CONTRA COSTA CLEAN WATER PROGRAM
INTEGRATED MONITORING REPORT
PART C: POLLUTANTS OF CONCERN IMPLEMENTATION PLAN

Submitted by:

CONTRA COSTA CLEAN WATER PROGRAM

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EXECUTIVE SUMMARY

Part C of the Integrated Monitoring Report (IMR) summarizes the implementation approach to reduce loads of pollutants of concern (mercury and PCBs) from urban stormwater discharged from Permittee's jurisdictions. The implementation approach is based on lessons learned about PCB controls from pilot projects implemented throughout the San Francisco Bay Area through a regional monitoring collaborative project implemented by the Bay Area Stormwater Management Agencies Association (BASMAA) during the first permit term of the Municipal Regional Stormwater NPDES Permit Order No. R2-2009-0074 (Permit). Lessons learned were derived from pilot projects in all participating counties. In Contra Costa County, the pilot watersheds studied were the Lauritzen and Parr watersheds in the City of Richmond.

Lessons Learned: Source Investigations

Source investigations that were conducted in the pilot watersheds led to five properties that based on visual inspections from the street, records review, and on-site inspections, may be sources of PCB-contaminated sediments. Follow-up sampling indicated that of the five properties, two have a persistent spatial and temporal trend of PCB concentrations that suggest they may be sources of PCB-contaminated sediments to the city streets of Richmond. Those two properties will be referred to the San Francisco Bay Regional Water Quality Control Board for enforcement.

Lessons Learned: Street Sweeping

A street sweeping pilot study is being conducted in the streets abutting one of the suspected properties. The goal of the study is to determine whether enhanced street sweeping practices can make a significant reduction in the amount of PCB-contaminated sediments that are present on city streets near the suspected PCB source area. Two property owners in the suspected PCB source area currently sweep streets several times daily, as operations allow; however, street sweepers are unable to completely remove PCB-contaminated sediments because of the condition of the road and the lack of a curb and gutter. The street sweeping pilot is not complete yet, but early observations during the field work indicate that, consistent with a literature review on the subject, the condition of the road, the type of street sweeper, and operator skill and care are important factors affecting street sweeping efficiency.

Lessons Learned: Treatment Retrofits

Stormwater treatment retrofits were also piloted in the Lauritzen watershed. Approximately 210 linear feet of bioswale will be installed between the curb and sidewalk along Cutting Blvd. adjacent to a transformer yard. Testing of the performance of the bioswales will commence in Water Year 2014–2015. Cost estimates from this pilot project and others indicate that, if treatment retrofits were to be the primary implementation approach, the cost would be approximately $30,000,000 for the 110-acre area within the Lauritzen pilot watershed that is most impacted. This would achieve a load reduction of 300 grams of PCBs, at a cost of approximately $100,000 per gram. By extrapolation, to achieve a Bay Area – wide reduction of PCBs totaling 18,000 grams, as stipulated in the TMDL, via treatment retrofits would cost about $1.8 billion.

Lessons Learned: Diversion to Sanitary Sewers

The CCCWP has budgeted $250,000 to fund a pilot project to divert stormwater from the North Richmond Pump Station into the West County Wastewater District treatment plant. That project will be constructed in 2014 and tested in the 2014–2015 time frame. The total cost of the diversion pilot is estimated at approximately $852,000. The ongoing cost of diversion, should the pilot become a long-term operation, is unknown at present, subject to the West County Wastewater District's decision on fees for long-term operation.

Proposed Actions in the Pilot Watersheds

Proposed actions for focused implementation in the pilot watersheds are:

1. Refer suspected sources properties the SFB Water Board for enforcement.
2. Review and provide comment on the fugitive emissions plan that the Bay Area Air Quality Management District requires of one of the suspect property owners.
3. Work with the SFB Water Board to motivate the property owner to improve their property so that street sweeping is more effective and / or so that stormwater is retained onsite or treated prior to discharge.
4. Develop concept plans for stormwater treatment retrofits and seek grant funding to implement those concept plans.

Implementation Approach POCs in the Next Permit Cycle

To determine whether additional high-opportunity areas comparable to the pilot watersheds exist in other areas of Contra Costa County, an assessment will be conducted in the 2014–2015 time frame. The assessment begins with a mapping exercise, very similar to the trash plans developed by Permittees, that identifies old urban areas, old industrial areas, and potential PCB source areas such as electrical facilities and auto dismantlers. After refinement of the maps that have been developed through desktop analysis and on the ground inspections, samples will be collected from a prioritized list of suspect areas. Any high-opportunity areas identified would then be the subject of follow-up source identification and corrective measures comparable to the approach described above for the Laurtizen and Parr pilot watersheds.

It is anticipated that much of the old urban areas will reflect more widespread, moderately contaminated PCB concentrations in sediments. Most of the PCB load reductions required by the PCB Total Maximum Daily Load (TMDL) will likely have to come from control measures implemented over large areas of older urban land use. Planning and implementing a large-scale program of water quality improvement will take substantial resources. For context, based on the cost of recently reviewed stormwater treatment retrofits, stormwater treatment over a 1,000-acre watershed would cost around $285 million, based on a treatment cost of $285,000 per acre. That reflects only the capital cost; maintenance of treatment infrastructure such as bioswales and rain gardens will generate additional annual costs to local governments.

One of the most promising areas for watershed-scale water quality improvement, if funding were to be available, would be incorporation of low-impact development features into green streets projects as roads are repaved and rehabilitated. However, transportation funds are already limited, and typically constrained by statute to only fund transportation improvements, not water quality amenities. Contra Costa Clean Water Program (CCCWP) will partner with other countywide stormwater programs, state regulatory agencies, and transportation and planning commissions in the Bay Area to guide the development of new revenue streams to fund and incorporate water quality improvements. The CCCWP will also continue to support Permittee grant funding pursuits. Under any funding scenario, the project owners will be Permitees, with CCCWP providing coordination, support, and potentially providing matching funds.

The level of CCCWP funds available as cost match to fund implementation of water quality projects will be directly affected by the amount of funding that is required to go into monitoring. The CCCWP will spend approximately $1,425,000 to fund water quality monitoring programs in FY 2014/2015. The CCCWP has proposed through its submittal of Part A of the IMR that funds currently used to research pollutant loads in tributaries can be more practically applied to implementation of water quality improvement projects. Without a reduction of monitoring costs, CCCWP will not have resources to provide direct funds or grant match to support implementation of water quality improvement projects. Projects such as treatment retrofits also take time to plan, design and construct; therefore, implementation of water quality improvement projects on a watershed scale will take decades, not years, to achieve substantive changes.

1.0 INTRODUCTION

Part C of the Integrated Monitoring Report memorandum summarizes the approach to implementing actions to reduce stormwater loads of pollutants of concern (POC) that have established total maximum daily loads (TMDLs) with corresponding load allocations for urban stormwater. The POC driving this implementation planning effort are mercury and polychlorinated biphenyls (PCBs). The TMDL for mercury in San Francisco Bay requires that stormwater loads be reduced by approximately 50 percent compared to loads estimated at the time of TMDL adoption in 2006 by the San Francisco Bay Regional Water Quality Control Board. The TMDL for PCBs in San Francisco Bay requires approximately a ninety percent reduction compared to loads at the time of TMDL development adoption in 2008. The TMDL for methylmercury in the Sacramento–San Joaquin River Delta requires development of methylmercury control strategies to attain a roughly twofold reduction in the methylmercury concentration of Delta receiving waters as adopted by the Central Valley Regional Water Quality Control Board (CV Water Board) in 2010. All three TMDLs include multi-year implementation time frames for attainment, periodic reviews to evaluate progress and lessons learned, and possibly to revisit numeric targets and/or attainment schedules.

This summary of the implementation approach is a submittal required by two different National Pollutant Discharge Elimination System (NPDES) permits issued to Permittees of the Contra Costa Clean Water Program (CCCWP). The Municipal Regional Stormwater NPDES Permit Order No. R2-2009-0074 (MRP) issued by the SFB Water Board applies to most of urbanized Contra Costa County. The eastern portion of Contra Costa County is subject to a separate NPDES permit issued by the CV Water Board. The jurisdictions of the SFB and CV Water Boards within Contra Costa County are shown on Figure 1.

Section 2.0 below summarizes lessons learned from pilot studies required under the MRP as they inform next steps in the two high-opportunity[1] pilot watersheds that were selected within Contra Costa County: the Parr Watershed and the Harbor Watershed in the City of Richmond, which together make up the Santa Fe Channel Watershed. Findings of pilot studies have been summarized in detail in Part B of the Integrated Monitoring Report (IMR); therefore, this assessment of next steps relies on summaries of findings as they appear in IMR Part B, without repeating the details. Pilot studies evaluated in the Richmond pilot watersheds include stormwater treatment retrofits, enhanced street sweeping. In other pilot watersheds, street flushing and sediment removal pilots were evaluated.

In addition to the pilot watersheds identified for focused implementation during the next five-year MRP term, CCCWP Permittees will be working to identify new watersheds that may also be considered high-opportunity because of elevated PCB concentrations in sediments linked to potential source areas. The process to evaluate where within Contra Costa County “high-opportunity areas” may be located is described in **Section 3.0** below, along with a schedule and description of Permittee actions and support from CCCWP staff and contractors necessary to implement the assessment process. This approach has been developed by Bay Area

[1] High-opportunity areas are locations where PCB concentrations in sediments exceed 0.5 mg/kg, and the elevated concentrations are consistently observed over time and in spatial patterns that indicate a source area.

Stormwater Management Agencies Association (BASMAA) members in consultation with the SFB Water Board staff during the scoping of the next reissuance of the MRP.

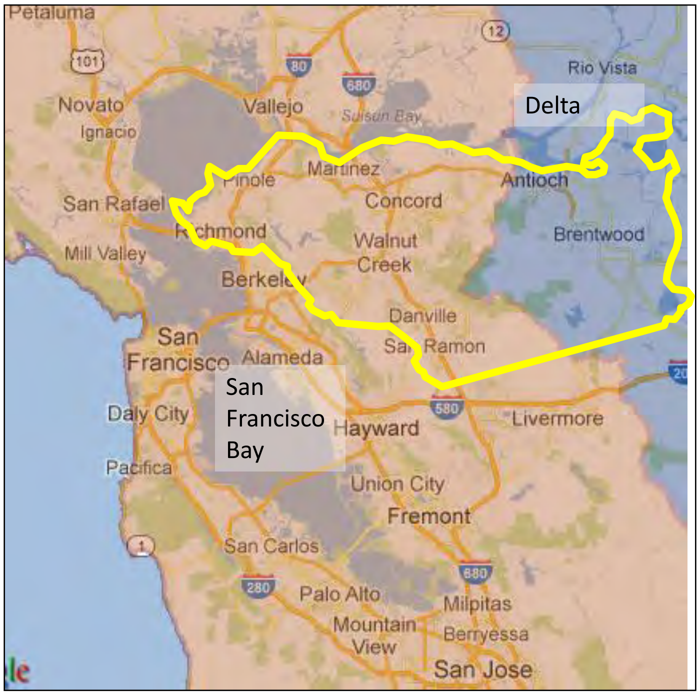


Figure 1. Jurisdictions of SFB Water Board (red) and CV Water Board (blue) in Contra Costa County (yellow border)

The assessment approach described in **Section 3.0** of IMR Part C parses out older urban areas, defined as areas that were urbanized prior to the 1980s, into either high-opportunity areas or all other older urban land uses. Lessons learned from MRP 1.0 indicate that high-opportunity areas for abating the release of PCB-contaminated sediments into the MS4 system are located within old industrial areas, where PCBs historically were manufactured, used, or released. Another lesson learned is that there are not likely enough high-opportunity areas to enable a 90 percent reduction of PCB loads from stormwater through focused implementation in a just those areas. Rather, attainment of a 90 percent reduction in PCB loads appears to require treatment of stormwater from a significant portion of the urbanized landscape – with the highest priority being in old urban areas.

