BMP information pertaining to loading and unloading of liquids.
- Protect materials from rainfall, runon, runoff, and wind dispersal:
  - Cover the storage area with a roof.
  - Minimize stormwater runon by enclosing the area or building a berm around it.
  - Use a "doghouse" structure for storage of liquid containers.
  - Use covered dumpsters for waste product containers.
- Employ safeguards against accidental releases:
  - Provide overflow protection devices to warn operator or automatic shut down transfer pumps.
  - Provide protection guards (bollards) around tanks and piping to prevent vehicle or forklift damage, and
  - Provide clear tagging or labeling, and restricting access to valves to reduce human error.
- Berm or surround tank or container with secondary containment system using dikes, liners, vaults, or double walled tanks.
- Contact the appropriate regulatory agency regarding environmental compliance for facilities with "spill ponds" designed to intercept, treat, and/or divert spills.
- Have registered and specifically trained professional engineers can identify and correct potential problems such as loose fittings, poor welding, and improper or poorly fitted gaskets for newly installed tank systems.

Storage Areas

- Provide storage tank piping located below product level with a shut-off valve at the tank; ideally this valve should be an automatic shear valve with the shut-off located inside the tank.
- Provide barriers such as posts or guard rails, where tanks are exposed, to prevent collision damage with vehicles.
- Provide secure storage to prevent vandalism.
- Place tight-fitting lids on all containers.
- Enclose or cover the containers where they are stored.

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- Raise the containers off the ground by use of pallet or similar method, with provisions for spill control and secondary containment.
- Contain the material in such a manner that if the container leaks or spills, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters or groundwater.
- Place drip pans or absorbent materials beneath all mounted container taps, and at all potential drip and spill locations during filling and unloading of containers. Drip pans must be cleaned periodically, and all collected liquids and soiled absorbent materials must be reused/recycled or properly disposed.
- Ensure that any underground or aboveground storage tanks shall be designed and managed in accordance with applicable regulations, be identified as a potential pollution source, have secondary containment, such as a berm or dike with an impervious surface.
- Rainfall collected in secondary containment system must not contain pollutants for discharge to storm drain system.

Container Management

- Keep containers in good condition without corrosion or leaky seams.
- Place containers in a lean-to structure or otherwise covered to keep rainfall from reaching the drums.
- Replace containers if they are deteriorating to the point where leakage is occurring. Keep all containers undercover to prevent the entry of stormwater. Employees should be made aware of the importance of keeping the containers free from leaks.
- Keep waste container drums in an area such as a service bay. Drums stored outside must be stored in a lean-to type structure, shed or walk-in container.

Storage of Hazardous Materials

- Storage of reactive, ignitable, or flammable liquids must comply with the fire and hazardous waste codes.
- Place containers in a designated area that is paved, free of cracks and gaps, and impervious in order to contain leaks and spills. The area should also be covered.
- Surround stored hazardous materials and waste with a curb or dike to provide the volume to contain 10 percent of the volume of all of the containers or 110 percent of the volume of the largest container, whichever is greater. The area inside the curb should slope to a drain and a dead-end sump should be installed in the drain.

Inspection

- Provide regular inspections:
  - Inspect storage areas regularly for leaks or spills.

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- Conduct routine inspections and check for external corrosion of material containers. Also check for structural failure, spills and overfills due to operator error, failure of piping system.
- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.
- Visually inspect new tank or container installations for loose fittings, poor welding, and improper or poorly fitted gaskets.
- Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Replace containers that are leaking, corroded, or otherwise deteriorating with ones in good condition. If the liquid chemicals are corrosive, containers made of compatible materials must be used instead of metal drums.
- Label new or secondary containers with the product name and hazards.

Training

- Train employees (e.g. fork lift operators) and contractors in proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.
- Train employees in proper storage measures.
- Use a training log or similar method to document training.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date, and implement accordingly.
- Have an emergency plan, equipment and trained personnel ready at all times to deal immediately with major spills.
- Collect all spilled liquids and properly dispose of them.
- Employees trained in emergency spill cleanup procedures should be present when dangerous waste, liquid chemicals, or other wastes are delivered.
- Operator errors can be prevented by using engineering safe guards and thus reducing accidental releases of pollutant.
- Store and maintain appropriate spill cleanup materials in a location known to all near the tank storage area.
- See Aboveground Tank Leak and Spill Control section of the Spill Prevention, Control & Cleanup fact sheet (SC-11) for additional information.

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Other Considerations

- Storage sheds often must meet building and fire code requirements.
- The local fire district must be consulted for limitations on clearance of roof covers over containers used to store flammable materials.
- All specific standards set by federal and state laws concerning the storage of oil and hazardous materials must be met.
- Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code.
- Storage of oil and hazardous materials must meet specific federal and state standards including:
  - Spill Prevention Control and Countermeasure Plan (SPCC) Plan
  - Secondary containment
  - Integrity and leak detection monitoring
  - Emergency preparedness plans

Requirements

Costs

- Will vary depending on the size of the facility and the necessary controls, such as berms or safeguards against accidental controls.

Maintenance

- Conduct weekly inspection.
- Sweep and clean the storage area regularly if it is paved, do not hose down the area to a storm drain.

Supplemental Information

- The most common causes of unintentional releases are:
  - Installation problems,
  - Failure of piping systems (pipes, pumps, flanges, couplings, hoses, and valves),
  - External corrosion and structural failure,
  - Spills and overfills due to operator error, and
  - Leaks during pumping of liquids or gases from truck or rail car to a storage tank or vice versa

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Further Detail of the BMP

Dikes

One of the best protective measures against contamination of stormwater is diking. Containment dikes are berms or retaining walls that are designed to hold spills. Diking is an effective pollution prevention measure for above ground storage tanks and railcar or tank truck loading and unloading areas. The dike surrounds the area of concern and holds the spill, keeping spill materials separated from the stormwater side of the dike area. Diking can be used in any industrial or municipal facility, but it is most commonly used for controlling large spills or releases from liquid storage areas and liquid transfer areas.

- For single-wall tanks, containment dikes should be large enough to hold the contents of the storage tank for the facility plus rain water.
- For trucks, diked areas should be capable of holding an amount equal to the volume of the tank truck compartment. Diked construction material should be strong enough to safely hold spilled materials.
- Dike materials can consist of earth, concrete, synthetic materials, metal, or other impervious materials.
- Strong acids or bases may react with metal containers, concrete, and some plastics.
- Where strong acids or bases or stored, alternative dike materials should be considered. More active organic chemicals may need certain special liners for dikes.
- Dikes may also be designed with impermeable materials to increase containment capabilities.
- Dikes should be inspected during or after significant storms or spills to check for washouts or overflows.
- Regular checks of containment dikes to insure the dikes are capable of holding spills should be conducted.
- Inability of a structure to retain stormwater, dike erosion, soggy areas, or changes in vegetation indicate problems with dike structures. Damaged areas should be patched and stabilized immediately.
- Accumulated stormwater in the containment are should be analyzed for pollutants before it is released to surface waters. If pollutants are found or if stormwater quality is not determined, then methods other than discharging to surface waters should be employed (e.g., discharge to sanitary sewer if allowed).
- Earthen dikes may require special maintenance of vegetation such as mulching and irrigation.

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Curbing

Curbing is a barrier that surrounds an area of concern. Curbing is similar to containment diking in the way that it prevents spills and leaks from being released into the environment. The curbing is usually small scaled and does not contain large spills like diking. Curbing is common at many facilities in small areas where handling and transfer liquid materials occur. Curbing can redirect stormwater away from the storage area. It is useful in areas where liquid materials are transferred from one container to another. Asphalt is a common material used for curbing; however, curbing materials include earth, concrete, synthetic materials, metal, or other impenetrable materials.

- Spilled materials should be removed immediately from curbed areas to allow space for future spills.
- Curbs should have manually-controlled pump systems rather than common drainage systems for collection of spilled materials.
- The curbed area should be inspected regularly to clear clogging debris.
- Maintenance should also be conducted frequently to prevent overflow of any spilled materials as curbed areas are designed only for smaller spills.
- Curbing has the following advantages:
  - Excellent runon control,
  - Inexpensive,
  - Ease of installment,
  - Provides option to recycle materials spilled in curb areas, and
  - Common industry practice.

Examples

The "doghouse" design has been used to store small liquid containers. The roof and flooring design prevent contact with direct rain or runoff. The doghouse has two solid structural walls and two canvas covered walls. The flooring is wire mesh about secondary containment. The unit has been used successfully at Lockheed Missile and Space Company in Sunnyvale.

