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Clean Watersheds for a Clean Bay (CW4CB) Task 5

Pilot Retrofit Projects

1. Project Concepts

The project concepts include a discussion of the CW4CB Task 5 retrofit project background, the proposed treatment measure, catchment information, and project design/construction status. The selected projects are in varying stages of design. For those projects with complete designs (i.e., the Nevin Avenue Improvement project and Alameda and High Streets HDS Unit), project design drawings or example specifications are referenced. For projects in the design stage (i.e., the Ettie Street Pump Station project, both PG&E Substation projects, the Bransten Road Green Street project, and the West Oakland Industrial Area project), treatment measure concepts are provided.

1.1 Ettie Street Pump Station

The Ettie Street Pump Station Project is located in West Oakland at 3465 Ettie Street, adjacent to MacArthur Freeway to the north and Nimitz Freeway to the west. The Ettie Street Pump Station is an Alameda County Flood Control and Water Conservation District (ACFCWCD) facility that collects and pumps stormwater runoff to San Francisco Bay. The Ettie Street Pump Station drainage catchment is comprised of approximately 1,200 acres in West Oakland and includes residential, commercial, and industrial areas. The proposed stormwater treatment measure for the Project is a media filter system with two separate filter beds containing different media. The stormwater program and Alameda County representative for the Project is Arleen Feng.

Project Catchment

The site is located in a highly industrial area, located adjacent to MacArthur Freeway to the north, Nimitz Freeway to the west, and industrial and residential areas to the south and east. The Ettie Street Pump Station receives rainfall and other flows from an approximately 1,200 acre watershed. The watershed contains mixed land uses currently comprised of approximately 42% residential, 38% industrial, and 20% commercial land uses.

PCBs have been previously found in sediments collecting at both the Ettie Street Pump Station and in the surrounding catchment. A 2010 report by East Bay Municipal Utility District (EBMUD) presents data from water samples collected between April 2008 and February 2010, during dry weather, first flush, and wet weather events at the Ettie Street Pump Station wet well inlet and diversion outlet. The EBMUD report states that average concentrations for PCB congeners for the pump station effluent were 2,930 pg/L, 19,900 pg/L, and 34,500 pg/L, for dry weather, first flush and wet weather flows respectively. Additionally from 2004 to 2006, the City

of Oakland performed an evaluation of potential source properties and collection of sediment samples from right-of-way areas and private properties, which found elevated PCB concentrations (<http://www2.oaklandnet.com/Government/o/PWA/o/FE/s/ID/OAK024739>).

Treatment Measure Concept

The Ettie Street Pump Station Project will install two parallel media filter beds to treat PCBs and mercury (Hg) that enter the Ettie Street Pump Station from the drainage catchment. The media filter will be located at grade outside the pump station building and will include a pump and pretreatment storage tank. The pump (nominally 1-2 gpm) will draw water up from one of the two wet wells into the pretreatment storage tank, designed to settle out the fine and coarse sand sizes (>63 µm).

Water from the pretreatment storage tank will then be split and conveyed to each tank containing the filter media. Water will be directed over a weir onto the surface of the media filter bed where it will infiltrate through the 2-foot-thick filter media to a 4-inch gravel drainage layer. One filter bed will contain sand and the second bed will contain a mix of media types, including sand, zeolite and granulated active carbon (GAC). The residence time in the pretreatment settling tank will be approximately 1.5 hours and the residence time in the sand filter bed will be approximately 12 hours.

To separate the filter media from the drainage layer, a geotextile filter fabric (or alternatively a choking stone layer) will be placed between the media and the drainage layer. Perforated PVC pipes (2 in diameter) will be located in the drainage layer to carry the water to a line to be discharged into the other wet well. The bottom of the filter bed will be sloped for drainage. The total depth of the media filter will be approximately 2 feet with an additional 6 inches for the underdrain layer.

The area of the pretreatment tank will be approximately 10 square feet and the total area of each filter bed will be approximately 50 square feet. These dimensions are well within the available Project area identified as 14 feet by 14 feet and will allow space for access and testing (specific clearances to existing fence and structures will be provided at the start of the design phase).