Section 4.0 of IMR Part C describes potential approaches that could be implemented in the much larger subset of older urban land uses within Contra Costa County. One approach to reducing loads over such a widespread area is implementation of stormwater treatment by low-impact development (LID) and "green streets" projects (see Section 4.0) in conjunction with street improvement and economic revitalization projects. This strategy is aimed at maintaining or restoring the natural hydrologic functions of a site or drainage area. LID and green street projects are designed to detain, treat, and infiltrate runoff by minimizing impervious area, using pervious pavements and green roofs, dispersing runoff to landscape areas, and routing runoff to rain gardens, cisterns, swales and other small-scale or regional facilities within a site or watershed, respectively. The resources, timing, and funding necessary to achieve such a significant, widespread stormwater quality improvement program are discussed in this section. In conjunction with LID and green streets projects, the SFB Water Board has directed CCCWP Permittees to conduct a pilot study to evaluate the feasibility, costs, and benefits of diverting dry-weather and first-flush urban runoff into a sanitary sewage treatment plant. The status and initial findings of that pilot study as they inform next steps are summarized in **Section 5**.

2.0 Lessons Learned About PCB Controls in the Pilot Watersheds

Provisions C.11 (for mercury) and C.12 (for PCBs) require the identification of pilot watersheds know or suspected to be high-opportunity areas, and implementation of the following pilot projects in those watersheds:

- Investigation and abatement of sources of mercury and PCB contaminated sediments to public streets and drainage conveyances (Provisions C.11.c and C.12.c).
- Evaluation of enhanced municipal sediment management practices (Provisions C.11.d and C.12.d).
- Evaluation of on-site stormwater treatment via retrofit (Provisions C.11.e and C.12.e).

The pilot watersheds in Contra Costa County are the Parr and Lauritzen Channel Watersheds, located in Richmond, California. They are adjacent watersheds, forming a larger watershed that drains into the Harbor Channel of the Richmond Harbor (see Figures B.4.10 and B.4.12 in IMR Part B). The subsections below describe lessons learned from each pilot study, and then summarize potential next steps based on those lessons learned.

The North Richmond Pump Station Watershed is the subject of a separate pilot project to evaluate diversion of stormwater to sanitary sewers. That pilot project is described in **Section 5.0** below.

2.1 Source Investigation

The source identification approach and findings in the Contra Costa County pilot watersheds is described in IMR Part B, Section B.4. After an initial screening, five suspect properties were identified that were believed to merit additional monitoring. Of the five, two were found to have PCB detections in the public right-of-way at concentrations sufficiently high to warrant referral to the SFB Water Board:

1. Rickert International, a forklift repair business, has old equipment stored on site that inspectors noted was at risk for leaking hydraulic fluid. This location was targeted for sediment sampling from a storm drain inlet in front of the driveway entrance to the forklift repair yard. Sampling crews were able to collect soil directly adjacent to the property of the forklift storage yard, between the fence and the sidewalk in the public right-of-way. Sediment samples from the storm drain had PCB concentrations of 367 µg/kg; sediment samples collected adjacent to the fence had PCB concentrations of 326 µg/kg. These are consistent with prior PCB measurements in the area, and above what is considered urban background for the area. Although direct-flow paths from the property to the storm system were not obvious to inspectors, the driveway entrance appears to be a visible trackout source onto city streets.
2. SIMS Metal Management is located on the former United Heckathorn property, a Superfund site that is under remediation for DDT contamination. During the Superfund investigation of the site, it was discovered that scrap metal previously recycled at this facility included used transformers. That practice is believed to have ceased, and the property owner has implemented best management practices (BMPs, including dust control, blocking storm drain inlets, and street sweeping). However, on-site inspectors

noted that there was visible standing water as a result of dust control and that activities on the large dirt lot of the facility had potential to generate trackout. The front entrance is a potential trackout source that is swept regularly as a BMP; however, sediment accumulates in crevices along the fence line on Fourth Street that appears to be beyond the reach of street sweepers. Sediment also accumulates in railroad track grooves adjacent to the rear entrance of the facility and on Hoffman Boulevard on the east side of the facility. Those sediments in adjacent streets have PCB concentrations ranging from 932 to 1,450 µg/kg, which is well above typical urban background. Those 2012 measurements are consistent with previous measurements in the area in 2006 and 2007.

The goal of referring properties to the SFB Water Board for enforcement is to compel property owners to modify their properties and/or conduct their operations in a manner that does not cause or contribute to the presence of elevated PCB concentrations in the public right-of-way.

2.2 Enhanced Sediment Management

The enhanced sediment management practice being evaluated in the pilot watersheds is street sweeping. As described in IMR Part B Section B.5, pilot street sweeping studies are currently being conducted, and so final results will not be reported until 2015. However, initial findings of a literature review of the subject (EOA and Geosyntec Consultants) are consistent with field observations during the first enhanced street sweeping studies conducted in 2014 in the pilot watersheds: key factors affecting the efficiency of street sweepers include the condition of the roads, the type of street sweeper (e.g., vacuum vs. brushes), and the skill and care of the operator.

Some practical lessons learned from observations and BMPs resulted from street sweeping areas that had not been previously swept (see IMR Part B Appendix B.5.B). In Richmond, a section of Hoffman Boulevard adjacent to the metal recycler was not previously on the regular street sweeper logs. In North Richmond, a section of Market Avenue that previously had no paved shoulders or curbs was reconfigured, allowing street sweeping where it had not previously occurred.

The estimated load reduction benefit from these changes depends on the PCB concentration in source area sediments, among other factors. In the Richmond location, where sediment PCB concentrations are approximately 1,000 µg/kg, initiation of street sweeping along 0.3 miles of Hoffman Boulevard is estimated to reduce or avoid approximately 3 grams of PCBs annually. In contrast, sediments in the North Richmond watershed have approximately three- to fivefold lower PCB concentrations, with correspondingly lower PCB load reduction benefits from street sweeping. The load reduction estimates for the Hoffman location will be improved as a result of the pilot street sweeping study; however, based on literature reviews and practical assessments, the above estimates are not expected to change by an order of magnitude.

Other enhanced sediment management pilot projects are being evaluated and are documented in IMR Part B, Section B.6. Those pilot projects include pump station cleaning, storm drain line cleaning / flushing, and street flushing. Pump station cleaning is not applicable to the Parr and Lauritzen watersheds, as there are no stormwater pump stations downstream of the affected area having high PCB concentrations in sediments. Storm drain line cleaning and flushing was evaluated as a potential pilot project in the Parr and Lauritzen watersheds; however, the confounding influences of tidal intrusion and aging infrastructure precluded conducting such a pilot study within the schedule and budget constraints of the pilot projects. The potential for maintenance and rehabilitation of the stormwater conveyance system in the Parr and Lauritzen watersheds to benefit PCB management will need to be evaluated in the future, in the context of rehabilitation of aging infrastructure.

A street washing and flushing pilot project was previously evaluated in Oakland, and another is being conducted in San Mateo. Using pressurized water to dislodge sediments from the nooks and crannies of city streets can be thought of as extremely high-efficiency street sweeping that generates liquid waste and costs substantially more than street sweeping alone. For context, the pilot study in the city of Oakland cost $100,000 and removed approximately 9 grams of PCBs from city streets. One of the significant challenges to both street and pipe flushing is disposal of the water; therefore, street and pipe flushing may be more implementable in conjunction with diversions to sanitary sewers (see Section 5.0 below), where the infrastructure allows such an approach. In the Parr and Lauritzen watersheds, the option to divert to sanitary sewers is not available, as the existing system is already susceptible to sanitary sewer overflows and upsets caused by stormwater inflow and infiltration.

2.3 On-Site Stormwater Treatment

A pilot stormwater treatment retrofit was designed for an area in the Lauritzen Channel Watershed in the City of Richmond (IMR Part B, Section B.7). The retrofit consists of one bioretention cell with an underdrain and one bioretention cell with no underdrain. In addition, the bioretention cell with the underdrain provided two types of media for comparison: one with a carbon-based adsorption enhancer, known as “biochar,” and one without.

The design cost for this pilot retrofit was $108,000. The construction cost estimate based on the design was $240,000; however, based on contractor bid estimates, it is possible that the actual construction cost could be as high as $350,000. Additionally, City of Richmond staff time in support of the planning, design and construction totaled $82,000. About a third of that staff time reflects inspection and contractor management effort that would be expected for any such project; the remainder reflects planning effort needed to carry out the site selection and treatment evaluation in a regional collaboration. In summary, the total planning and design cost for this retrofit that treats stormwater along a roadway segment of approximately 210 linear ft. is estimated to be between $458,000 and $540,000, depending on the final construction cost and how City staff time is counted.

For planning purposes, $500,000 for 210 linear ft, or $2,380 per linear ft, of curbside treatment can be used to estimate the cost of area-wide implementation. Another way to view the cost of retrofits is on an acreage basis. A review of this Lauritzen Channel retrofit and four other projects indicates that costs-per-acre-treated range from $27,000 per acre to as much as $992,000 per acre treated (Appendix C.1). A local benchmark cost of $285,000 per acre for the Lauritzen Channel retrofit at 1st and Cutting is more appropriate for extrapolation, because of utility constraints and local construction costs.

Based on lessons learned from treatment retrofits, the cost to design and implement stormwater treatment retrofits across the entire 750 acre area of the Lauritzen and Parr watersheds is approximately $213,000,000, assuming treatment costs of $285,000 per acre. Treatment of a smaller, 110-acre subset of the watersheds focused around the metal recycler source area would cost approximately $31,000,000. About 12,250 total linear ft. of street lie within the 110 acres of high-opportunity area in the Lauritzen and Parr watersheds. At a cost of $2,380 per linear ft, this would correspond to $29 million for a complete treatment retrofit. In other words, a treatment retrofit approach in this high opportunity area would cost approximately $30 million, which is well beyond the reasonable and foreseeable means of the City of Richmond.

Construction of the pilot treatment retrofit in the Lauritzen Channel watershed at 1st and Cutting is anticipated to take place in the summer of 2014. Monitoring will occur in Water Year 2014-2015. That pilot project would only capture a few milligrams to a gram of PCBs, because of the limited treatment area within the pilot watershed.

Although direct load reduction benefits for the entire high opportunity area have not yet been measured, land-area modeling indicates that the expected load reduction from this high-opportunity area would be on the order of 300 grams, or 0.3 kg of PCBs. At an estimated cost of $30 million for a retrofit approach, this corresponds to $100,000 per gram of PCBs. For context, the PCB load reduction assigned to all urban stormwater discharges is 18 kg per year, or 18,000 grams. To achieve a 18,000 gram per year load reduction at a cost of $100,000 per gram of PCBs would cost $1.8 billion, which is beyond the means of Bay Area municipalities.