The "doghouse" design has been used to store small liquid containers. The roof and flooring design prevent contact with direct rain or runoff. The doghouse has two solid structural walls and two canvas covered walls. The flooring is wire mesh about secondary containment. The unit has been used successfully at Lockheed Missile and Space Company in Sunnyvale.

References and Resources

British Columbia Lake Stewardship Society. Best Management Practices to Protect Water Quality from Non-Point Source Pollution. March 2000 http://www.nalms.org/bclss/storage.html

King County Stormwater Pollution Control Manual – http://dnr.metrokc.gov/wlr/dss/spcm.htm

British Columbia Lake Stewardship Society. Best Management Practices to Protect Water Quality from Non-Point Source Pollution. March 2000 http://www.nalms.org/bclss/storage.html

King County Stormwater Pollution Control Manual – http://dnr.metrokc.gov/wlr/dss/spcm.htm

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San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) - http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

Waste Handling & Disposal SC-34



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

Improper storage and handling of solid wastes can allow toxic compounds, oils and greases, heavy metals, nutrients, suspended solids, and other pollutants to enter stormwater runoff. The discharge of pollutants to stormwater from waste handling and disposal can be prevented and reduced by tracking waste generation, storage, and disposal; reducing waste generation and disposal through source reduction, re-use, and recycling; and preventing runon and runoff.

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Approach

Pollution Prevention

- Reduction in the amount of waste generated can be accomplished using the following source controls such as:
  - Production planning and sequencing
  - Process or equipment modification
  - Raw material substitution or elimination
  - Loss prevention and housekeeping
  - Waste segregation and separation
  - Close loop recycling
- Establish a material tracking system to increase awareness about material usage. This may reduce spills and minimize contamination, thus reducing the amount of waste produced.
- Recycle materials whenever possible.

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Suggested Protocols

General

- Cover storage containers with leak proof lids or some other means. If waste is not in containers, cover all waste piles (plastic tarps are acceptable coverage) and prevent stormwater runon and runoff with a berm. The waste containers or piles must be covered except when in use.
- Use drip pans or absorbent materials whenever grease containers are emptied by vacuum trucks or other means. Grease cannot be left on the ground. Collected grease must be properly disposed of as garbage.
- Check storage containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.
- Sweep and clean the storage area regularly. If it is paved, do not hose down the area to a storm drain.
- Dispose of rinse and wash water from cleaning waste containers into a sanitary sewer iff allowed by the local sewer authority. Do not discharge wash water to the street or storm drain.
- Transfer waste from damaged containers into safe containers.
- Take special care when loading or unloading wastes to minimize losses. Loading systems can be used to minimize spills and fugitive emission losses such as dust or mist. Vacuum transfer systems can minimize waste loss.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.
- Provide a sufficient number of litter receptacles for the facility.
- Clean out and cover litter receptacles frequently to prevent spillage.

Waste Collection

- Keep waste collection areas clean.
- Inspect solid waste containers for structural damage or leaks regularly. Repair or replace damaged containers as necessary.
- Secure solid waste containers; containers must be closed tightly when not in use.
- Place waste containers under cover if possible.
- Do not fill waste containers with washout water or any other liquid.
- Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, pesticides, etc. may not be

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disposed of in solid waste containers (see chemical/ hazardous waste collection section below).

- Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal.

Good Housekeeping

- Use all of the product before disposing of the container.
- Keep the waste management area clean at all times by sweeping and cleaning up spills immediately.
- Use dry methods when possible (e.g. sweeping, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.
- Stencil storm drains on the facility's property with prohibitive message regarding waste disposal.

Chemical/Hazardous Wastes

- Select designated hazardous waste collection areas on-site.
- Store hazardous materials and wastes in covered containers protected from vandalism, and in compliance with fire and hazardous waste codes.
- Place hazardous waste containers in secondary containment.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.

Runon/Runoff Prevention

- Prevent stormwater runon from entering the waste management area by enclosing the area or building a berm around the area.
- Prevent the waste materials from directly contacting rain.
- Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropylene or hypalon.
- Cover the area with a permanent roof if feasible.
- Cover dumpsters to prevent rain from washing waste out of holes or cracks in the bottom of the dumpster.
- Move the activity indoor after ensuring all safety concerns such as fire hazard and ventilation are addressed.

Inspection

- Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.
- Check waste management areas for leaking containers or spills.
- Repair leaking equipment including valves, lines, seals, or pumps promptly.

Training

- Train staff pollution prevention measures and proper disposal methods.
- Train employees and contractors proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.
- Train employees and subcontractors in proper hazardous waste management.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup.
- Keep your Spill Prevention Control and countermeasure (SPCC) plan up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.
- Vehicles transporting waste should have spill prevention equipment that can prevent spills during transport. The spill prevention equipment includes:
  - Vehicles equipped with baffles for liquid waste
  - Trucks with sealed gates and spill guards for solid waste

Other Considerations

- Hazardous waste cannot be re-used or recycled; it must be disposed of by a licensed hazardous waste hauler.

Requirements

Costs

- Capital and operation and maintenance costs will vary substantially depending on the size of the facility and the types of waste handled. Costs should be low if there is an inventory program in place.

Maintenance

- None except for maintaining equipment for material tracking program.

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Supplemental Information

Further Detail of the BMP

Land Treatment System

- Minimize the runoff of polluted stormwater from land application of municipal waste on-site by:
  - Choosing a site where slopes are under 6%, the soil is permeable, there is a low water table, it is located away from wetlands or marshes, there is a closed drainage system.
  - Avoiding application of waste to the site when it is raining or when the ground is saturated with water.
  - Growing vegetation on land disposal areas to stabilize soils and reduce the volume of surface water runoff from the site.
  - Maintaining adequate barriers between the land application site and the receiving waters. Planted strips are particularly good.
  - Using erosion control techniques such as mulching and matting, filter fences, straw bales, diversion terracing, and sediment basins.
  - Performing routine maintenance to ensure the erosion control or site stabilization measures are working.

References and Resources

King County Stormwater Pollution Control Manual - http://dnr.metrokc.gov/wlr/dss/spcm.htm

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Associations (BASMAA). On-line: http://www.basmaa.org

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Building & Grounds Maintenance SC-41



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Description

Stormwater runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals, and abnormal pH. Utilizing the following protocols will prevent or reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

Approach

Pollution Prevention

- Switch to non-toxic chemicals for maintenance when possible.
- Choose cleaning agents that can be recycled.
- Encourage proper lawn management and landscaping, including use of native vegetation.
- Encourage use of Integrated Pest Management techniques for pest control.
- Encourage proper onsite recycling of yard trimmings.
- Recycle residual paints, solvents, lumber, and other material as much as possible.

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Suggested Protocols

Pressure Washing of Buildings, Rooftops, and Other Large Objects

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a waste water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.
- If soaps or detergents are not used, and the surrounding area is paved, wash water runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in he catch basin to trap the particles in wash water runoff.
- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement. Ensure that this practice does not kill grass.

Landscaping Activities

- Do not apply any chemicals (insecticide, herbicide, or fertilizer) directly to surface waters, unless the application is approved and permitted by the state.
- Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures on exposed soils.
- Check irrigation schedules so pesticides will not be washed away and to minimize non-stormwater discharge.

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.
- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.
- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.
- Clean paint brushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.

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- Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and solids must be collected and disposed of before removing the containment device(s) at the end of the work day.
- If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. In which case you should direct the water through hay bales and filter fabric or use other sediment filters or traps.
- Store toxic material under cover with secondary containment during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

Mowing, Trimming, and Planting

- Dispose of leaves, sticks, or other collected vegetation as garbage, by composting or at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures when soils are exposed.
- Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- Consider an alternative approach when bailing out muddy water; do not put it in the storm drain, pour over landscaped areas.
- Use hand or mechanical weeding where practical.

Fertilizer and Pesticide Management

- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.
- Follow manufacturers' recommendations and label directions. Pesticides must never be applied if precipitation is occuring or predicted. Do not apply insecticides within 100 feet of surface waters such as lakes, ponds, wetlands, and streams.
- Use less toxic pesticides that will do the job, whenever possible. Avoid use of copper-based pesticides if possible.
- Do not use pesticides if rain is expected.
- Do not mix or prepare pesticides for application near storm drains.
- Use the minimum amount needed for the job.
- Calibrate fertilizer distributors to avoid excessive application.
- Employ techniques to minimize off-target application (e.g. spray drift) of pesticides, including consideration of alternative application techniques.