Figure 1 below summarizes the proposed retrofit Project configuration with respect to the primary components and monitoring locations. As shown in Figure 1, flows will be pumped from the Ettie Street Pump Station wet well through the settling tank, and then will be evenly split to each media bed using flow control valves. Discharge from the media beds will be combined prior to returning to the storm drain system. Flows will be continuously monitored and water quality grab samples will be collected at influent and effluent locations. Additional solids monitoring locations could be added at the inflow from the wet well.

The primary components for the retrofit Project include the inlet works, media beds, underdrains, outlet works, tanks, flow control valves, in-line strainer, PVC piping and connections, sampling ports, flow meter, filtration media, geotextile, and the slotted underdrain.

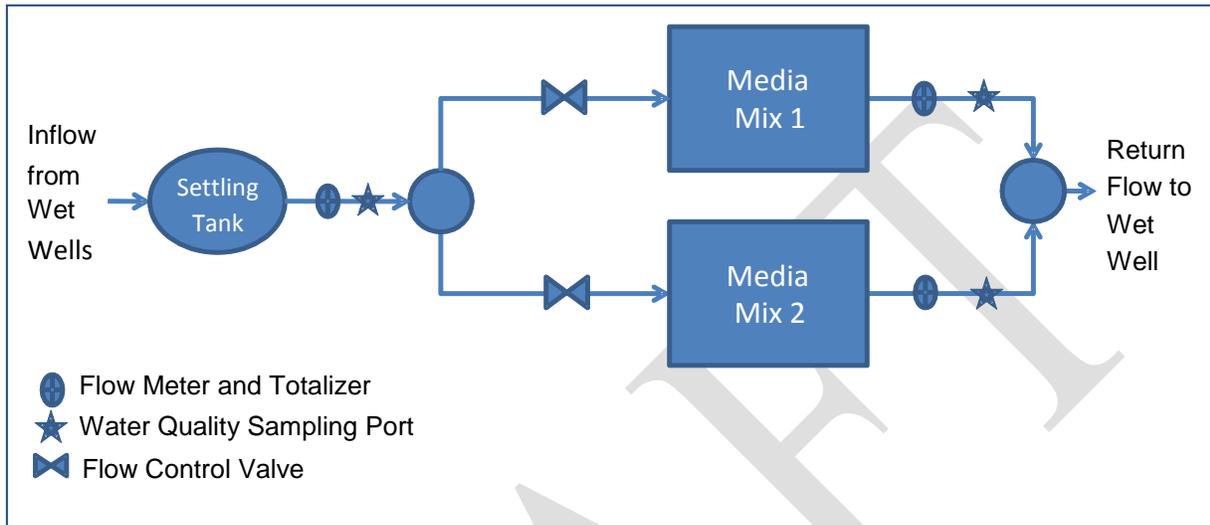


Figure 1. Overall Ettie Street Pump Station Pilot Project Components and Monitoring Locations

Project Design and Construction Schedule

The Ettie Street Pump Station Retrofit Project is currently in the design phase. Design of the Project began in November 2011 and construction will occur in the Fall of 2012.

1.2 Alameda and High Street HDS Unit

The City of Oakland Alameda and High Street Hydrodynamic Separator (HDS) Unit Project is located at the intersection of Alameda Avenue and High Street in Oakland. Another planned HDS project, at International Boulevard and 73rd Street, serves as an alternate site for this Project. These HDS units are planned for installation as part of Oakland’s Trash Load Reduction Plan. The stormwater program representative for the Project is Arleen Feng of the Clean Water Program and the City of Oakland representative is Rebecca Tuden.

Project Catchment

The Alameda and High Street CDS unit is located in a watershed with a high concentration of old industrial land uses, including historic rail lines. The current watershed is a mix of industrial and commercial land uses.

Both HDS unit locations are located within 2.5 kilometers of medium (0.1 – 1.0 mg PCBs/ kg sediment) PCB concentrations.

Project Concept

The HDS unit proposed for the Project is the Contech CDS unit. The unit combines hydrodynamic forces and treatment screens to remove solids from stormwater.

Project Design and Construction Schedule

The Project went out to bid in March 2012. Construction is expected to begin in the summer of 2012.