2.4 Proposed Approach in the Existing Pilot Watersheds

The lessons learned as summarized above inform the implementation approach in the Lauritzen Channel and Parr pilot watersheds. The City of Richmond's representative to the CCCWP has reviewed the options and agreed that the following actions can be implemented now and in the next permit term:

- The suspected sources properties indicated in Section 2.3 above will be referred to the SFB Water Board for enforcement. This action will be initiated in April 2014 by the City of Richmond with CCCWP technical support. The time frame for follow-up actions and expected outcomes will depend, among other factors, on SFB Water Board staff decisions about the priority and approach for enforcement. The desired outcome of this action is a change in the activities and/or configuration of the suspect properties such that sediments with PCB concentrations exceeding 100 µg/kg are not dispersed to City streets via vehicle trackout, wind dispersion, or other modes of transport, and that stormwater discharged from the properties is also managed such that PCB-contaminated sediments are not discharged to the MS4 system or to the Bay.
- The fugitive emissions plan prepared by SIMS Metal Management will be reviewed and comments will be provided to the Bay Area Air Quality Management District. This action is expected to be initiated in May 2014, by the City of Richmond with CCCWP technical support. The desired outcome of this action is a change in the activities and/or configuration of the suspect property such that sediments with PCB concentrations exceeding 100 µg/kg are not dispersed to City streets via fugitive emissions, wind dispersion or other modes of transport.
- The City of Richmond will, through referral of the SIMS Metal Management Property to the SFB Water Board, to motivate the property owner to improve their property so that street sweeping is more effective and / or so that stormwater is retained onsite or treated prior to discharge.

- Concept plans for stormwater treatment retrofits will be developed and grant funding will be sought to design and construct stormwater treatment retrofits in the high-opportunity areas of the Santa Fe Channel. This action will be led by the City of Richmond with CCCWP support. Concept plans will be developed during the 2014–2015 fiscal year. Planning for stormwater treatment retrofits will need to account for the long-term maintenance of the retrofits installed. To the extent that the need for those retrofits is generated by a private property owner in the high-opportunity area, the City of Richmond will seek to establish funding partnerships with the owners of source-area properties to recover capital and maintenance costs of complying with the requirements of the MRP and the PCB TMDL.

The above actions constitute the limits of what can reasonably and foreseeably be implemented by the City of Richmond with CCCWP support.

3.0 IDENTIFICATION OF NEW HIGH-OPPORTUNITY AREAS

This section describes the planning approach that will be taken in the next year to prepare for MRP implementation during the next permit term. The CCCWP has worked with BASMAA member agencies and the SFB Water Board to develop an approach to identify new high-opportunity areas for PCB and mercury load reductions. The approach is founded on the concept that PCB concentrations in urban sediments tend to be higher in older urban areas, particularly areas that were industrialized prior to the peak usage period of mercury and PCBs in the time frame of 1950–1980 (Appendix C.2).

A BASMAA analysis of land use within the Bay Area MRP Permittee's jurisdiction indicates that approximately 20,000 acres of land can be categorized as old urban. Within those 20,000 acres, a smaller subset is old industrial. Lessons learned from MRP implementation show that high-opportunity areas tend to be located in old industrial areas. There are also certain types of industrial / commercial activities – such as electric power transmission, auto dismantling, metal recycling, refineries, crematorium, cement plants and operations – that are in some instances associated with higher concentrations of mercury and PCBs in nearby urban sediments.

The CCCWP has developed an initial geographic information systems (GIS) analysis of land use in Contra Costa County (Appendix C.3) The GIS layers show land uses in each Permittee's jurisdiction, including acreage estimates for each type of land use. Acreage in each land use type is used to estimate PCB loads based on the following yields of PCBs (expressed as mg PCBs per acre per year)[2]:

- Old Industrial: 50
- Old Urban 17.5
- New Urban 2
- Open Space 2.5
- Other 2

The land use analysis provides an initial estimate of PCB loads from each Permittee's jurisdiction. The goals of this planning approach are as follows:

- Refine the land use classifications based on Permittee input, desktop analysis, and walking / driving inspections.
- Identify potential source areas based on existing and historic commercial and industrial activity, visible sediment sources, and other information, consistent with the source identification work carried out in the first MRP permit term.
- Collect sediment samples from potential source areas to determine whether additional high-opportunity areas, such as the locations in the Lauritzen and Parr watersheds, can be identified.
- Prioritize old urban areas that present more moderate opportunities for development and implementation of water quality improvement plans.

In many ways, the exercise is similar to the trash mapping task that Permittees have undertaken, with the exception that the presences of trash can be visually confirmed, whereas

[2] Yields based on analysis by Geosyntec and EOA as presented to the MRP 2.0 Stakeholders Steering Committee, November, 2013.

PCBs require sample collect and chemical analysis for confirmation. This activity would commence in the 2014–2015 time frame, in preparation for MRP implementation in the next permit term. Details of the schedule and approach are presented in Appendix C.4.

In any new high-opportunity areas identified, the follow-up actions would be consistent with activities in the Lauritzen and Parr watersheds. Follow-up sampling and analysis is typically necessary to confirm consistently high PCB concentrations are noted over time, and to determine whether a spatial pattern indicates a specific source area. If a source area can be tied to a property owner, the property owner would be contacted to alert them of concerns about potential release of PCB contaminated sediments from their property, and to discuss corrective measures. If the property owner cannot or will not take action to control the dispersion of PCB contaminated sediments from the property under their control, they would be referred to the SFB Water Board for enforcement. As with the experience in the Lauritzen and Parr watersheds, if source control is not achieved, Permittees and the SFB Water Board would need to weigh the costs and benefits of continued pressure on the property owner vs. taking actions outside the source property to prevent PCB contaminated sediments from entering the municipal storm drain system.

The search for new high-opportunity areas is necessary due diligence. If there are other significant sources of PCB contaminated sediments connected to properties or activities, they must be identified and abated to make meaningful progress toward reducing PCB loads to the Bay. However, it is unlikely that the assessment will reveal enough high-opportunity source areas to account for the PCB load reductions prescribed in the TMDL. Rather, a majority of the load reductions are expected to result from control measures applied in old urban land areas. Therefore, another output of this assessment is a prioritized list of watersheds, presumably mostly old urban, that need improvement. The next section describes how watersheds prioritized for improvement will be addressed.

The expected cost of the assessment approach described above is in the range of $100,000 to $200,000, depending on the sampling intensity of the monitoring phase. The CCCWP proposes to the SFB Water Board that this assessment be performed in lieu of POC loads monitoring at Marsh Creek during Water Year 2014–2015, so that monitoring resources are more directly addressing the need for PCB load reductions from urban stormwater discharges. This monitoring does not rely on storms and can therefore be conducted even in drought years. Details of the scope, schedule, and budget on this approach are currently being worked out with BASMAA member agencies.

4.0 WATER QUALITY IMPROVEMENT IN OLD URBAN AREAS

Water quality improvement plans will be developed for the more widespread old urban areas that have been prioritized through the assessment approach described in Section 3.0 above. Based on lessons learned from the MRP, the most likely path to achieving significant PCB load reductions across such a large area – thousands of acres – would be implementation of stormwater treatment retrofits. However, implementation of treatment retrofits over such a large area is expected to be costly. As noted above in Section 2.0, treatment retrofit costs in the constrained urban settings that are the highest priorities are approximately $285,000 per acre. At that rate, implementation of treatment retrofits across 1,000 acres would cost around $285 million.

The cost of such a level of activity is beyond the means of Permittees. To reasonably and forseeably achieve such a level of widespread stormwater treatment retrofit, it will take time, planning, and new fiscal resources. A strategy put forth by the MRP Stakeholder Steering Committee is to identify retrofit opportunities that maximize water quality benefit. For example, almost all streets are or soon (within the next decade) will be in need of rehabilitation and repair. Areas that will provide the greatest pollutant reduction, not only for PCBs but also for trash, should be prioritized for “green streets” improvements.

The cost of stormwater treatment retrofits is an important constraint on the implementation of green streets projects. Transportation funds are typically restricted for use only on transportation related design and construction. Municipalities are already struggling to keep up with the work needed to keep existing streets operable. Addition of stormwater treatment to street repaving and repair projects, without any new revenues to offset the cost, is not feasible.

The development of “green streets” (i.e., streets that incorporate LID) is part of a larger trend in urban planning toward “complete streets” (streets designed to minimize energy use, facilitate multiple transport modes, and promote a greener urban environment). The “greening” of our existing streets and roads with stormwater quality features on a watershed scale will take decades and the support of taxpayers in order to generate the funding needed to plan, design and construct needed treatment retrofits.

In the short term, the CCCWP can support municipalities with pursuit of grant funding to implement stormwater treatment retrofits. The CCCWP submitted two concept proposals to the Proposition 84 stormwater grant program in the fall of 2013. One of the two was called back for submittal of a full proposal in February 2014 (Appendix C.5). The proposed Proposition 84 project, if awarded grant funds, would implement an LID retrofit stormwater treatment and hydromodification management demonstration project providing long term water quality improvements for a 27-acre area, including the Contra Costa County Public Works Department, which is located in the Upper Grayson Creek Watershed.

Although the demonstration project will be a step forward, Proposition 84 funds will have limited use for most of Contra Costa County’s PCB load reduction needs. The legislation that authorized Proposition 84 requires funded projects to address freshwater lakes and streams, not the Bay. Much of the old urban areas that are likely to be the highest priority are going to be low-lying catchments that discharge directly to the Bay.

One alternative to Proposition 84 is the U.S. EPA's Water Quality Improvement fund. That program provided $5 million of implementation funding that, along with $2.5 million in matching funds from BASMAA member programs, funded the Clean Watersheds for a Clean Bay pilot projects describe in IMR Part B. In the fall of 2013, the CCCWP submitted a stormwater improvement proposal to the Water Quality Improvement Fund that was well received by grant reviewers, but was not funded (Appendix C.6).

The CCCWP will continue to identify and track funding opportunities for water quality improvement projects. The CCCWP will provide staff and consultant support needed to develop grant proposals on behalf of Permittees. As noted in the conclusion to IMR Part A, if monitoring costs can be reduced, the CCCWP is also willing to redirect those funds that would otherwise go to monitoring for cost match or direct support of water quality improvement projects. The CCCWP has already authorized $250,000 to support a pilot pump station diversion project (described in Section 5 below).

The use of CCCWP resources to not only seek grant funding, but also to assist Permittees with the cost of capital improvements to achieve required water quality improvements, is a new paradigm. The success of this new approach, and the prospects for getting voter support needed to raise any new revenues locally, depends on a clear demonstration to Permittee representatives and the public that the funds are going to projects that produce tangible benefits. The general public is more likely to support fees used to build rain gardens and bioswales than on water quality monitoring, pilot studies, and long, detailed technical reports. This disconnect between use of existing funds and a clearly defined capital improvement is a root cause of the recent failure of the CCCWP's 2012 Community Clean Water Funding Initiative to raise stormwater fees.

Directing CCCWP funds to grant matches that implement water quality improvement projects will be a helpful step in the right direction, if that step is enabled by freeing up monitoring resources. But even that step will be small in comparison to the cost of modifying the landscape and drainages of large swaths of Contra Costa County. The CCCWP is also committed to working with BASMAA member programs, municipal representatives, and the SFB Water Board to lobby transportation agencies and the legislature for creation of revenues that are dedicated to implementation of green streets and other water quality improvement infrastructure. A key issue to be resolved in the reissuance of the MRP is how to sensibly integrate that commitment into the language of a stormwater permit.

As long-term and short-term funding strategies are developed and pursued, they need to address not only capital costs, but also long-term operations and maintenance costs. Every new treatment control that is installed will generate some level of new ongoing effort and cost to maintain. Those ongoing costs must also need to be factored into the capital planning of water quality improvements. These large-scale and long-term funding commitments will require time to plan for resource allocation and implementation. The CCCWP can assist Permittees with that planning and implementation; however, realistic expectations need to be set in the minds of the public. The approach to reducing PCB loads from the thousands of acres of old urban areas will be achieved over decades, not years.