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- Apply pesticides only when wind speeds are low.
- Work fertilizers into the soil rather than dumping or broadcasting them onto the surface.
- Irrigate slowly to prevent runoff and then only as much as is needed.
- Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Dispose of empty pesticide containers according to the instructions on the container label.
- Use up the pesticides. Rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Implement storage requirements for pesticide products with guidance from the local fire department and County Agricultural Commissioner. Provide secondary containment for pesticides.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering, and repair leaks in the irrigation system as soon as they are observed.

Training

- Educate and train employees on use of pesticides and in pesticide application techniques to prevent pollution.
- Train employees and contractors in proper techniques for spill containment and cleanup.
- Be sure the frequency of training takes into account the complexity of the operations and the nature of the staff.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup
- Keep your Spill Prevention Control and countermeasure (SPCC) plan up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- Alternative pest/weed controls may not be available, suitable, or effective in many cases.

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Requirements

Costs

- Overall costs should be low in comparison to other BMPs.

Maintenance

- Sweep paved areas regularly to collect loose particles, and wipe up spills with rags and other absorbent material immediately, do not hose down the area to a storm drain.

Supplemental Information

Further Detail of the BMP

Fire Sprinkler Line Flushing

Building fire sprinkler line flushing may be a source of non-stormwater runoff pollution. The water entering the system is usually potable water though in some areas it may be non-potable reclaimed wastewater. There are subsequent factors that may drastically reduce the quality of the water in such systems. Black iron pipe is usually used since it is cheaper than potable piping but it is subject to rusting and results in lower quality water. Initially the black iron pipe has an oil coating to protect it from rusting between manufacture and installation; this will contaminate the water from the first flush but not from subsequent flushes. Nitrates, polyphosphates and other corrosion inhibitors, as well as fire suppressants and antifreeze may be added to the sprinkler water system. Water generally remains in the sprinkler system a long time, typically a year, between flushes and may accumulate iron, manganese, lead, copper, nickel and zinc. The water generally becomes anoxic and contains living and dead bacteria and breakdown products from chlorination. This may result in a significant BOD problem and the water often smells. Consequently dispose fire sprinkler line flush water into the sanitary sewer. Do not allow discharge to storm drain or infiltration due to potential high levels of pollutants in fire sprinkler line water.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

King County - ftp://dnr.metrokc.gov/wlr/dss/spcm/Chapter%20a.PDF

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Mobile Cleaners Pilot Program: Final Report. 1997. Bay Area Stormwater Management Agencies Association (BASMAA) http://www.basmaa.org/

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA) http://www.basmaa.org/

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) - http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

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Rooftop and Impervious Area Disconnection (Self-retaining areas)

Description
Disconnection of rooftop and impervious areas from the storm drain system helps reduce runoff and provide pollutant removal as the re-directed water travels over and through vegetation and soil instead of being directly piped and discharged into the storm drain. Roof runoff is directed to spread over a vegetated area (self-retaining area) or is directed into vegetated area that drains to the MS4 system (self-treating areas) or to bioretention facilities.

The following are examples of ways to implement rooftop disconnection:

Splash Block
Splash blocks reduce the velocity and impact of water exiting the roof downspout and direct water to a pervious area (self-retaining area).

Pop-up Drainage Emitter
Pop-up drainage emitters are useful in conveying storm water from roof downspouts into vegetated areas. Roof runoff is piped then released through a capped device that opens with water pressure, allowing the storm water to flow out of the emitter and into the vegetated area.



Confirm that the following conditions have been met when using Self-Retaining Areas as a Source Control Measure:

On Site Plan Show:

- ☐ Delineate the impervious DMA from where the runoff will be coming from
- ☐ Delineate the pervious area where the runoff will be directed to (self-retaini ng area)
- ☐ Show how the runoff will be directed to the (self-retaining area)

Confirm that the following specifications will be met:

- ☐ Tributary area (impervious area) does not exceed more than twice the Self-retaining Area)
- ☐ Roof areas collect runoff and route to the self-retaining area
- ☐ Paved areas are slope to direct runoff to self-retaining area
- ☐ Runoff is dispersed across the self-retaining area (splash block or pop-up emitter)
- ☐ Self-retaining area has vegetation soils meeting the requirements above
- ☐ Drain inlets, if present, are at least 3-inches above surrounding grade (provides for the retent ion of the 85th percentile – 24-hr storm event (approx.. 1-inch)
- ☐ Type A/B soils are present or native soils have been amended to increase infiltration rates
- ☐ Self-retaining area are basin-like shaped depressions with a maximum slope of 25%

Please utilize the Lake County Storm Water Control Plan Worksheets to tabulate the runoff reduction that can be achieved using this BMP. This checklist must be included with the SCP worksheet if used as a site design measure.

Tree Plantings/Preservation



Trees intercept rain water on their leaves and branches, allowing rain water to evaporate or run down the branches and trunk of the tree where it readily infiltrates into the soil. Trees also provide shade over impervious surfaces which reduces peak flow in streams and provides shade, which reduces the "heat island" effects of urban areas.

Technique

The number and species of trees planted or preserved on a project is used in reducing the amount of tributary area that must be accounted for when calculating treatment and volume capture stormwater facilities (self-retaining, rain barrels, and bioretention). The total tributary area reduction is limited to 50% of the total tributary area. Only trees that overhang impervious areas or are within 25 ft of impervious areas can qualify for the tree credits. The following tree credits can apply:

- New deciduous trees provide a tributary area reduction credit of 100 ft²
- New evergreen trees provide a tributary area reduction credit of 200 ft²
- Existing trees provide a tributary area reduction credit equal to half of the existing tree canopy area – existing trees must be adequately protected during construction

At a minimum inspection and maintenance shall include the following:

- Annual inspection prior to the rainy season.
- Annual proper watering and application of mulch.
- Routine pruning and weeding as needed.
- Replacement of trees as needed.

Please utilize the Lake County Strom Water Plan Worksheets for assistance with calculating the runoff reduction with this BMP. Below are the runoff reduction rates per Tree.

Evergreen	100 square feet
Deciduous	200 square feet

Planter Box

An above-ground planter box is similar to a bioretention facility except that infiltration into native soils is prohibited by a barrier. Planter Boxes may be appropriate if the site lacks level landscaped areas or appropriate soils.



The standard size Flow-through Planter box is 2X2X4 (pictured below), In the picture to the right a standard sized galvanized water trough is used as the flow through planter box. It can treat about 200 square feet of impervious surface.



Show the following on your site plan:

- ☐ Impervious area tributary to the planter box
- ☐ Location and dimensions of planter box

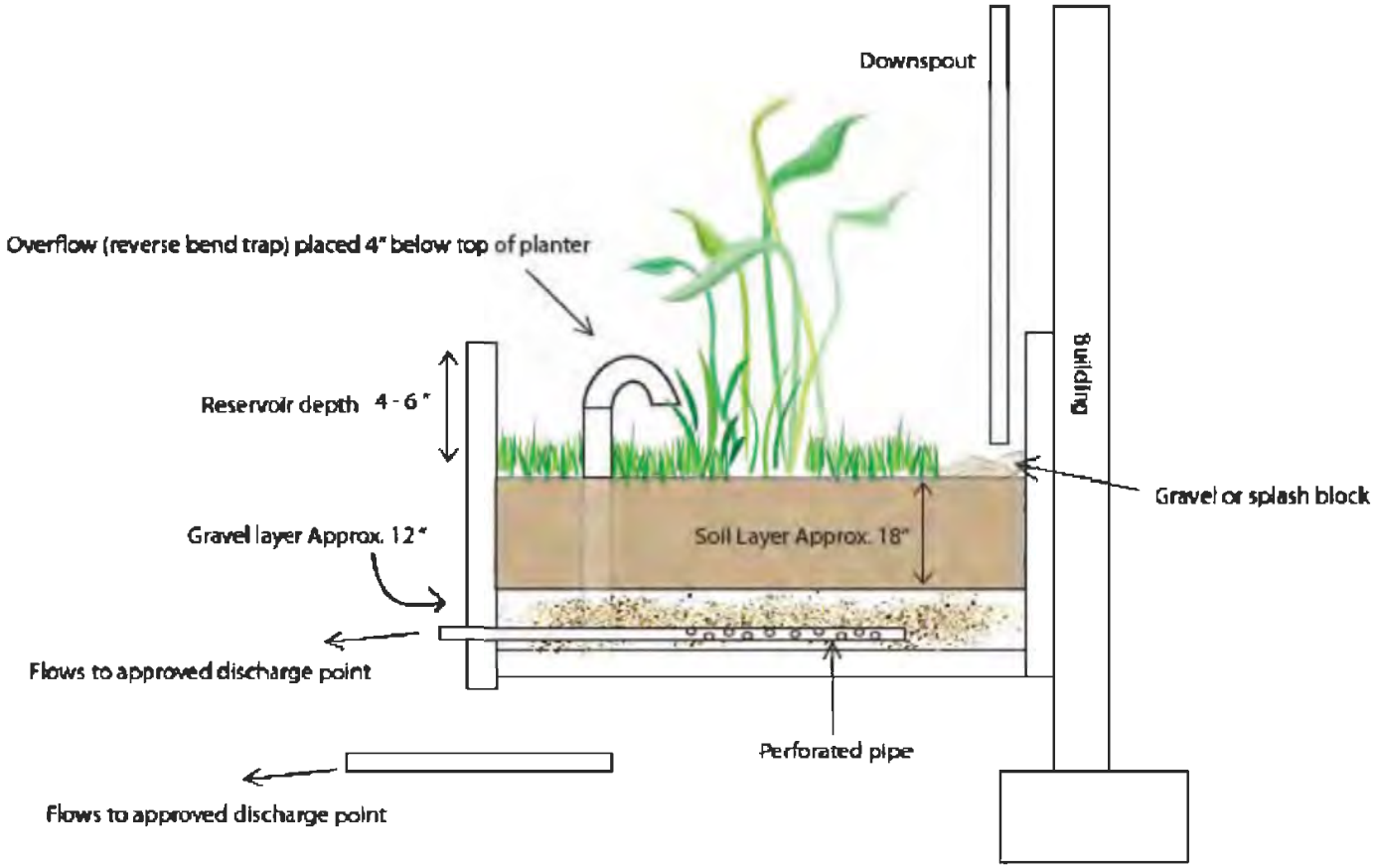
Confirm the following specifications have been met:

- ☐ Reservoir depth is 4-6" min.
- ☐ 18" layer of soil / compost mix (see Bioretention facility specs for required compost specs.)
- ☐ Surface area of soil mix is a minimum .04 times the tributary impervious area (flow through box can treat 25 times the soil surface area).
- ☐ Gravel layer is comprised of "Class 2 perm" or equivalent and is about 12" deep
- ☐ No filter fabric is used
- ☐ Perforated Pipe (PVC SDR 35 or equivalent) under drain with outlet located flush or near flush with planter bottom
- ☐ Connection with sufficient dead to drain to storm drain or pervious area
- ☐ Planter is set on a level surface
- ☐ Emergency spillage will be safely conveyed over surface not directly into storm drain
- ☐ Plantings are suitable to the climate, exposure, and well-drained soils. (see Bioretention planting palette), irrigation is appropriate for plantings

Please include this sheet with SCP Worksheet Submission

Flow-through Planter Box

not to scale



O&M Plan Checklist and Certification for Regulated Projects

For Office Use Only
Application No._____
Received By: _____

A. Designate the *Responsible Individual (RI).*

The *RI* is the person that will have direct responsibility for the maintenance of storm water controls, maintain self-inspection records, and sign any correspondence with the County of Lake.

Name of RI:_____

Phone:_____

Project Name:_____

Physical Site Address and/or APN:_____

☐ Include from the Storm Water Control Plan Worksheet the *Drainage Management Area*s tabulations (table #1-4)

☐ Include the site plan delineating the DMAs and the locations of the bioretention or equivalent facilities.

☐ Include the final construction drawings of the storm water facilities:

- Plans, elevations, and details of bioretention facilities.
- Construction details and specifications, including: depths of sand and soil, compaction, pipe materials, and bedding.
- Location and layouts of inflow piping and piping to off-site discharge
- Native soils (lenses beneath the facilities)

B. Scheduled Maintenance Activities

The following activities will need to occur on an annual basis, frequency may need to be adjusted depending on facility.

- **Refuse removal,** remove trash the collects near the inlets or that is trapped by vegetation. Clean out soil and debris blocking inlets or overflows.
- **Control weeds,** manual methods and soil amendments; non-natural (synthetic) pesticides should not be used.
- **Add mulch,** add mulch to maintain a mulch layer thickness of ~ 3 inches.
- **Pruning and replanting vegetation,** it may be necessary to replace or remove vegetation to ensure the proper functioning of the facility.
- **Check irrigation**, if irrigation exists, check to make sure the system is working as intended.

An annual self-certification letter will be mailed to the RI. This letter will serve as verification that all the storm water facilities on the property are being maintained and remain operational. The letter should be signed and returned within 30 days.

O&M Plan Checklist and Certification for Regulated Projects

C. Updates to the O & M Plan

Contact information for the Responsible Individual should be current. If the RI changes the County of Lake's Community Development Department should be notified with the appropriate revisions.

D. O & M plans for other Facility Types

If your project included a non-standard storm water treatment facility that was approved by the Community Development Department, such as a tree-box type system, than the O & M should reflect the manufacturer's recommended maintenance scheduling.

E. Signature and Certification:

"I, the RI/applicant accept responsibility for operation and maintenance of storm water treatment and flow-control facilities until such time as this responsibility is transferred to a subsequent owner." Furthermore, a condition on the property deed will be recorded with the County Recorder's office indicating that a storm water facility is present on the property and that the maintenance responsibility will transfer with property ownership in perpetuity.

_____ _____

Signature of the RI Date

_____

Print Name

I am the:

☐ Property Owner

☐ Applicant

☐ Contractor

BMP INSPECTION AND MAINTENANCE PLAN

VEGETATED SWALES AND BIORETENTION AREAS - SUBDRAINS

Frequency Before each rainy season	**Observation** Inspect all subdrain cleanouts. Ensure that all cleanout caps are present. Look for obstructions, debris, trash, leaves, vegetation, etc. growing inside the subdrain or covering the cleanout.	**Maintenance Activity** Remove any obstruction by hand (if near the cleanout entrance) or by flushing (with pressurized water) if too far down the pipe. Replace missing caps and secure to prevent unauthorized removal or accidental displacement.
Frequency Before each rainy season	**Observation** Inspect each subdrain where it enters the catch basin to see whether the subdrain pipe is dry, or is clogged with vegetation. Ensure that the subdrain is flowing by testing with water from the cleanout end.	**Maintenance Activity** If water does not flow through the subdrain, rod or flush the line to ensure flow.

VEGETATED SWALES AND BIORETENTION AREAS - GENERAL

Frequency Before each rainy season	**Observation** Inspect curb cuts (gaps in curb for water to flow down to treatment facility). Look for any obstructions that will prevent water from leaving the street and flowing into the treatment facility. This includes litter, debris, and vegetation. There should be at least 1 inch drop from the curb cut to the erosion control rock. No vegetation should obstruct the flow of water through the curb cut.	**Maintenance Activity** Remove any obstruction, clean litter and cut vegetation.
Frequency Before each rainy season	**Observation** Inspect bank between curb cuts and treatment facility. Look for gullies, washouts, evidence of uncontrolled surface water flow or any other evidence of distress to the slope.	**Maintenance Activity** Repair bank by excavating gullies and replacing soil in its original configuration, properly compacted. Replace gravel or other erosion control device so that bank does not erode again.
Frequency Before each rainy season	**Observation** Determine whether the bioretention area / swale is draining correctly. Inspect adjacent infrastructure, such as retaining walls, curbs, and pavement for signs of failure caused by water intrusion into the surrounding soil. This is a sign of poor drainage from the treatment facility. Water should drain from the bioretention area / swale.	**Maintenance Activity** Determine the cause of the poor drainage (i.e. siltation of "sandy loam" soil mix, blocked subdrains, blocked catch basin, blocked storm drain) and repair.
Frequency After the first heavy rain	**Observation** Determine whether the bioretention area / swale is draining correctly. Look for standing water or soggy, saturated soil. Look for holes containing standing water and permitting mosquitoes. This is a sign of poor drainage from the treatment facility. Water should drain from bioretention area / swale within 72 hours. After 72 hours, there should be no patches of standing water – bioretention area / swale should drain evenly.	**Maintenance Activity** Determine the cause of the poor drainage (siltation of "sandy loam soil mix, blocked subdrains, blocked catch basin, blocked storm drain) and repair. Fill holes containing standing water with "sandy loam" soil mix. Tilling of "sandy loam" soil mix may be required. After several years, the soil medium may become impermeable because of silt deposition, in which case removal and