1.3 West Oakland Industrial Area

The West Oakland Project consists of six proposed storm drain catchment retrofits in the West Oakland neighborhoods. The proposed catchment retrofits are located within a three block by four block area, bounded by 32nd Street to the north, 24th Street to the south, Wood Street to the West, and Poplar Street to the east. PCBs have been detected in sediment at the site as well as in the greater site vicinity. Biofilter treatment measures (Filterra[®] devices) are proposed in six possible locations in the area. The stormwater program representative for the Project is Arleen Feng with the Clean Water Program and the municipal representative is Rebecca Tuden with the City of Oakland.

Project Catchment

The Project is located in the Ettie Street Pump Station Watershed. The blocks adjacent to the six proposed treatment facility options are highly industrial, and include a metal recycling facility, a concrete batch plant, various mixed light industrial and commercial properties, and some residential land use.

Sediment samples taken at the catch basins adjacent to the proposed facilities yielded medium to very high PCB concentrations. The drainage areas for the proposed facilities range from approximately 0.2 acres and 0.6 acres, and largely consist of road land uses.

Project Concept

Filterra units are proposed for the six possible catchment retrofit locations. Filterra[®] units are proprietary biofilter devices which consist of specialized media and vegetation (trees would be used for this Project). Runoff is filtered through the media and treated runoff is discharged through the facility underdrain.

The proposed BMP locations were selected based on a GIS desktop screening analysis as well as field observations. Field observations were conducted to determine which locations would be feasible for BMP installation, and included measuring distances to utility poles, visible underground utilities, and trees, as well as sidewalk widths. Other impediments to installation and/or monitoring were also observed, such as proximity to business entrances, traffic density, and other factors. Approximately 30 possible catch basins were considered for retrofit. Additionally, the approximate drainage boundary and flow direction was noted. Based on these observations, GIS was used to approximate the right-of-way drainage areas tributary to the selected locations.

Project Design and Construction Schedule

The conceptual design for the West Oakland Industrial Area Project is complete. The design firm is WRECO and 100% design is expected to be completed in August 2012. The Project is expected to go out to bid in October 2012 and construction is anticipated to begin in January 2013.

1.4 Nevin Avenue Improvements

The Nevin Avenue Improvement Project is a planned streetscape project along Nevin Avenue between 19th Street and 27th Street in the City of Richmond. This Project includes stormwater treatment measures integrated into the streetscape. Planned streetscape features include standard street trees and curb extensions to make the street more bicyclist and pedestrian friendly. The City's base contract for the Project includes rain garden curb extensions as the primary stormwater treatment measure. Additional treatment measures proposed under the CW4CB Task 5 Project include permeable pavers with subterranean drainage, porous asphalt concrete pavement, and tree well filters. The stormwater program representative for the Project is Khalil Abusaba, with the Contra Costa Clean Water Program, and the municipal representative is Lynne Scarpa, Environmental Manager for the City of Richmond Stormwater Program.

Project Catchment

The site is located in a mixed civic, residential, and commercial area. Light industrial and historical industrial land uses are within close proximity to the Nevin Avenue Improvement Project location. The Project catchment contains mixed land uses. The area is largely residential in the lower blocks (19th through 23rd Streets), and is adjacent to the Richmond BART station. From 23rd to 25th Streets, the land use is largely commercial, and from 25th to 27th Streets, the City Hall buildings are the dominant land use (civic), with some commercial buildings interspersed.

The drainage to the treatment measures will be largely street drainage with possible drainage from adjacent parcels. Flow direction varies along the extent of the Project. According to a survey obtained from City of Richmond, flow direction is to the west for the blocks between 19th Street and 23rd Street, and again for the blocks between 24th Street and 27th Street. Flow is to the east for the block between 23rd Street and 24th Street.

The site is adjacent to old industrial land uses and is within a 2.5 kilometer halo of high PCB concentrations.

Project Concept

The Nevin Avenue Improvement Project is a streetscape project along eight blocks of Nevin Avenue, from the Richmond BART station to Richmond City Hall. The primary stormwater treatment measure proposed along Nevin is rain garden (bioretention) curb extensions. A total of 4,200 square feet of the bioretention curb extensions are proposed for as part of the improvements.