Recognizing the difficulties of implementing stormwater treatment over a large area, the SFB Water Board has required Permittees to implement pilot projects that evaluate the feasibility and benefits of diverting stormwater from pump stations into sanitary sewer systems. The theory behind this requirement is that if small quantities of “first-flush” stormwater contained a disproportionately high amount of an entire storm’s PCB load, then diversion and treatment along with sanitary sewage might be a cost-effective approach to PCB load reduction. The approach and status of a pilot project under development by Contra Costa County Public Works Department with CCCWP support is described in the next section.

5.0 STORMWATER PUMP STATION DIVERSIONS

In 2009, the Contra Costa County Public Works Department successfully obtained a grant from the U.S. Environmental Protection Agency (EPA) to support infrastructure improvements at the North Richmond Pump Station. The North Richmond Pump Station is jointly owned by Contra Costa County and the City of Richmond. The County is the lead on this pilot project; the City of Richmond participates in the project through contributions to the CCCWP budget.

The scope of the grant authorized included installation and evaluation of a diversion to the West County Wastewater District (WCWD) treatment plant. Grant funds were awarded in 2010 and pre-project monitoring took place from 2010 to 2012. The final report on pre-project monitoring was completed in December 2012. The findings of that report were that approximately 10 grams of PCBs were discharged from the pump station during the entire period monitored. This is consistent with the expected load from the 900 acre, old urban, partly industrial watershed.

The County has been coordinating with WCWD since 2012 to establish a permitting framework that would allow discharge of stormwater into the WCWD sanitary sewer. A concept proposal was prepared by the CCCWP and submitted to the WCWD Planning and Project Committee in the fall of 2012 (Appendix C.7). Although WCWD board members serving on the Committee expressed support for the pilot project, they did have some concerns as follows:

- Capacity – Committee members noted that first flush potentially impacts retention capacity when it is least available.
- Definitions – The Committee wanted clarification about what specifically is meant by "first flush," as this definition plays into the concept of available capacity (e.g. intensity/duration, antecedent dry periods).
- Costs – The Committee made it very clear that they expected any project to be cost neutral from the WCWD ratepayer perspective.
- Impact on biosolids – The Committee expressed some concern that pollutants (e.g., PCBs) present in stormwater could limit biosolids management options. WCWD currently re-uses biosolids as landfill alternative daily cover, and would not want to lose that option due to increase pollutant concentrations in biosolids.
- Potential for upsets – WCWD staff have raised the concern that introduction of stormwater to sanitary sewers could disrupt activated sludge bacteria, leading to a sewage system upset.
- Impact on recycled water – The Committee noted that they are able to divert essentially all dry weather flows into the East Bay Municipal Utility District (EBMUD) North Richmond Water Recycling Facility for additional treatment at EBMUD's Richmond Advanced Recycling Expansion for resale to Chevron as process water. WCWD would not want any change to jeopardize that operation.

The CCCWP developed a monitoring needs technical memorandum to address the concerns expressed by WCWD staff and board members (Appendix C.8). Meetings with WCWD staff and board members in 2014 indicate that their concerns have been addressed and they are comfortable moving forward with the pilot project. The County has retained a design contractor and expects construction of the diversion to begin in the summer of 2014. Monitoring of the diversion pilot would take place in the 2014–2015 time frame. The total cost of the diversion pilot, including monitoring and safeguards addressing WCWD concerns, is estimated at approximately $852,000. The potential cost of long-term operation of the diversion after the pilot project is complete is unknown at present. The County has asked WCWD to provide an estimate of their fee for management[3] of the diversion and treatment of stormwater as a long-term operation.

The benefit of this diversion project, in terms of PCB loads reduced, is limited. The nearest wastewater conveyance will not allow more than 500 gpm to be diverted into the WCWD collection system. Diversions will need to be halted after first flush, because of inflow and infiltration that impacts the conveyance and treatment capacity of the WCWD plant. It is expect that at best, perhaps 1 gram of the approximately 10 grams of PCBs discharged from the watershed annually could be diverted and treated by the WCWD plant. The resulting cost per gram is about ten-fold greater, i.e. nearly $1 million per gram, for PCB load reduction by diversion to sanitary sewer as compared to onsite treatment retrofits described in Section 2.0 above.

The CCCWP developed a grant proposal to the U.S. EPA on behalf of the County to explore ways to enhance the diversion to the WCWD plant with on-site stormwater treatment, thereby enabling larger flows to be treated, and allowing treatment to continue beyond first flush. That grant proposal received favorable reviews from the U.S. EPA, but was not funded due to limited available funds. As a result of the favorable review, the CCCWP will consider re-submittal of a similar grant proposal in the future.

It should be recognized that even if 100 percent of stormwater from the North Richmond Pump Station could be diverted and treated, the expected load reduction is on the order of 10 grams of PCBs. This is but a tiny fraction of the 18 kg (18,000 grams) of PCB load reduction from all Bay Area urban stormwater prescribed by the TMDL. The disappointingly small gains that can be realized from treating discharges from a 900 acre old urban watershed signify the magnitude of the challenges posed by the mandates established in the TMDL.

[3] WCWD staff currently operate and maintain the North Richmond Pump Station under a service contract with the pump station owners.

Question: How much would removing 90% PCB cost in the Bay Area?

Using the Santa Fe Channel hot spot in Richmond as an example:

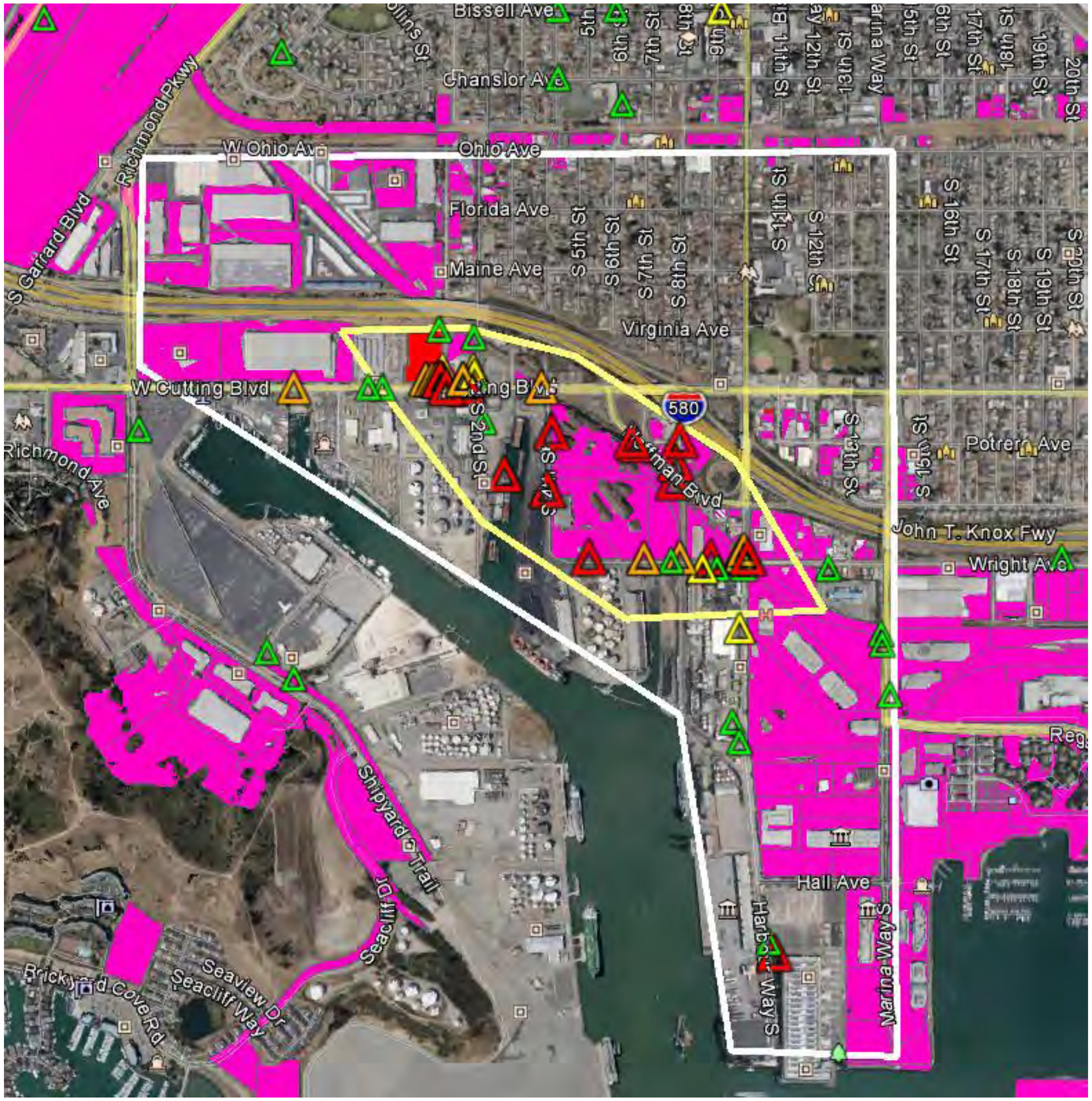


Figure 1: Santa Fe Channel potential treatment area delineation. The area highlighted in pink are Old Industrial, and the triangular notation designate PCB sample concentrations of: red = >1.0 mg/kg; orange = >0.5 & <1.0 mg/kg; yellow = >0.2 & <0.5 mg/kg; and green = <0.2 mg/kg.

Santa Fe Channel hypothetical treatment area, designated by the white polygon, is approximately 750 acres (Figure 1). The hypothetical treatment area for just around the metal recycler, designated by the yellow polygon, is approximately 110 acres.

Surveying a range of treatment projects in the Bay Area (Table 1), the cost of stormwater treatment span a significant range, varying from $27,000 per acre to $992,000 per acre. A multitude of factors contribute to this disparity. At the lower end of the cost spectrum, the city of Palo Alto was implementing retrofits for an entire neighborhood based on preexisting public land availability by adjusting the retrofits to fit with existing infrastructure, and also had some economy of scale. At the other end of the spectrum, the Bransten Road Green Street Project, potholing for utility location verification, redesign, and PCB challenges all contributed to the high cost.

Table 1: Survey of stormwater treatment projects in the Bay Area and their relative cost.

Project	Location	Contact	Description	Area treated (acres)	Design cost	Construction cost	Other cost	% cost related to water quality	Cost/acre
PG&E Substation	1st & Cutting, Richmond	Lynn Scarpa	1 bioretention w/ underdrain, 1 w/o	1.7	108,605	294,213	82,077**	100	285,000
Bransten Rd. Green St.	Btw. Old Country Rd. & Industrial Rd., San Carlos	Jon Konnan	9 bioretention in new curb extensions: 4 w/ underdrain, 5 w/o	0.54	156,000	379,600		100	992,000
Broadway and Redwood	Btw. Redwood & Valle Vista, Vallejo	Sam Kumar	Vegetated swale, initial irrigation	0.93					
San Pablo Ave. Green Spine	Btw. McBryde & Andrade, Richmond	Josh Brandt	6 bioretention: 1 rain garden, 5 curb extension	2.25					
El Cerrito Green Streets	10200 and 11048 San Pablo Ave., El Cerrito	Stephen Pree	19 rain gardens	1.33	*	324,127	181,705 ***		
Codornices Creek Restoration	Lower creek btw. Union Pacific tracks to San Pablo Ave.	Jim Scanlin	4 rain gardens/bioretention areas	1.93	35,000	140,000		100 for rain garden	91,000
Sustainable Sts & Parking Lots Demo	Off Donnelly and Burlingame Ave., Burlingame	Jane Gomery	1 rain garden, planter box(curb extension)	1.32	270,000 (design, engineering, construction)			100	205,000
Southgate Neighborhood Green Sts	Palo Alto	Jill Bicknell	19 bioretention areas, porous pavement	41.4	300,000	800,000		100 (and for poor drainage)	27,000

* Unknown. Competed as part of larger San Pablo Ave Streetscape Project.
** staff cost
*** O&M and monitoring

Using these figures, treatment of the larger 750 acre area can range from $20 million to $740 million. Treatment of the smaller area can range **between $3 million to $110 million**.