		replacement of the "sandy loam" soil mix and gravel will be required.
Frequency Each month	**Observation** Inspect the bioretention area / swale for litter, debris, leaves, dead vegetation and anything else that might interfere with flow, filtration or growth of grass.	**Maintenance Activity** Remove all such litter, debris, leaves, dead vegetation, etc. by hand or with hand tools. replace dead vegetation as appropriate.
Frequency Each month	**Observation** Inspect for growth of trees or invasive plants in grassy bioretention area / swale areas.	**Maintenance Activity** Remove invasive plants, weeds, shrubs, trees, or anything with a woody stem from grassy bioretention area / swale areas.
Frequency Each month	**Observation** Inspect condition of grass in bioretention area / swale. Grass must be of sufficient density and health to provide filtration and protect from erosion.	**Maintenance Activity** Mow as necessary, fertilize as necessary, note bare spots and reseed as necessary, remove dead grass and reseed as necessary. Fertilization is to be performed by a licensed professional. Only the minimum effective amount of fertilizer is to be used, to prevent downstream eutrification. Fertilizers used should be the most environmentally benign products available.
Frequency Before each dry season and each month throughout the dry season.	**Observation** Test the irrigation system. Observe whether all grassy areas in the bioretention area / swale are receiving the correct amount of water. Observe whether excessive irrigation is creating flow in the subdrains (irrigation should not cause any flow in subdrain).	**Maintenance Activity** Clean out all plugged sprinkler heads and filters. Straighten any displaced sprinkler heads. Replace any damaged sprinkler heads. Adjust for correct direction and throw distance. Set the sprinkler timer to provide enough water depending on the anticipated weather until the next irrigation inspection. Reduce the watering time if excess water flows from the subdrains.
Frequency Each month	**Observation** Inspect for presence of pests which constitute a nuisance and/or threaten the survival of the grass in the bioretention area / swale.	**Maintenance Activity** Apply pesticide to the minimum amount necessary to control pests. All application of pesticide is to be performed by a licensed professional pest control contractor trained in Integrated Pest Management (IPM) techniques.
Frequency Ongoing	**Observation** Before making any modification to on-lot swales, downspouts, grading, landscaping or drainage patterns, ascertain what effect such modification will have on the flow of water to the treatment swales and/or bioretention area.	**Maintenance Activity** Refrain from any construction , grading, landscaping, piping, or any other construction that will affect the flow of water to the treatment swales and/or bioretention area. Correct any changes that divert stormwater away from treatment facilities or otherwise reduce their effectiveness.

INFILTRATION TRENCHES

Frequency Once the trenches go online; after every major storm event until after a few months	**Observation** Check observation wells for water level.	**Maintenance Activity** Record water levels to have a baseline of performance against which later observations can be compared.
Frequency Before each rainy season	**Observation** Inspect the surface of the trench. Look for leaves, grass clippings, accumulated sediment on the surface.	**Maintenance Activity** Remove vegetative waste and sediment, replacing the top layer of pea gravel if necessary.
Frequency Before each rainy season	**Observation** Inspect all roof gutters and downspouts. Ensure that all the cleanout caps are present. Look for obstructions, debris, trash, leaves, vegetation, etc. present inside the gutter, downspouts, or choking the cleanouts.	**Maintenance Activity** Remove obstructions by hand (if near the cleanout entrance) or by flushing with pressurized water) if in the downspout pipe. Replace missing caps and secure to prevent unauthorized removal or accidental displacement.
Frequency Before each rainy season	**Observation** Inspect all of the storm drain manholes. Look for obstructions, debris, trash, leaves, vegetation, etc. present inside.	**Maintenance Activity** Remove obstructions by hand (if near the entrance) or by flushing with pressurized water.
Frequency After the first heavy rain of the season.	**Observation** Determine whether the infiltration trench is draining correctly. Look for standing water or soggy, saturated soil. Look in monitoring wells. Look for holes containing standing water and permitting mosquitoes, this is a sign of poor drainage.	**Maintenance Activity** Determine the cause of the poor drainage (siltation of gravel mix, blocked downspouts) and repair.
Frequency Twice Annually	**Observation** Inspect the top of the trench area for ponded water	**Maintenance Activity** Replace top layer of pea gravel

Frequency When infiltration facilities are substantially failing to perform (estimated 15 years from installation)	**Observation** Infiltration trenches are failing to drain. Minor maintenance activities have failed to rectify the problem.	**Maintenance Activity** Thorough inspection of stormwater facility by licenced professional (i.e. landscape contractor, landscape architect, civil engineer, etc.) Replacement of failed components and repair of stormwater facility to design specifications (per the WQHP

INTERCEPTOR TREES

Frequency Before each rainy season	**Observation** Check trees for health and routine maintenance.	**Maintenance Activity** Routine pruning, apply layer of mulch. Weeding and providing fertilizer as necessary. Replacement of trees if necessary. Consult an arborist if tree is in poor health.

Soil Map—Lake County, California
Soil Map—Lake County, California
(Zone 1)



Map Scale: 1:5,090 if printed on A portrait (8.5" x 11") sheet.

Meters 0 50 100 200 300

Feet 0 200 400 800 1200

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

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 1:24,000.

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: Lake County, California
Survey Area Data: Version 21, Aug 28, 2024

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

Date(s) aerial images were photographed: Mar 26, 2022—Apr 25, 2022

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
193	Aiken clay loam, 5 to 8 percent slopes	13.4	31.5%
1144	Benridge-Sodabay loams, 8 to 15 percent slopes	29.2	68.5%
Totals for Area of Interest		42.6	100.0%

Lake County, California

103—Asbill clay loam, 5 to 8 percent slopes

Map Unit Setting

National map unit symbol: hf4s
Elevation: 1,350 to 2,100 feet
Mean annual precipitation: 35 to 40 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 160 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Asbill

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from shale and siltstone

Typical profile

H1 - 0 to 13 inches: clay loam
H2 - 13 to 39 inches: silty clay
H3 - 39 to 60 inches: bedrock

Properties and qualities

Slope: 5 to 8 percent
Depth to restrictive feature: 39 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
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
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D

Ecological site: R015XB109CA - CLAYPAN (ANNUAL GRASS)
Hydric soil rating: No

Minor Components

Skyhigh
Percent of map unit: 4 percent
Hydric soil rating: No

Kelsey
Percent of map unit: 4 percent
Hydric soil rating: No

Unnamed
Percent of map unit: 4 percent
Hydric soil rating: No

Wappo, variant
Percent of map unit: 3 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Lake County, California
Survey Area Data: Version 21, Aug 28, 2024

Lake County, California

114—Benridge-Sodabay loams, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: hf54
Elevation: 1,300 to 4,500 feet
Mean annual precipitation: 30 to 35 inches
Mean annual air temperature: 55 to 59 degrees F
Frost-free period: 140 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Benridge and similar soils: 45 percent
Sodabay and similar soils: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Benridge

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 21 inches: gravelly clay loam
H3 - 21 to 63 inches: gravelly clay
H4 - 63 to 68 inches: gravelly clay

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C

Ecological site: R015XY009CA - Hills 20-40"ppt
Hydric soil rating: No

Description of Sodabay

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Volcanic ash

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 26 inches: loam
H3 - 26 to 52 inches: gravelly clay loam
H4 - 52 to 63 inches: gravelly clay loam
H5 - 63 to 79 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 63 to 67 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R015XY009CA - Hills 20-40"ppt
Hydric soil rating: No

Minor Components

Konocti

Percent of map unit: 3 percent
Hydric soil rating: No

Guenoc

Percent of map unit: 3 percent
Hydric soil rating: No

Steeper slopes

Percent of map unit: 3 percent
Hydric soil rating: No

Hambright

Percent of map unit: 3 percent

Hydric soil rating: No

Unnamed

Percent of map unit: 3 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Lake County, California
Survey Area Data: Version 21, Aug 28, 2024

Soil Map—Lake County, California
(Zone 2)



Map Scale: 1:1,290 if printed on A portrait (8.5" x 11") sheet.

Meters 0 15 30 60 90

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 1:24,000.