Additional stormwater treatment features proposed for the Project include a pilot treatment train. The treatment train would include permeable pavers with subterranean drainage, porous asphalt concrete pavement, and tree well filters, along with the bioretention curb extensions, and would be installed on two blocks of the Project (from 24th to Civic Center along Nevin Avenue). The treatment train concept would allow for added treatment benefit in this space-constrained location.

Project Design and Construction Schedule

The Nevin Avenue Improvement Project is currently at 95% design. The design firm is BKF and 100% design is expected to be completed in the summer of 2012. The Project is expected to go out to bid in October 2012 and construction is anticipated to begin in January 2013. Schedule may change pending authorization from grant funding organizations.

1.5 Richmond PG&E Substation

The PG&E Substation Project is located at South 1st Street and Cutting Boulevard in the City of Richmond. PCBs have been detected in storm drains directly adjacent to the site as well as in the greater site vicinity. Bioretention facilities are the proposed stormwater treatment measure for the Project. The stormwater program representative for the Project is Khalil Abusaba, with the Contra Costa Clean Water Program, and the municipal representative is Lynne Scarpa, Environmental Manager for the City of Richmond Stormwater Program.

Project Catchment

The PG&E substation is bounded by rail and Interstate 580 to the north, a recreational vehicle parking lot to the west, Cutting Boulevard to the south and South 1st Street to the east. The substation is surrounded by a concrete berm which retains most stormwater runoff on the site. Ground cover is largely gravel, along with a parking lot which consists partially of concrete. There is no landscaping on site. There is landscaping (trees and mulch) and sidewalk to the south of the substation parcel, which runs along the public right-of-way of Cutting Blvd. There are also utilities (power line pole and a utility box) located along the landscaped strip. Along the eastern site boundary, there is bare compacted dirt and no sidewalk between the substation parcel boundary and South 1st Street.

There are two catch basins that the proposed Project would connect to. The first catch basin is located to the south of the substation directly adjacent to the driveway. This catch basin has an inlet depth of 3 to 4 feet based on visual inspection. The second is located at the southeast corner of the site and has a drop inlet depth below storm grate of about one foot based on visual observation.

Sediment samples taken at the catch basins proposed for retrofit yielded high PCB concentrations.

Treatment Measure Design Concept

The proposed treatment measures for the Project include two alternatives. Alternative #1 would consist of a bioretention facility installed in the parkway adjacent to the PG&E substation along Cutting Boulevard and South 1st Street. Bioretention Facility #1 would collect approximately 0.49 acres along Cutting Boulevard drainage and a small portion of the PG&E substation entrance driveway.

Alternative #2 would consist of two bioretention facilities. Bioretention Facility #1 would collect approximately 0.49 acres, as stated previously. Bioretention Facility #2 would collect drainage from approximately 1.17 acres of South 1st Street and the substation.

Project Design and Construction Schedule

The City of Richmond PG&E Substation Project is currently in the design phase. The design firm is WRECO and 100% design is expected to be completed in October 2012. The Project is expected to go out to bid in December 2012 and construction is anticipated to begin in April 2013.

1.6 El Cerrito Green Streets

The El Cerrito Green Streets Project includes two already constructed flow-through biotreatment facilities. One is located at San Pablo and Madison Avenues and the second is located at San Pablo and Eureka Avenues, both in the City of El Cerrito. Details about this project can be found at (<http://www.el-cerrito.org/esd/landscapeandwater.html>) and at San Francisco Estuary Partnership (<http://www.sfestuary.org/projects/detail.php?projectID=41>). The stormwater program representative for the Project is Khalil Abusaba, with the Contra Costa Clean Water Program.

This Project was monitored by the SFEI during the 2011/ 2012 wet season, but the results are not yet available. CW4CB will perform additional monitoring during the 2012/13 wet season.

1.7 Leo Avenue HDS System

The Leo Avenue Hydrodynamic Separator (HDS) Unit Project is located on 7th Avenue just southeast of Phelan Avenue in southeast San Jose. This HDS unit is planned for installation as part of San Jose's Trash Load Reduction Plan, but a modified unit has been selected for enhanced sediment removal. The stormwater program representative for the Project is Chris Sommers of the Santa Clara Valley Urban Runoff Pollution Prevention Program and the City of San Jose representative is James Downing with the City of San Jose's Environmental Service Department.