Another way to estimate cost is to look at treatment area per linear feet. An approximate total street length of 12,250 ft lies within the yellow polygon in Figure 1 as potential area for bioretention treatment (Table 2).

Table 2: Street length included in yellow polygon in Figure 1.

Street	**Length (ft)**
Cutting	2080
Chesson St.	260
S 1st St.	470
S 2nd St.	1200
S 3rd St.	340
S 4th St.	1690
Hoffman Blvd	1920
S 7th St	330
Potrero Ave.	320
S 8th St.	450
Harbour Way	1160
Wright Ave.	2030
Total	**12250**

Contra Costa Clean Water Program PCB Contributions by City 2/24/2014

1. Introduction

The purpose of this technical memorandum is to quantify the amount of polychlorinated biphenyl (PCB) contributed by each city in Contra Costa County to support Provision C.12.c of Order No. R2-20009-0074 (Municipal Regional Stormwater Permit) issued by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) and Order No. R5-2010-0102 (the Central Valley Permit). Provision C.12.c requires the development and implementation of pilot projects to investigate and abate on-land locations with elevated PCB concentrations. The results from this memo will assist the development of a targeted approach to capture the maximum PCB extent possible before entering into the Bay.

A spreadsheet model was developed by Geosyntec to quantify loading from each permittee, which estimated the annual PCB loading by land use. In this memo, the same approached was developed using supplemental data made available by the Contra Costa Clean Water Program (CCCWP) and for additional cities not included in the Geosyntec analysis (e.g. Brentwood and Oakley) but fall under the purview of the Central Valley Permit.

2. Regulatory Setting

CCCWP is regulated by two different National Pollutant Discharge Elimination System (NPDES) permits for discharges of urban stormwater from Municipal Separate Storm Sewer Systems (MS4s). The Municipal Regional Stormwater NPDES Permit (a.k.a., "the MRP", Order R2-2009-0074, Adopted October 14, 2009, Revised November 28, 2011) issued by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) applies to most of Contra Costa County. The eastern portion of Contra Costa County is subject to a separate NPDES permit (Order R5-2010-0102, adopted September 23, 2010) issued by the CVRWQCB (a.k.a. the "Central Valley Permit"). The jurisdictions of the San Francisco Bay and Central Valley Regional Water Quality Control Boards within Contra Costa County are shown in Figure 1.

Figure 1. Jurisdictions of San Francisco Bay Regional Water Quality Control Board (Red) and Central Valley Regional Water Quality Control Board (Blue) in Contra Costa County (yellow border)

The SFBRWQCB and the CVRWQCB have also each adopted separate Total Maximum Daily Loads (TMDLs) for PCB in receiving waters of the San Francisco Bay and the Sacramento-San Joaquin River Delta, respectively. Both of those TMDLs include requirements for MS4 dischargers to identify and implement PCB control measures. To the extent possible, CCCWP attempts to coordinate activities required under both NPDES permits to derive countywide benefits and avoid duplication of effort. For this analysis, the opportunity for coordinated action is a combined analysis mandated by the MRP for evaluation of PCB load reductions.

3. Approach

Using Google Earth .KMZ file for the area, land in each city within the County was partitioned into the historical land use categories of 1) Old Industrial, 2) Old Urban, 3) New Urban, 4) Open Space, and 5) Other. “Old Industrial” includes land that is not redeveloped or redeveloped into new industrial, mixed land use, residential, retail offices, roads, schools, or open space. “Other” includes parcels that house electrical properties, freeway, military, ports, and railroad. As “Open Space” was not defined by the .KMZ file and is not simply the remaining area after omitting the five categories above, the areas designated as “Open Space” and “Park” by the county’s General Plan was used. Since the interest lies in PCB influx into the Bay, areas designated as "Utility-Owned Watershed" and "Delta-Open Space / Recreational" were excluded from the total "Open Space" acreage, as water from those areas do not flow to the Bay.

Using the partitioned areas and the appropriate PCB multiplier, total PCB loading in each city can be calculated as:

$$\begin{aligned} \textit{Total Loading [mg/yr]} = {} & (\textit{Area}_{\textit{old industrial}})\ \textit{acres*50 mg/acre/yr} \\ & + (\textit{Area}_{\textit{old urban}})\ \textit{acres*17.5 mg/acre/yr} \\ & + (\textit{Area}_{\textit{new urban}})\ \textit{acres*2 mg/acre/yr} \\ & +(\textit{Area}_{\textit{open space}})\ \textit{acres*2.5 mg/acre/yr} \\ & +(\textit{Area}_{\textit{other}})\ \textit{acres*2 mg/acre/yr} \end{aligned}$$

Performing this calculation for each city in the County results in loading estimates as shown in Table 1.

CITY	Old Industrial	Old Urban	Open Space	New Urban and Other	Total
	g/yr				
Antioch	11.2	1.1	9.2	0.2	22
Brentwood	3.5	0.0	3.2	0.0	7
Clayton	0.0	12.9	2.5	1.4	17
Concord	9.0	175.8	14.0	12.4	211
Contra Costa County	221.4	228.1	169.2	15.5	634
Danville	0.3	75.7	8.2	5.3	89
El Cerrito	0.0	34.8	0.9	0.1	36
Hercules	6.5	5.5	3.1	3.3	18
Lafayette	0.0	98.9	2.2	1.2	102
Martinez	21.4	47.0	5.9	3.6	78
Moraga	1.1	3.1	5.8	0.1	10
Oakley	11.3	0.0	1.1	0.0	12
Orinda	0.0	2.1	3.4	0.1	6
Pinole	1.4	33.0	1.9	0.6	37
Pittsburg	70.7	50.7	7.2	4.4	133
Pleasant Hill	1.0	61.9	1.4	0.7	65
Richmond	167.1	107.6	17.6	3.3	296
San Pablo	1.8	24.5	0.2	0.1	27
San Ramon	0.0	29.6	11.5	11.0	52
Walnut Creek	1.9	128.5	11.1	1.7	143
Total	529.8	1120.6	279.6	64.7	**1995**

Table 1: PCB contribution per city estimated using historical land use and area.

Our analysis show comparable values to Geosyntec's analysis. Significant differences can be seen in cities such as Antioch, which in the current analysis is evaluated in its entirety, in contrast to only the portion under Region 2 jurisdiction, as in Geosyntec's analysis.

Other discrepancies are caused by the definition of "Open Space." Geosyntec's analysis defined "Open Space" as:

$$\textit{Open Space} = (\textit{Watershed Boundaries below Dams (SFEI) area}) - (\textit{Old Industrial} + \textit{Old Urban} + \textit{New Urban} + \textit{Other})$$

whereas the definition for "Open Space" in the present calculations was sourced from the Contra Costa General Plan. Because "Open Space" was calculated separately from the .KMZ file, there were some areas that double counted as both Open Space as well as another category. This artifact was particularly notable in Concord, where a large portion of the military property has been converted to open space (Figure 2).

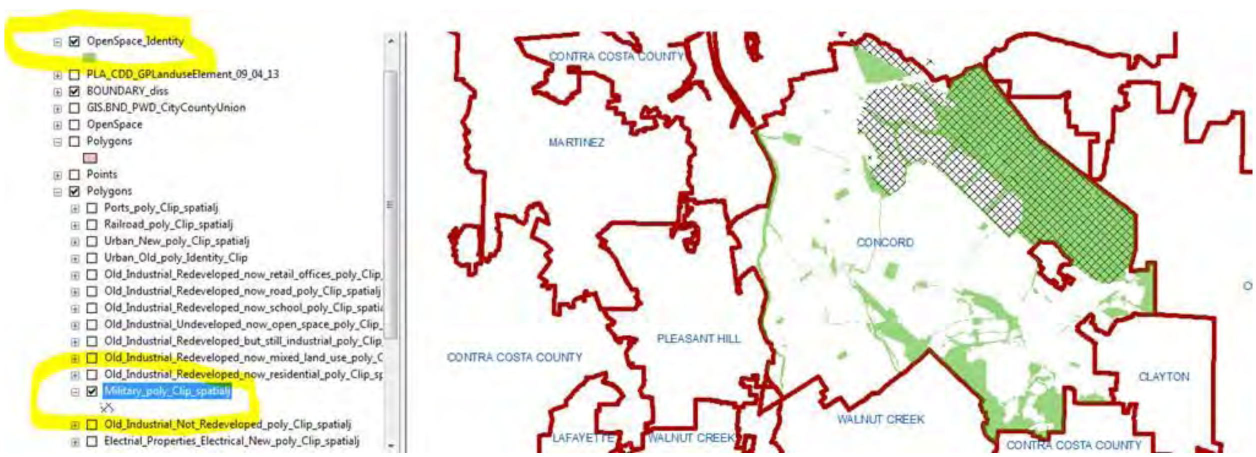
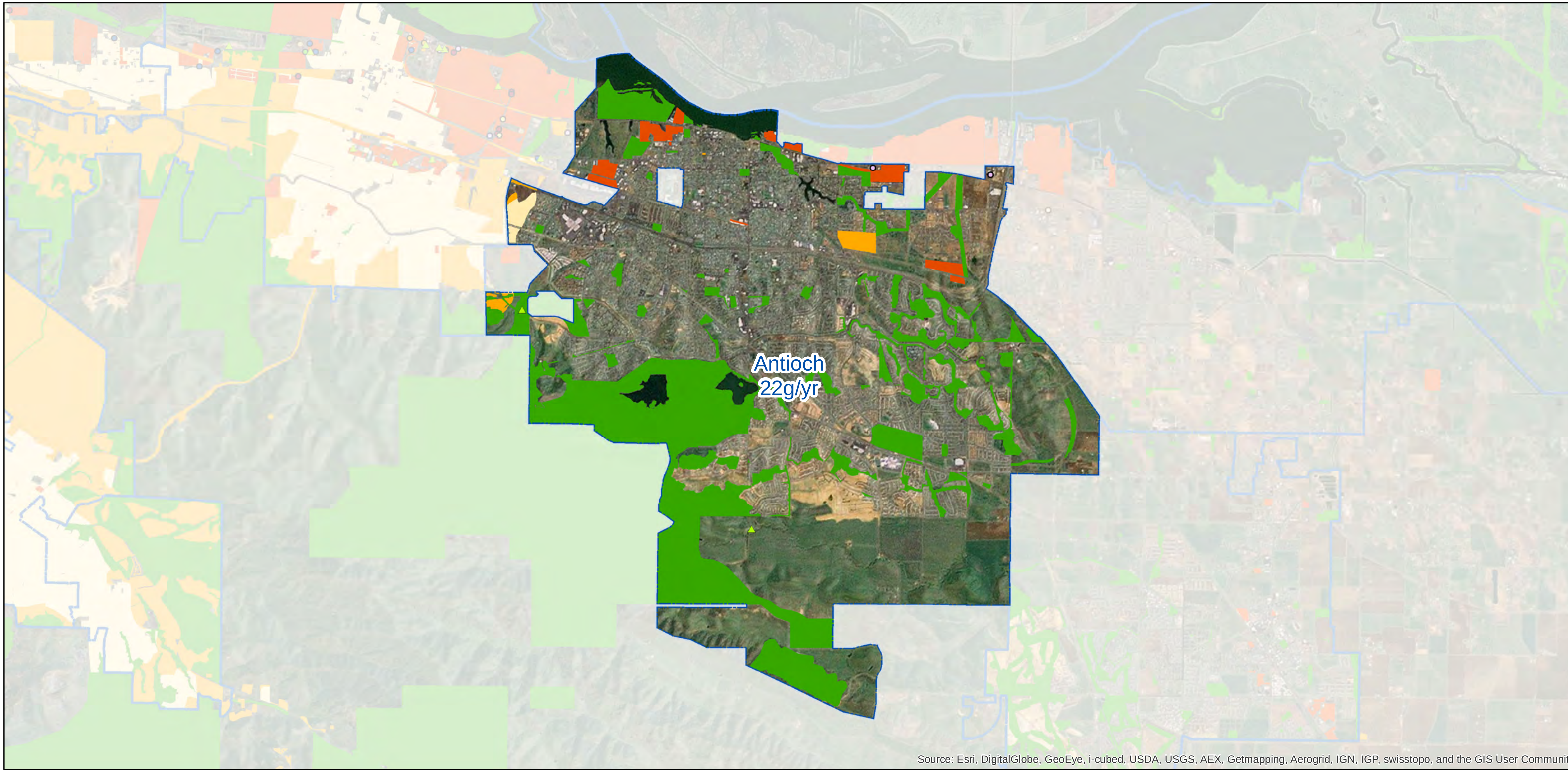


Figure 2: Open Space and military polygons in Concord.