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: Lake County, California
Survey Area Data: Version 21, Aug 28, 2024

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

Date(s) aerial images were photographed: Mar 26, 2022—Apr 25, 2022

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
193	Aiello clay loam, 5 to 8 percent slopes	1.8	30.2%
194	Aiello clay loam, 8 to 15 percent slopes	2.2	37.6%
1114	Bennidge-Sodabay loams, 8 to 15 percent slopes	1.9	32.2%
Totals for Area of Interest		5.9	100.0%

Lake County, California

103—Asbill clay loam, 5 to 8 percent slopes

Map Unit Setting

National map unit symbol: hf4s
Elevation: 1,350 to 2,100 feet
Mean annual precipitation: 35 to 40 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 160 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Asbill

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from shale and siltstone

Typical profile

H1 - 0 to 13 inches: clay loam
H2 - 13 to 39 inches: silty clay
H3 - 39 to 60 inches: bedrock

Properties and qualities

Slope: 5 to 8 percent
Depth to restrictive feature: 39 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
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
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D

Ecological site: R015XB109CA - CLAYPAN (ANNUAL GRASS)
Hydric soil rating: No

Minor Components

Skyhigh
Percent of map unit: 4 percent
Hydric soil rating: No

Kelsey
Percent of map unit: 4 percent
Hydric soil rating: No

Unnamed
Percent of map unit: 4 percent
Hydric soil rating: No

Wappo, variant
Percent of map unit: 3 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Lake County, California
Survey Area Data: Version 21, Aug 28, 2024

Lake County, California

104—Asbill clay loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: hf4t
Elevation: 1,350 to 2,100 feet
Mean annual precipitation: 35 to 40 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 160 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Asbill

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Residuum weathered from shale and siltstone

Typical profile

H1 - 0 to 13 inches: clay loam
H2 - 13 to 39 inches: silty clay
H3 - 39 to 60 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 39 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
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
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D

Ecological site: R015XB109CA - CLAYPAN (ANNUAL GRASS)
Hydric soil rating: No

Minor Components

Skyhigh

Percent of map unit: 8 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 7 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Lake County, California
Survey Area Data: Version 21, Aug 28, 2024

Lake County, California

114—Benridge-Sodabay loams, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: hf54
Elevation: 1,300 to 4,500 feet
Mean annual precipitation: 30 to 35 inches
Mean annual air temperature: 55 to 59 degrees F
Frost-free period: 140 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Benridge and similar soils: 45 percent
Sodabay and similar soils: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Benridge

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 21 inches: gravelly clay loam
H3 - 21 to 63 inches: gravelly clay
H4 - 63 to 68 inches: gravelly clay

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C

Ecological site: R015XY009CA - Hills 20-40"ppt
Hydric soil rating: No

Description of Sodabay

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Volcanic ash

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 26 inches: loam
H3 - 26 to 52 inches: gravelly clay loam
H4 - 52 to 63 inches: gravelly clay loam
H5 - 63 to 79 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 63 to 67 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R015XY009CA - Hills 20-40"ppt
Hydric soil rating: No

Minor Components

Konocti

Percent of map unit: 3 percent
Hydric soil rating: No

Guenoc

Percent of map unit: 3 percent
Hydric soil rating: No

Steeper slopes

Percent of map unit: 3 percent
Hydric soil rating: No

Hambright

Percent of map unit: 3 percent

Hydric soil rating: No

Unnamed

Percent of map unit: 3 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Lake County, California
Survey Area Data: Version 21, Aug 28, 2024

Soil Map—Lake County, California
(ZONE 3)



Map Scale: 1:1,560 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

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 1:24,000.

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: Lake County, California
Survey Area Data: Version 20, Aug 28, 2023

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

Date(s) aerial images were photographed: Mar 26, 2022—Apr 25, 2022

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
104	Asbill clay loam, 8 to 15 percent slopes	0.7	12.5%
114	Benridge-Sodabay loams, 8 to 15 percent slopes	5.0	87.5%
Totals for Area of Interest		**5.7**	**100.0%**

Lake County, California

114—Benridge-Sodabay loams, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: hf54
Elevation: 1,300 to 4,500 feet
Mean annual precipitation: 30 to 35 inches
Mean annual air temperature: 55 to 59 degrees F
Frost-free period: 140 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Benridge and similar soils: 45 percent
Sodabay and similar soils: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Benridge

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 21 inches: gravelly clay loam
H3 - 21 to 63 inches: gravelly clay
H4 - 63 to 68 inches: gravelly clay

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C

Ecological site: R015XY009CA - Hills 20-40"ppt
Hydric soil rating: No

Description of Sodabay

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Volcanic ash

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 26 inches: loam
H3 - 26 to 52 inches: gravelly clay loam
H4 - 52 to 63 inches: gravelly clay loam
H5 - 63 to 79 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 63 to 67 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R015XY009CA - Hills 20-40"ppt
Hydric soil rating: No

Minor Components

Hambright

Percent of map unit: 3 percent
Hydric soil rating: No

Guenoc

Percent of map unit: 3 percent
Hydric soil rating: No

Konocti

Percent of map unit: 3 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 3 percent

Hydric soil rating: No

Steeper slopes

Percent of map unit: 3 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Lake County, California
Survey Area Data: Version 20, Aug 28, 2023

Lake County, California

104—Asbill clay loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: hf4t
Elevation: 1,350 to 2,100 feet
Mean annual precipitation: 25 to 40 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 160 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Asbill

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Residuum weathered from shale and siltstone

Typical profile

H1 - 0 to 13 inches: clay loam
H2 - 13 to 39 inches: silty clay
H3 - 39 to 60 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 39 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
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
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D

Ecological site: R015XD109CA - CLAYPAN (ANNUAL GRASS)
Hydric soil rating: No

Minor Components

Skyhigh
Percent of map unit: 8 percent
Hydric soil rating: No

Unnamed
Percent of map unit: 7 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Lake County, California
Survey Area Data: Version 20, Aug 28, 2023

Soil Map—Lake County, California
(Zone 4)



Map Scale: 1:2,160 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

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 1:24,000.

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: Lake County, California
Survey Area Data: Version 21, Aug 28, 2024

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

Date(s) aerial images were photographed: Mar 26, 2022—Apr 25, 2022

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
114	Benridge-Sodabay loams, 8 to 15 percent slopes	1.9	100.0%
Totals for Area of Interest		**1.9**	**100.0%**

Lake County, California

114—Benridge-Sodabay loams, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: hf54
Elevation: 1,300 to 4,500 feet
Mean annual precipitation: 30 to 35 inches
Mean annual air temperature: 55 to 59 degrees F
Frost-free period: 140 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Benridge and similar soils: 45 percent
Sodabay and similar soils: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Benridge

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 21 inches: gravelly clay loam
H3 - 21 to 63 inches: gravelly clay
H4 - 63 to 68 inches: gravelly clay

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C

Ecological site: R015XY009CA - Hills 20-40"ppt
Hydric soil rating: No

Description of Sodabay

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Volcanic ash

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 26 inches: loam
H3 - 26 to 52 inches: gravelly clay loam
H4 - 52 to 63 inches: gravelly clay loam
H5 - 63 to 79 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 63 to 67 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R015XY009CA - Hills 20-40"ppt
Hydric soil rating: No

Minor Components

Konocti

Percent of map unit: 3 percent
Hydric soil rating: No

Guenoc

Percent of map unit: 3 percent
Hydric soil rating: No

Steeper slopes

Percent of map unit: 3 percent
Hydric soil rating: No

Hambright

Percent of map unit: 3 percent

Hydric soil rating: No

Unnamed

Percent of map unit: 3 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Lake County, California
Survey Area Data: Version 21, Aug 28, 2024

STATE WATER RESOURCES CONTROL BOARD

GEOTRACKER

FORMER PEARCE AERO (T0603300057) - (MAP)

SIGN UP FOR EMAIL ALERTS

7140 OLD HWY 53
CLEARLAKE, CA 95422
LAKE COUNTY
LUST CLEANUP SITE (INFO)
COMPLETED - CASE CLOSED AS OF 7/31/1995 - DEFINITION

PRINTABLE CASE SUMMARY / CSM REPORT

CLEANUP OVERSIGHT AGENCIES
LAKE COUNTY (LEAD)
CASE MANAGER: MANUEL RAMIREZ
CENTRAL VALLEY RWQCB (REGION 5S) - *CASE #* 170077
CASE MANAGER: MARILYN PETRUESCU

Summary | Cleanup Action Report | Regulatory Activities | *Environmental Data (ESI)* | *Site Maps / Documents* | Community Involvement | *Related Cases*

Regulatory Profile

PRINTABLE CASE SUMMARY

CLEANUP STATUS - DEFINITIONS
COMPLETED - CASE CLOSED AS OF 7/31/1995 - (CLEANUP STATUS HISTORY)

POTENTIAL CONTAMINANTS OF CONCERN
WASTE OIL / MOTOR / HYDRAULIC / LUBRICATING

POTENTIAL MEDIA OF CONCERN
SOIL

FILE LOCATION

DESIGNATED GROUNDWATER BENEFICIAL USE(S) - DEFINITIONS
MUN, AGR, IND, PROC

DWR GROUNDWATER SUB-BASIN NAME
Clear Lake Cache Formation (5-066)

CALWATER WATERSHED NAME
Cache Creek - Upper Cache Creek - Lower Lake (513.51)

Site History

No site history available

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STATE WATER RESOURCES CONTROL BOARD