Project Catchment

The Leo Avenue HDS unit is expected to receive runoff from approximately 214 acres of commercial and industrial land uses.

Sediment samples taken on Leo Avenue, which is located within the Project's drainage catchment have detected high levels of PCBs.

Project Concept

The City of San Jose proposes to implement a modified prefabricated HDS unit which incorporates a larger sump for enhanced sediment collection.

Project Design and Construction Schedule

The design for the Leo Avenue HDS Unit Project is complete. The Project went out to bid in March 2012 and construction is anticipated to begin in the summer of 2012.

1.8 Bransten Road Curb Extensions

The Bransten Road Curb Extensions Project is located along Bransten Road, between Old County Road to the southwest and Industrial Road to the northeast, in the City of San Carlos. Curb extension bioretention facilities are the proposed stormwater treatment measure for the Project. The countywide stormwater program representative for the Project is Laura Prickett, with the San Mateo Countywide Water Pollution Prevention Program. The City of San Carlos representative for the Project is Ray Chan, Acting City Engineer.

Project Catchment

The site is located in a highly industrial area, located adjacent to Caltrain tracks and El Camino Real to the southwest, and the 101 Freeway to the northwest. The combined acreage of the estimated catchment, which consists of Bransten Road and adjacent commercial and light industrial land uses, is approximately 25 acres. The approximate area of the roadway right-of-way (sidewalks, parkways, and street width) is two acres. It is unknown if the drainage from the adjacent parcels flows into the street; it is assumed for this concept that parcel drainage would not be treated in the curb extension bioretention facilities.

Industrial land uses within the estimated tributary area include a concrete batch processing plant, a top soil facility, a transfer station and fire station, and other light industrial and commercial land uses, including a school bus yard.

Flow direction on the street is known to be towards the northeast. There are no storm drains along the upstream portion of Bransten Road. Beginning at 977 Bransten Road, there is a storm drain (unknown diameter) which runs along the center of the road towards Industrial Road. Soils underlying the site have low infiltration rates.

Sediment samples taken on Bransten Road have detected high levels of PCBs.

Project Concept

The concept plan is a green street retrofit along Bransten Road. Curb extension bioretention facilities are proposed along Bransten Road between Old County Road and Industrial Road. The curb extension bioretention facilities are proposed to be similar to the stormwater curb extension

illustrated in the Countywide Program's Sustainable Green Streets and Parking Lots Design Guidebook and the City of Portland design schematic. The curb extension bioretention facilities would include an underdrain where the storm drain is present and would not include an underdrain, if allowable, up-gradient of the existing storm drain.

Stormwater will flow into the facilities through a curb cut located at the upstream end of the curb extension. The outlet from the facilities will be an elevated curb cut at the downstream end, which will act like an overflow weir designed to provide for 12 inches of ponding depth across the facility. The facility cross-section will include 1.5 feet of bioretention media underlain by gravel to provide storage and potential infiltration below these facilities, provided it is allowable. Approximately 770 linear feet of curb extension bioretention facility without an underdrain are proposed upstream of the storm drain. Approximately 500 linear feet of curb extension bioretention with an underdrain are proposed. The curb extensions are proposed to be approximately 6.0 feet wide, yielding a proposed total area of curb extension bioretention without an underdrain of 4,620 square feet, and a proposed total area of curb extension bioretention with an underdrain of 3,000 square feet.

Project Design and Construction Schedule

The Bransten Road Green Streets Project is currently in the design phase. The design firm is WRECO and 100% design is expected to be completed in September 2012. The Project is expected to go out to bid in November 2012 and construction is anticipated to begin in April 2013.

1.9 Broadway and Redwood

The Broadway and Redwood Project is located east of Broadway between Redwood and Valle Vista in downtown Vallejo. The project would retrofit a vegetated swale in the area between Broadway and the Southern Pacific Railroad tracks. The land is owned by Southern Pacific but the Vallejo Sanitation and Flood Control District has an easement on the property that would permit construction of a treatment measure within the easement. Kevin Cullen, with the Fairfield-Suisun Sewer District, Lance Barnett, with Vallejo Sanitation & Flood Control District, and Sam Kumar with the City of Vallejo are the municipal leads for the Project.