Even with this discrepancy, the total loading for Concord was identical in this analysis and Geosyntec's.

Taking into consideration the uncertainties of land use definitions, these estimates appear to be a reasonable representation of actual PCB loadings in Contra Costa County.



PBC Sources, Site Samples, and Land Use in Contra Costa County

Contra Costa Public Works

Rev. 3/15/2014

Agency: Antioch

PCB Sites

- Transport/Shipping
- Creamation Facility
- Metals Manufacturing
- Cement
- Recycling - Metals
- Recycling - Drums
- Recycling - Automotive
- Recycling -General Waste
- Old Rebuilt Power Plants
- Old Power Plants
- New Power Plants

Sampling PCB Concentration (mg/kg)

- 0.0 - .2
- 0.2 - 0.5
- 0.5 - 3.0

Land Use

- Old_Industrial
- Old_Urban
- County_GP_Openspace
- New_Urban_and_Other
- High_Opportunity
- City and County Limits

N

0 1 2 4 6 8 Miles

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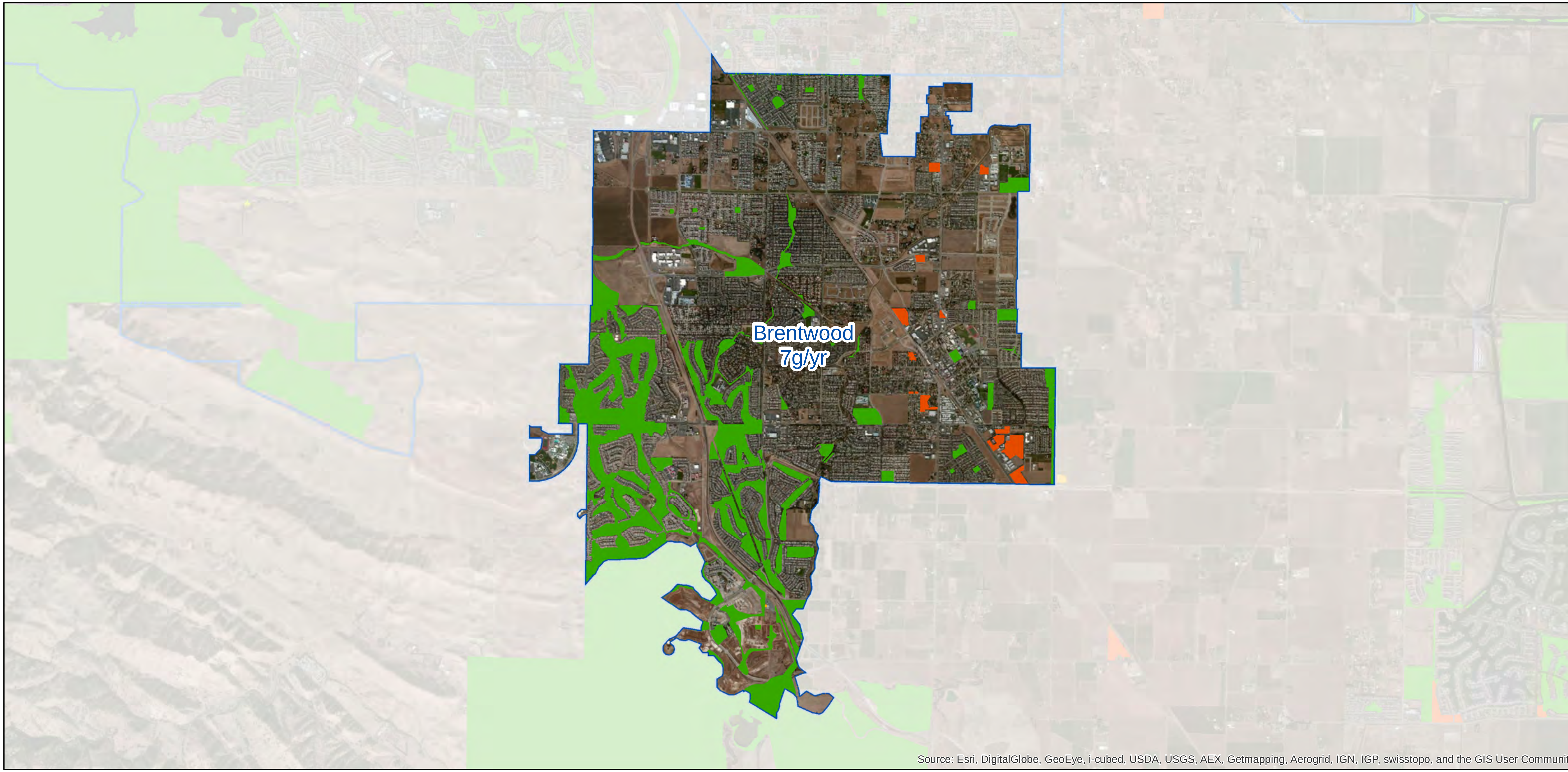
Land Use Load (grams PCBs/year)

CITY	Old_Industrial	Old_Urban	New_Urban_and_Other	Open_Space	High_Opportunity	Total
ANTIOCH	11.2	1.1	0.2	9.2	0	22
BRENTWOOD	3.5	0	0	3.2	0	7
CLAYTON	0	12.9	1.4	2.5	0	17
CONCORD	9	175.8	12.4	14	0	211
CONTRA COSTA COUNTY	221.4	228.1	15.5	169.2	0	634
DANVILLE	0.3	75.7	5.3	8.2	0	89
EL CERRITO	0	34.8	0.1	0.9	0	36
HERCULES	6.5	5.5	3.3	3.1	0	18
LAFAYETTE	0	98.9	1.2	2.2	0	102
MARTINEZ	21.4	47	3.6	5.9	0	78
MORAGA	1.1	3.1	0.1	5.8	0	10
OAKLEY	11.3	0	0	1.1	0	12
ORINDA	0	2.1	0.1	3.4	0	6
PINOLE	1.4	33	0.6	1.9	0	37
PITTSBURG	70.7	50.7	4.4	7.2	0	133
PLEASANT HILL	1	61.9	0.7	1.4	0	65
RICHMOND	167.1	107.6	3.3	17.6	300	596
SAN PABLO	1.8	24.5	0.1	0.2	0	27
SAN RAMON	0	29.6	11	11.5	0	52
WALNUT CREEK	1.9	128.5	1.7	11.1	0	143
TOTAL	529.8	1120.6	64.7	279.6	300	2295



PBC Sources, Site Samples, and Land Use in Contra Costa County

Contra Costa Public Works

Rev. 3/15/2014

Agency: Brentwood

PCB Sites

- Transport/Shipping
- Creamation Facility
- Metals Manufacturing
- Cement
- Recycling - Metals
- Recycling - Drums
- Recycling - Automotive
- Recycling -General Waste
- Old Rebuilt Power Plants
- Old Power Plants
- New Power Plants

Sampling PCB Concentration (mg/kg)

- 0.0 - .2
- 0.2 - 0.5
- 0.5 - 3.0

Land Use

- Old_Industrial
- Old_Urban
- County_GP_Openspace
- New_Urban_and_Other
- High_Opportunity
- City and County Limits

0 1 2 4 6 Miles

N

Land Use Load (grams PCBs/year)

CITY	Old_Industrial	Old_Urban	New_Urban_and_Other	Open_Space	High_Opportunity	Total
ANTIOCH	11.2	1.1	0.2	9.2	0	22
BRENTWOOD	3.5	0	0	3.2	0	7
CLAYTON	0	12.9	1.4	2.5	0	17
CONCORD	9	175.8	12.4	14	0	211
CONTRA COSTA COUNTY	221.4	228.1	15.5	169.2	0	634
DANVILLE	0.3	75.7	5.3	8.2	0	89
EL CERRITO	0	34.8	0.1	0.9	0	36
HERCULES	6.5	5.5	3.3	3.1	0	18
LAFAYETTE	0	98.9	1.2	2.2	0	102
MARTINEZ	21.4	47	3.6	5.9	0	78
MORAGA	1.1	3.1	0.1	5.8	0	10
OAKLEY	11.3	0	0	1.1	0	12
ORINDA	0	2.1	0.1	3.4	0	6
PINOLE	1.4	33	0.6	1.9	0	37
PITTSBURG	70.7	50.7	4.4	7.2	0	133
PLEASANT HILL	1	61.9	0.7	1.4	0	65
RICHMOND	167.1	107.6	3.3	17.6	300	596
SAN PABLO	1.8	24.5	0.1	0.2	0	27
SAN RAMON	0	29.6	11	11.5	0	52
WALNUT CREEK	1.9	128.5	1.7	11.1	0	143
TOTAL	529.8	1120.6	64.7	279.6	300	2295