GEOTRACKER

CASE SUMMARY

I. REPORTED BY -

UNKNOWN

CREATED BY

UNKNOWN

III. SITE LOCATION

FACILITY NAME
FORMER PEARCE AERO

FACILITY ID

FACILITY ADDRESS
7140 OLD HWY 53
CLEARLAKE, CA 95422
LAKE COUNTY

ORIENTATION OF SITE TO STREET

CROSS STREET
HWY 29

V. SUBSTANCES RELEASED / CONTAMINANT(S) OF CONCERN

WASTE OIL / MOTOR / HYDRAULIC / LUBRICATING

VI. DISCOVERY/ABATEMENT

DATE DISCHARGE BEGAN

DATE DISCOVERED	HOW DISCOVERED	DESCRIPTION
10/14/1994	Tank Closure	

DATE STOPPED	STOP METHOD	DESCRIPTION
10/14/1994		

VII. SOURCE/CAUSE

SOURCE OF DISCHARGE
Tank

CAUSE OF DISCHARGE
Corrosion

DISCHARGE DESCRIPTION

VIII. CASE TYPE

CASE TYPE
Soil

IX. REMEDIAL ACTION

NO REMEDIAL ACTIONS ENTERED

X. GENERAL COMMENTS

XI. CERTIFICATION

I HEREBY CERTIFY THAT THE INFORMATION REPORTED HEREIN IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE.

XII. REGULATORY USE ONLY

LOCAL AGENCY CASE NUMBER

REGIONAL BOARD CASE NUMBER

170077

LOCAL AGENCY

CONTACT NAME	INITIALS	ORGANIZATION_NAME	EMAIL ADDRESS
MANUEL RAMIREZ	MAN	LAKE COUNTY	

ADDRESS

CONTACT DESCRIPTION

r5 UNKNOWN, CA

REGIONAL BOARD

CONTACT NAME	INITIALS	ORGANIZATION_NAME	EMAIL ADDRESS
MARILYN PETRUESCU	MSP	CENTRAL VALLEY RWQCB (REGION 5S)	marilyn.petruescu@waterboards.ca.gov

ADDRESS

CONTACT DESCRIPTION

11020 Sun Center Drive, Suite 200
RANCHO CORDOVA, CA 95670

PHONE TYPE	PHONE NUMBER	EXTENSION
PHONE	(916) 464-4758	

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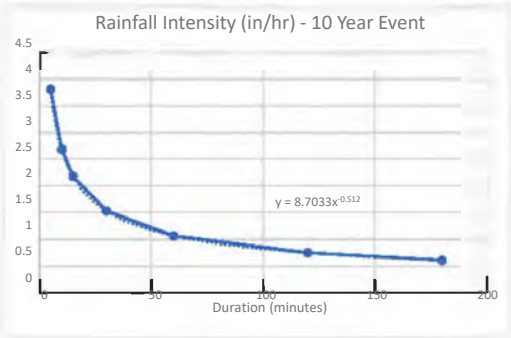
PREDEVELOPMENT K Values, C-VALUES, TIME OF CONCENTRATION VALUES, INTENSITY VALUES, MANNING'S Q

Drainage Area	A (ac)	Atot	Kfactor	$C_{UNCLASS}$	Tc (min)	Drainage Area	i_{10}	$Q_{zone(10)}$	i_{100}	$Q_{zone(100)}$	Imperv. SF	% Imperv.
Zone 1 (DMAs C-H)	35.344	1,809,590	0.88	0.31	15.0	Zone 1 (DMAs C-H)	2.18	**21.0**	2.80	**27.0**	105,430	6%
DMA "C"	12.433	541,600	0.88	0.31	15.0	DMA "C"	2.18	**7.4**	2.80	**9.5**		
DMA "D"	9.386	408,840	0.88	0.31	15.0	DMA "D"	2.18	**5.6**	2.80	**7.2**		
DMA "E"	2.616	113,950	0.88	0.31	15.0	DMA "E"	2.18	**1.6**	2.80	**2.0**		
DMA "F"	10.909	475,200	0.88	0.31	15.0	DMA "F"	2.18	**6.5**	2.80	**8.3**		
DMA "G"	3.216	140,100	0.88	0.31	15.0	DMA "G"	2.18	**1.9**	2.80	**2.5**		
DMA "H"	2.982	129,900	0.88	0.31	15.0	DMA "H"	2.18	**1.8**	2.80	**2.3**		
Zone 2 (DMAs "A&A-1")	5.645	245,910	0.88	0.31	15.0	Zone 2 (DMAs "A&A-1")	2.18	**3.4**	2.80	**4.3**	2,800	1%
DMA "A"	1.907	83,060	0.88	0.31	15.0	DMA "A"	2.18	**1.1**	2.80	**1.5**		
DMA "A-1"	3.739	162,850	0.88	0.31	15.0	DMA "A-1"	2.18	**2.2**	2.80	**2.9**		
Zone 3 (DMA "B")	5.733	249,730	0.88	0.31	15.0	Zone 3 (DMA "B")	2.18	**3.4**	2.80	**4.4**	37,660	15%
Zone 4 (DMA "I")	1.869	81,400	0.88	0.31	15.0	Zone 4 (DMA "I")	2.18	**1.1**	2.80	**1.4**	660	1%

10 Yr Rainfall Duration (min	Rainfall Intensity (in/hr)
5	3.81
10	2.68
15	2.18
30	1.53
60	1.07
120	0.75
180	0.61

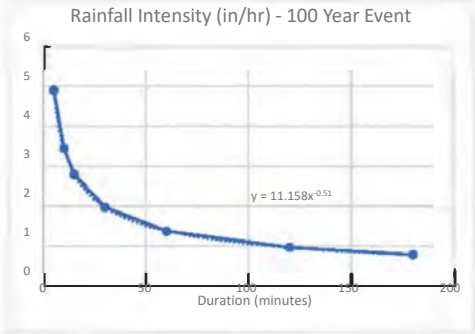
Source: City of Clearlake 2. Drainage Design Standards Section VI Rainfall Intensity

Mean Seasonal Precipitation
25



100 Yr Rainfall Duration (min)	Rainfall Intensity (in/hr)
5	4.91
10	3.45
15	2.8
30	1.97
60	1.38
120	0.97
180	0.79

Source: City of Clearlake 2. Drainage Design Standards Section VI Rainfall Intensity



POST-DEVELOPMENT K Values, C-VALUES, TIME OF CONCENTRATION VALUES, INTENSITY VALUES, MANNING'S Q

Drainage Area	A (ac)	Atot	Kfactor	$C_{comm.}$	Tc (min)	Drainage Area	i_{10}	$Q_{zone(10)}$	i_{100}	$Q_{zone(100)}$	Imperv. SF	% Imperv.							
DMA "A"	1.907	83,060	0.88	0.9	7.0	DMA "A"	3.21	**4.8**	4.13	**6.2**	43,080	52%							
DMA "A"-1	3.739	162,850	0.88	0.9	7.0	DMA "A"-1	3.21	**9.5**	4.13	**12.2**	69,102	42%							
DMA "B"	5.733	249,730	0.88	0.9	7.0	DMA "B"	3.21	**14.6**	4.13	**18.8**	222,940	89%							
DMA "C"	12.433	541,600	0.88	0.9	7.0	DMA "C"	3.21	**31.6**	4.13	**40.7**	423,280	78%							
DMA "D"	9.386	408,840	0.88	0.9	7.0	DMA "D"	3.21	**23.9**	4.13	**30.7**	237,545	58%							
DMA "E"	2.616	113,950	0.88	0.9	7.0	DMA "E"	3.21	**6.6**	4.13	**8.6**	92,090	81%							
DMA "F"	10.909	475,200	0.88	0.9	7.0	DMA "F"	3.21	**27.7**	4.13	**35.7**	425,300	89%							
DMA "G"	3.216	140,100	0.88	0.9	7.0	DMA "G"	3.21	**8.2**	4.13	**10.5**	125,020	89%							
DMA "H"	2.982	129,900	0.88	0.9	7.0	DMA "H"	3.21	**7.6**	4.13	**9.8**	104,640	81%							
DMA "I"	1.869	81,400	0.88	0.9	7.0	DMA "I"	3.21	**4.7**	4.13	**6.1**	73,580	90%							
Predev. Total	54.789	2,386,630	0.88	0.31	15.0	Predev. Total	2.18	**32.5**	2.80	**41.9**	146,550	6%	2,240,080	377.4	352.7	330.5	555	327.2	319.2	306
Post Dev. Total	54.789	2,386,630	0.88	0.9	7.0	Post Dev. Total	3.21	**139.2**	4.19	**181.8**	1,816,577	76%	570,053							