Project Catchment

The catchment would include (1) that portion of Broadway (between Redwood and Valle Vista) that drains to the east (from the crown in the road) and (2) the area between the railroad tracks and Broadway. The portion draining from Broadway is completely impervious, whereas the area draining between the tracks and Broadway is mostly pervious. The land use can be characterized as transportation.

The site is within a 2.5-kilometer halo of high PCB concentration.

Project Concept

The treatment measure concept is to install a vegetated swale between the railroad tracks and Broadway. The width of the swale will be designed within the VSFCD easement. The length of the swale will ideally extend along the entire block of Broadway between Redwood and Valle Vista, but may be shorter depending on the final design. Curb cuts would be made through the existing curb along Broadway to divert roadway runoff into the swale.

Project Design and Construction Schedule

The Broadway and Redwood Project is currently in the design phase. The design firm is WRECO and 100% design is expected to be completed in the summer of 2012. The Project is expected to go out to bid in the fall of 2012 and construction is anticipated to begin in the fall or winter of 2012.

1.10 Vallejo PG&E Substation

The PG&E Substation Project is located on the corner of Sutter Street and Pennsylvania Avenue. The substation is bounded by an alley named Ford Al to the north, a truck container lot to the east, Pennsylvania Avenue to the south, and Sutter Street to the west. Sutter Street is a crowned, two lane road that runs north-south with a sidewalk on both sides. Approximately 12 ft of dense vegetation separates the PG&E substation and the Sutter Street sidewalk. The substation groundcover is predominantly compact gravel. Kevin Cullen, with the Fairfield-Suisun Sewer District and Sam Kumar with the City of Vallejo are the municipal leads for the Project.

Project Catchment

The catchment includes a portion of the PG&E substation at 500 Sutter Street and a portion of the roadway along Sutter Street. The treated watershed was estimated to be approximately 0.13 acres. The land use is a combination of industrial and commercial.

Project Concept

The PG&E substation drains into two drainage inlets along Sutter Street. Within the substation property, a concrete berm surrounds the substation structure and directs stormwater runoff from the structure area into a concrete lined ditch at the southwest corner of the property. The ditch connects to a 15 inch culvert that flows directly into drainage Inlet #1 on the northeast corner of Sutter Street and Pennsylvania Street. Stormwater runoff from the rest of the substation property sheet flows via driveway towards Sutter Street and into drainage Inlet #2 adjacent to the substation driveway. A curb along the northern and eastern edges of the substation lot prevents substation runoff from draining towards Ford Al alley. The two drainage inlets connect to a 36 inch culvert that flows south under Sutter Street. Information on the existing drainage systems was provided by the Vallejo Sanitation and Flood Control District.

A new drainage inlet would be installed adjacent to the substation driveway to collect sheet flow from the PG&E substation site. The proposed drainage inlet would be a Contech Catchbasin Stormfilter. Contech Stormfilters provide stormwater treatment through a replaceable media filter cartridge. The cartridge media filter is available with a variety of media, including PhosphoSorb, Perlite, Zeolite, CFS Leaf Media, Granular Activated Carbon (GAC), and a Zeolite, Perlite, GAC (ZPG) blend. Stormwater flows into the drainage inlet influent chamber

and then into a second chamber with the media filter cartridge. The medium filter cartridge traps pollutants but allows water to flow through the media filter and into the effluent chamber.

Preliminary surveys show a gas line very close to the proposed inlet location. The curb inlet configuration is proposed to avoid utility conflicts. The site watershed would be approximately 0.15 acres. Based on the watershed size, a single cartridge catchbasin would be sufficient to provide treatment for the site. An 18" culvert would connect the StormFilter to the existing inlet along the northbound lanes of Sutter Street.

Project Design and Construction Schedule

The PG&E Substation Project is currently in the design phase. The design firm is WRECO and 100% design is expected to be completed in the summer of 2012. The Project is expected to go out to bid in the fall of 2012 and construction is anticipated to begin in the fall or winter of 2012.

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