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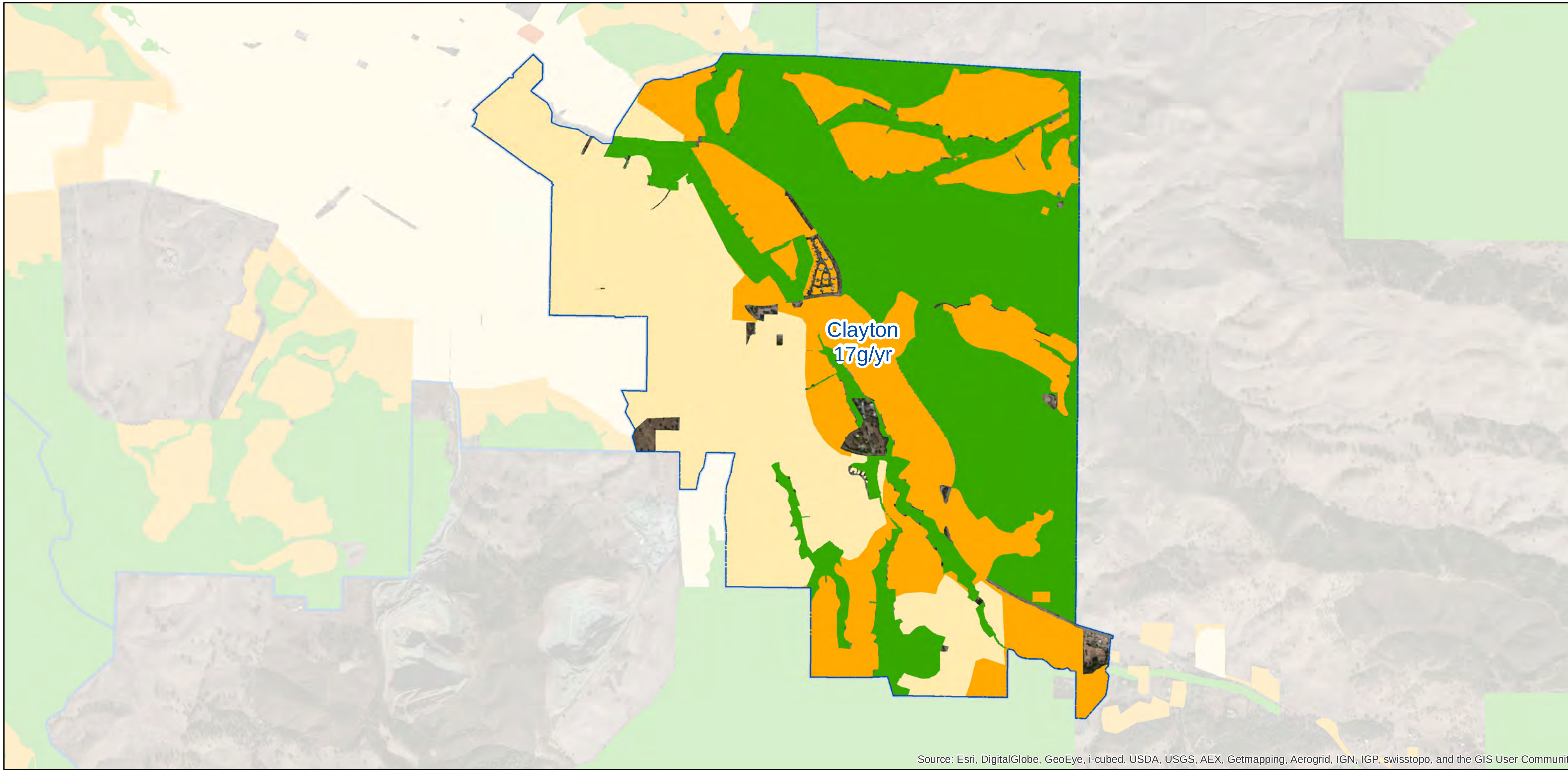

PBC Sources, Site Samples, and Land Use in Contra Costa County

Contra Costa
Public Works

Agency: Clayton

PCB Sites

- Transport/Shipping
- Creamation Facility
- Metals Manufacturing
- Cement
- Recycling - Metals
- Recycling - Drums
- Recycling - Automotive
- Recycling -General Waste
- Old Rebuilt Power Plants
- Old Power Plants
- New Power Plants

Sampling PCB Concentration (mg/kg)

- 0.0 - .2
- 0.2 - 0.5
- 0.5 - 3.0

Land Use

- Old_Industrial
- Old_Urban
- County_GP_Openspace
- New_Urban_and_Other
- High_Opportunity
- City and County Limits

0 1 2 Miles

N

Land Use Load (grams PCBs/year)

CITY	Old_Industrial	Old_Urban	New_Urban_and_Other	Open_Space	High_Opportunity	Total
ANTIOCH	11.2	1.1	0.2	9.2	0	22
BRENTWOOD	3.5	0	0	3.2	0	7
CLAYTON	0	12.9	1.4	2.5	0	17
CONCORD	9	175.8	12.4	14	0	211
CONTRA COSTA COUNTY	221.4	228.1	15.5	169.2	0	634
DANVILLE	0.3	75.7	5.3	8.2	0	89
EL CERRITO	0	34.8	0.1	0.9	0	36
HERCULES	6.5	5.5	3.3	3.1	0	18
LAFAYETTE	0	98.9	1.2	2.2	0	102
MARTINEZ	21.4	47	3.6	5.9	0	78
MORAGA	1.1	3.1	0.1	5.8	0	10
OAKLEY	11.3	0	0	1.1	0	12
ORINDA	0	2.1	0.1	3.4	0	6
PINOLE	1.4	33	0.6	1.9	0	37
PITTSBURG	70.7	50.7	4.4	7.2	0	133
PLEASANT HILL	1	61.9	0.7	1.4	0	65
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SAN PABLO	1.8	24.5	0.1	0.2	0	27
SAN RAMON	0	29.6	11	11.5	0	52
WALNUT CREEK	1.9	128.5	1.7	11.1	0	143
TOTAL	529.8	1120.6	64.7	279.6	300	2295

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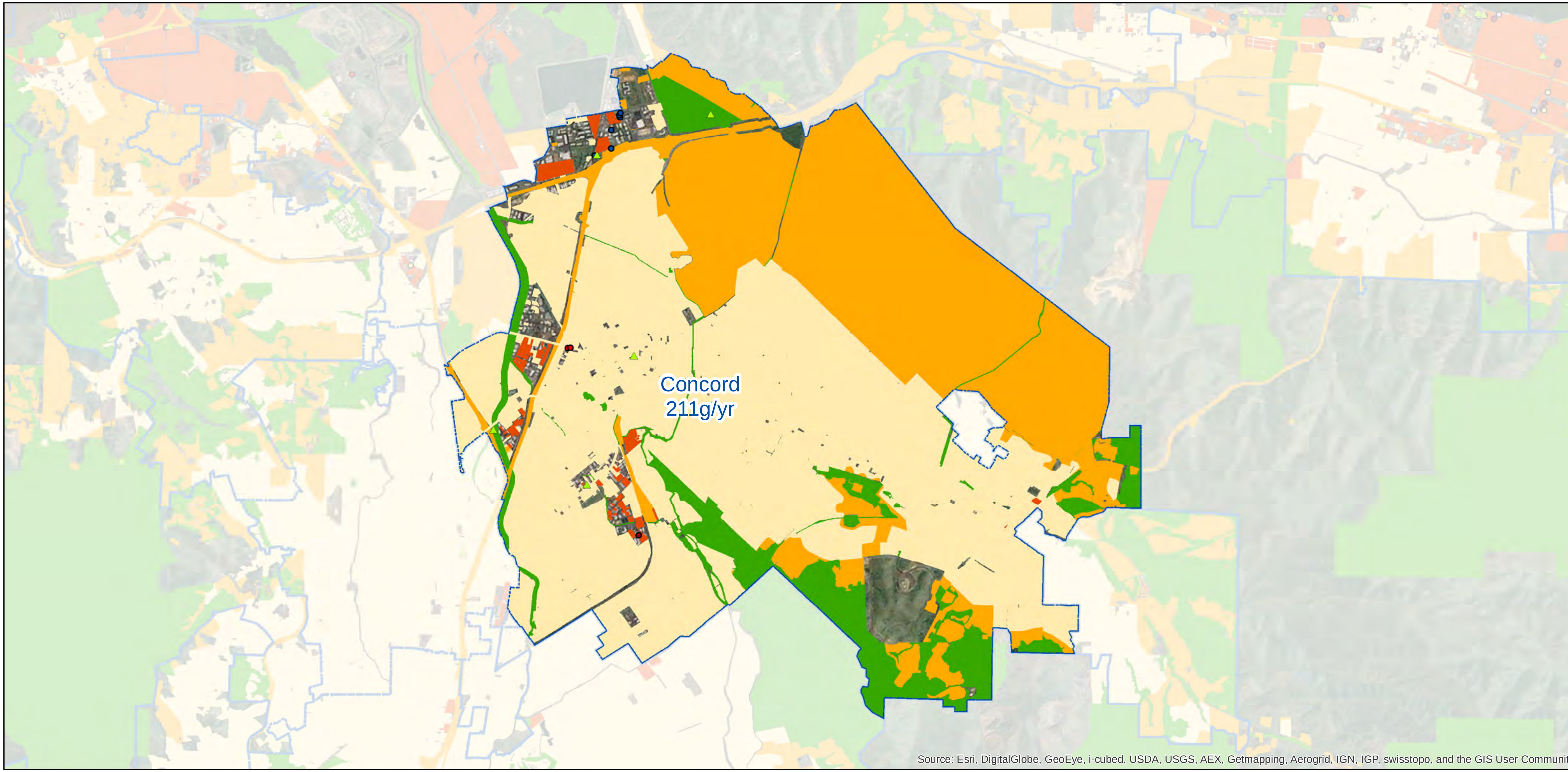

PBC Sources, Site Samples, and Land Use in Contra Costa County

Contra Costa Public Works

Rev. 3/15/2014

Agency: Concord

PCB Sites

- Transport/Shipping
- Creamation Facility
- Metals Manufacturing
- Cement
- Recycling - Metals
- Recycling - Drums
- Recycling - Automotive
- Recycling -General Waste
- Old Rebuilt Power Plants
- Old Power Plants
- New Power Plants

Sampling PCB Concentration (mg/kg)

- 0.0 - .2
- 0.2 - 0.5
- 0.5 - 3.0

Land Use

- Old_Industrial
- Old_Urban
- County_GP_Openspace
- New_Urban_and_Other
- High_Opportunity
- City and County Limits

0 1 2 4 6 8 Miles

N

Land Use Load (grams PCBs/year)

CITY	Old_Industrial	Old_Urban	New_Urban_and_Other	Open_Space	High_Opportunity	Total
ANTIOCH	11.2	1.1	0.2	9.2	0	22
BRENTWOOD	3.5	0	0	3.2	0	7
CLAYTON	0	12.9	1.4	2.5	0	17
CONCORD	9	175.8	12.4	14	0	211
CONTRA COSTA COUNTY	221.4	228.1	15.5	169.2	0	634
DANVILLE	0.3	75.7	5.3	8.2	0	89
EL CERRITO	0	34.8	0.1	0.9	0	36
HERCULES	6.5	5.5	3.3	3.1	0	18
LAFAYETTE	0	98.9	1.2	2.2	0	102
MARTINEZ	21.4	47	3.6	5.9	0	78
MORAGA	1.1	3.1	0.1	5.8	0	10
OAKLEY	11.3	0	0	1.1	0	12
ORINDA	0	2.1	0.1	3.4	0	6
PINOLE	1.4	33	0.6	1.9	0	37
PITTSBURG	70.7	50.7	4.4	7.2	0	133
PLEASANT HILL	1	61.9	0.7	1.4	0	65
RICHMOND	167.1	107.6	3.3	17.6	300	596
SAN PABLO	1.8	24.5	0.1	0.2	0	27
SAN RAMON	0	29.6	11	11.5	0	52
WALNUT CREEK	1.9	128.5	1.7	11.1	0	143
TOTAL	529.8	1120.6	64.7	279.6	300	2295