1110 CIVIC CENTER BOULEVARD, SUITE 404 YUBA CITY, CALIFORNIA 95993 TEL: (530) 751-0952 FAX: (530) 751-0953

PREDEVELOPMENT WEIGHTED CN

CN values from FMDM Table C-2

	Area (SF)	Area (Ac)	Soil Group	CN	arithmatic weight	Cover Type Description
Zone 1 (DMAs C-H)	1,809,590	41.54	C	71.8	2,984.1538	Arid/Semiarid rangeland Herbaceous Fair
DMA "C"	541,600	12.43	C	81	1,007.1074	Arid/Semiarid rangeland Herbaceous Fair
DMA "D"	408,840	9.39	C	81	760.2397	Arid/Semiarid rangeland Herbaceous Fair
DMA "E"	113,950	2.62	C	94	245.90	Developed Urban Commercial/Business
DMA "F"	475,200	10.91	D	89	970.9091	Arid/Semiarid rangeland Herbaceous Fair
DMA "G"	140,100	3.22	C	73	234.7865	Other Agricultural - Woods Fair
DMA "H"	129,900	2.98	C	71	211.7287	Other Agricultural - Meadow
ıne 2 (DMAs "A&A-1")	245,910	5.65	D	83	468.5613	Other Agricultural - Woods Poor
DMA "A"	83,060	1.91	D	83	158.2640	Other Agricultural - Woods Poor
DMA "A-1"	162,850	3.74	D	83	310.2973	Other Agricultural - Woods Poor
Zone 3 (DMA "B")	249,730	5.73	C	77	441.4419	Other Agricultural - Woods Poor
Zone 4 (DMA "I")	81,400	1.87	C	77	143.8889	Other Agricultural - Woods Poor
TOTALS:	2,386,630	54.79	-	81.9	4,485	

POST-DEVELOPMENT WEIGHTED CN

CN values from FMDM Table C-2

	Area (SF)	Area (Ac)	Soil Group	CN	arithmatic weight	Cover Type Description
DMA "A"	83,060	1.91	D	95	181.1455	Developed Urban Commercial/Business
DMA "A"-1	162,850	3.74	D	95	355.1596	Developed Urban Commercial/Business
DMA "B"	249,730	5.73	C	94	538.9031	Developed Urban Commercial/Business
DMA "C"	541,600	12.43	C	94	1,168.7420	Developed Urban Commercial/Business
DMA "D"	408,840	9.39	C	94	882.2534	Developed Urban Commercial/Business
DMA "E"	113,950	2.62	C	94	245.8976	Developed Urban Commercial/Business
DMA "F"	475,200	10.91	C	94	1,025.4545	Developed Urban Commercial/Business
DMA "G"	140,100	3.22	C	94	302.3278	Developed Urban Commercial/Business
DMA "H"	129,900	2.98	C	94	280.3168	Developed Urban Commercial/Business
DMA "I"	81,400	1.87	C	92	171.9192	Paved, open ditches, including ROW
TOTALS:	2,386,630	52.92	-	94.1	4,980	

BRA #	BRA Area (SF)	BMP Retention	Flood Retention (	DMA Totals (CF)
DMA "A"	4000	5600	4000	9,600
DMA "A"-1	7270	10178	7270	17,448
DMA "B"	11510	16114	5755	21,869
DMA "C"	58400	81760	58400	140,160
DMA "D"	25230	35322	56681	92,003
DMA "E"	8000	11200	8000	19,200
DMA "F"	20400	28560	20400	48,960
DMA "G"	6200	8680	6200	14,880
DMA "H"	7440	10416	7440	17,856
DMA "I"	3300	4620	0	4,620
SUM:	151,750	212,450	174,146	**386,596**
		BMP	Ponding	TOTAL STORAGE

Multi-Hydrograph Plot

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Hyd. No. 1

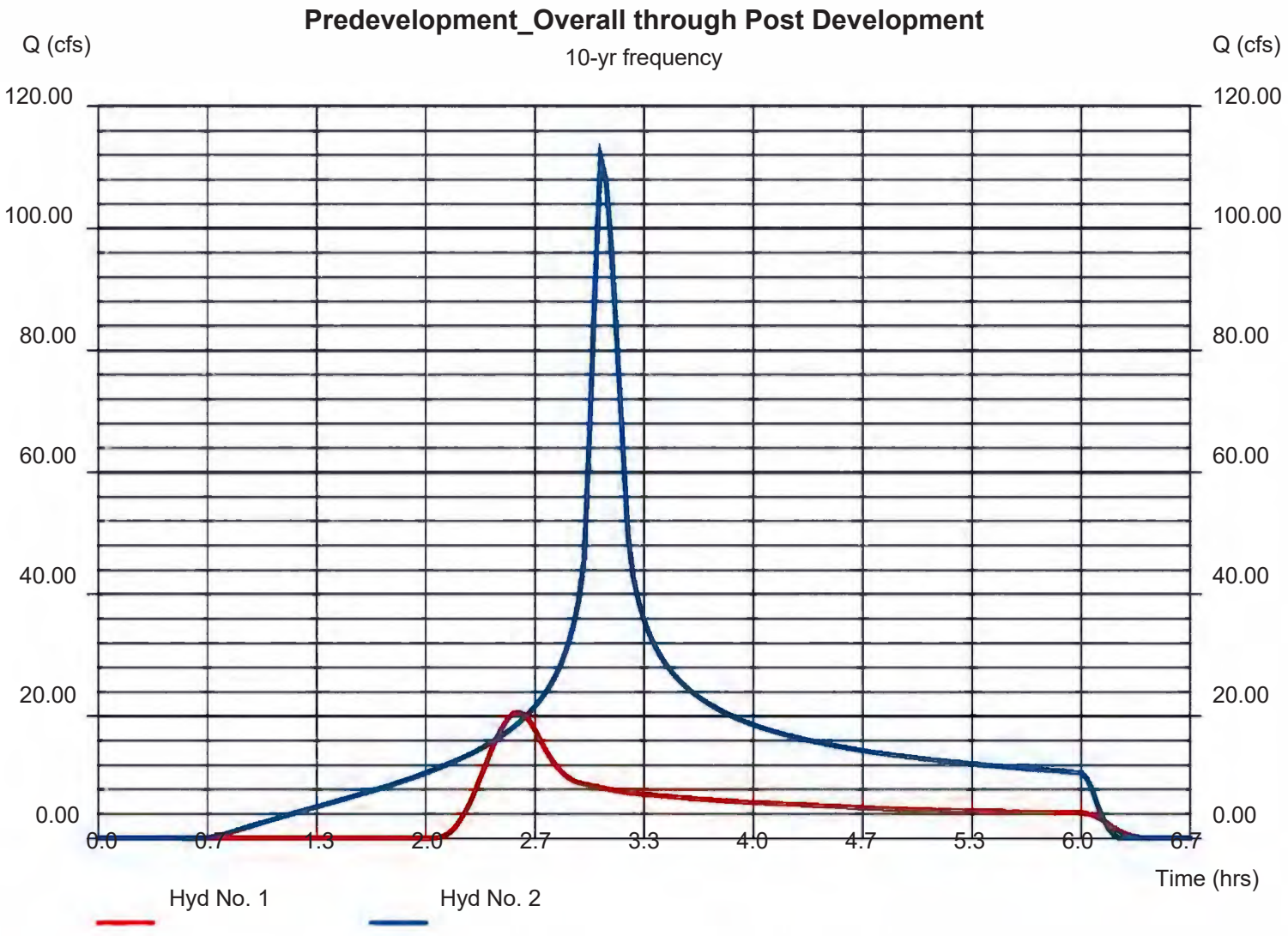
Predevelopment_Overall

Hydrograph type	=	SCS Runoff
Peak discharge	=	20.63 cfs
Time to peak	=	2.57 hrs
Hyd. Volume	=	100,505 cuft

Hyd. No. 2

Post Development

Hydrograph type	=	SCS Runoff
Peak discharge	=	111.58 cfs
Time to peak	=	3.07 hrs
Hyd. Volume	=	348,422 cuft



Multi-Hydrograph Plot

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Hyd. No. 1

Predevelopment_Overall

Hydrograph type	=	SCS Runoff
Peak discharge	=	46.34 cfs
Time to peak	=	2.53 hrs
Hyd. Volume	=	206,935 cuft

Hyd. No. 2

Post Development

Hydrograph type	=	SCS Runoff
Peak discharge	=	188.87 cfs
Time to peak	=	3.07 hrs
Hyd. Volume	=	592,340 cuft