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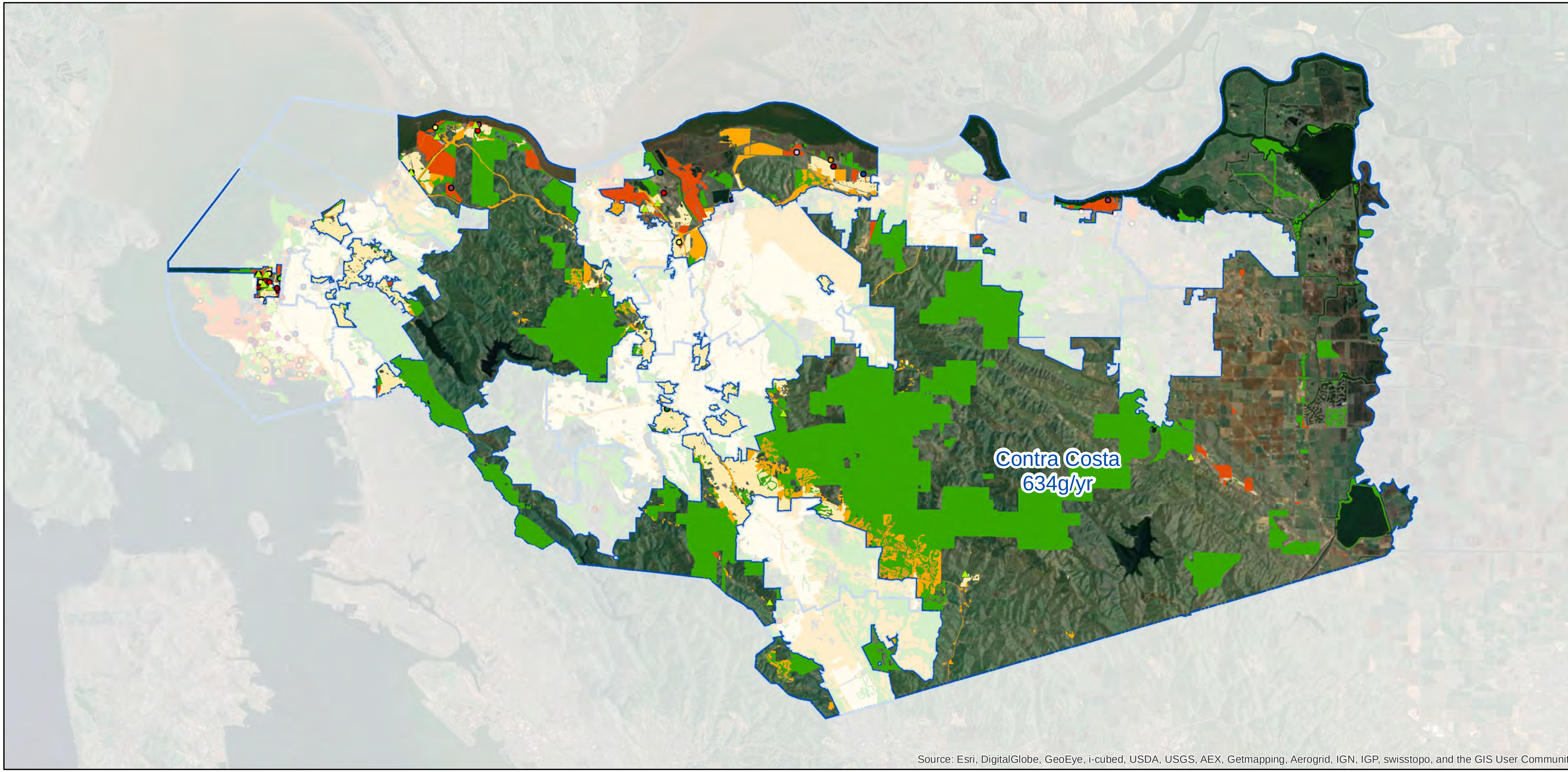

PBC Sources, Site Samples, and Land Use in Contra Costa County

Contra Costa Public Works

Rev. 3/15/2014

Agency: Contra Costa

PCB Sites

- Transport/Shipping
- Creamation Facility
- Metals Manufacturing
- Cement
- Recycling - Metals
- Recycling - Drums
- Recycling - Automotive
- Recycling -General Waste
- Old Rebuilt Power Plants
- Old Power Plants
- New Power Plants

Sampling PCB Concentration (mg/kg)

- 0.0 - .2
- 0.2 - 0.5
- 0.5 - 3.0

Land Use

- Old_Industrial
- Old_Urban
- County_GP_Openspace
- New_Urban_and_Other
- High_Opportunity
- City and County Limits

0 1 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 Miles

N

Land Use Load (grams PCBs/year)

CITY	Old_Industrial	Old_Urban	New_Urban_and_Other	Open_Space	High_Opportunity	Total
ANTIOCH	11.2	1.1	0.2	9.2	0	22
BRENTWOOD	3.5	0	0	3.2	0	7
CLAYTON	0	12.9	1.4	2.5	0	17
CONCORD	9	175.8	12.4	14	0	211
CONTRA COSTA COUNTY	221.4	228.1	15.5	169.2	0	634
DANVILLE	0.3	75.7	5.3	8.2	0	89
EL CERRITO	0	34.8	0.1	0.9	0	36
HERCULES	6.5	5.5	3.3	3.1	0	18
LAFAYETTE	0	98.9	1.2	2.2	0	102
MARTINEZ	21.4	47	3.6	5.9	0	78
MORAGA	1.1	3.1	0.1	5.8	0	10
OAKLEY	11.3	0	0	1.1	0	12
ORINDA	0	2.1	0.1	3.4	0	6
PINOLE	1.4	33	0.6	1.9	0	37
PITTSBURG	70.7	50.7	4.4	7.2	0	133
PLEASANT HILL	1	61.9	0.7	1.4	0	65
RICHMOND	167.1	107.6	3.3	17.6	300	596
SAN PABLO	1.8	24.5	0.1	0.2	0	27
SAN RAMON	0	29.6	11	11.5	0	52
WALNUT CREEK	1.9	128.5	1.7	11.1	0	143
TOTAL	529.8	1120.6	64.7	279.6	300	2295

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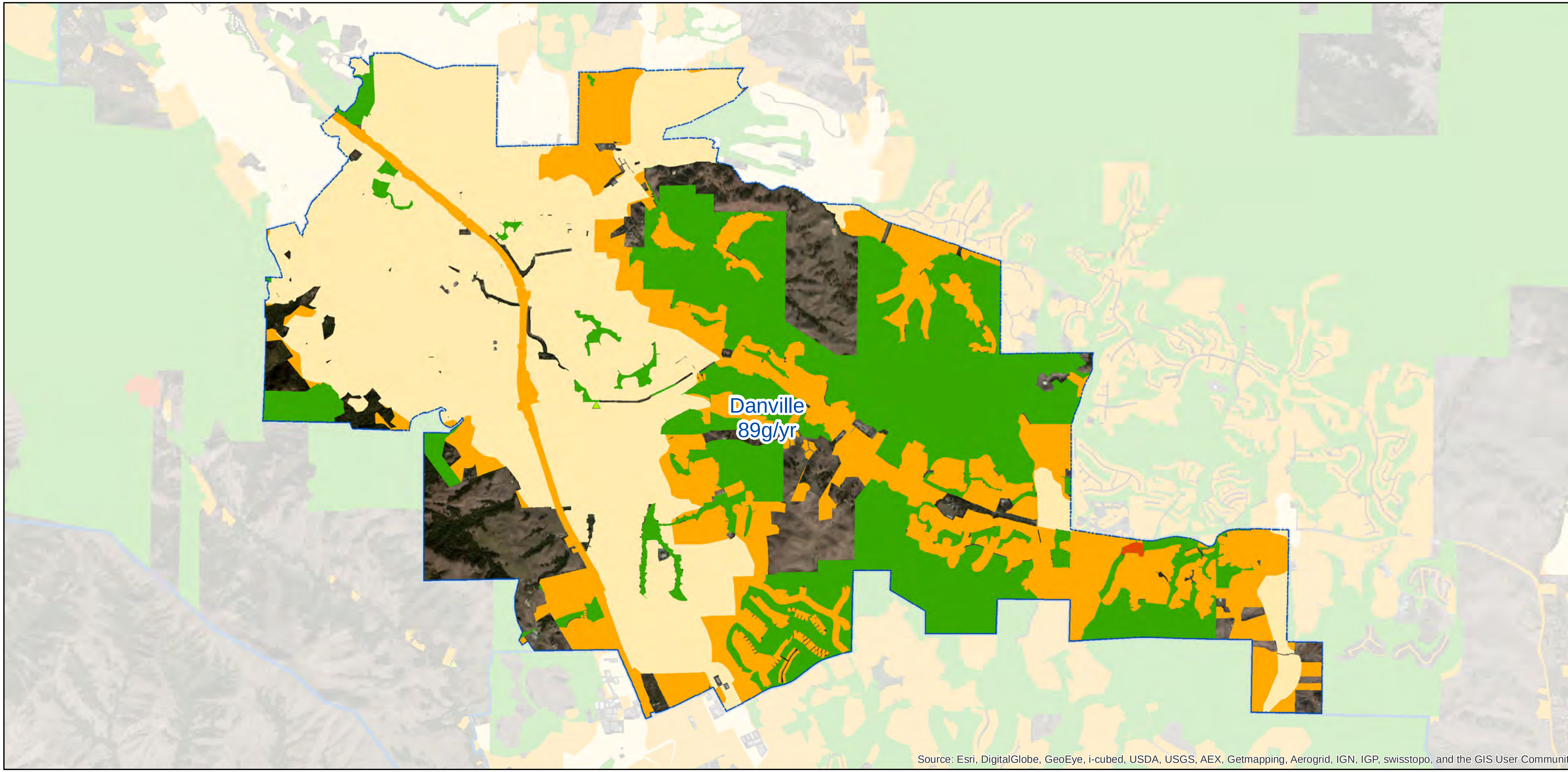

PBC Sources, Site Samples, and Land Use in Contra Costa County

Contra Costa
Public Works
Rev. 3/15/2014

Agency: Danville

PCB Sites

- Transport/Shipping
- Creamation Facility
- Metals Manufacturing
- Cement
- Recycling - Metals
- Recycling - Drums
- Recycling - Automotive
- Recycling -General Waste
- Old Rebuilt Power Plants
- Old Power Plants
- New Power Plants

Sampling PCB Concentration (mg/kg)

- 0.0 - .2
- 0.2 - 0.5
- 0.5 - 3.0

Land Use

- Old_Industrial
- Old_Urban
- County_GP_Openspace
- New_Urban_and_Other
- High_Opportunity
- City and County Limits

0 1 2 4 Miles

N

Land Use Load (grams PCBs/year)

CITY	Old_Industrial	Old_Urban	New_Urban_and_Other	Open_Space	High_Opportunity	Total
ANTIOCH	11.2	1.1	0.2	9.2	0	22
BRENTWOOD	3.5	0	0	3.2	0	7
CLAYTON	0	12.9	1.4	2.5	0	17
CONCORD	9	175.8	12.4	14	0	211
CONTRA COSTA COUNTY	221.4	228.1	15.5	169.2	0	634
DANVILLE	0.3	75.7	5.3	8.2	0	89
EL CERRITO	0	34.8	0.1	0.9	0	36
HERCULES	6.5	5.5	3.3	3.1	0	18
LAFAYETTE	0	98.9	1.2	2.2	0	102
MARTINEZ	21.4	47	3.6	5.9	0	78
MORAGA	1.1	3.1	0.1	5.8	0	10
OAKLEY	11.3	0	0	1.1	0	12
ORINDA	0	2.1	0.1	3.4	0	6
PINOLE	1.4	33	0.6	1.9	0	37
PITTSBURG	70.7	50.7	4.4	7.2	0	133
PLEASANT HILL	1	61.9	0.7	1.4	0	65
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SAN RAMON	0	29.6	11	11.5	0	52
WALNUT CREEK	1.9	128.5	1.7	11.1	0	143
TOTAL	529.8	1120.6	64.7	279.6	300	2295

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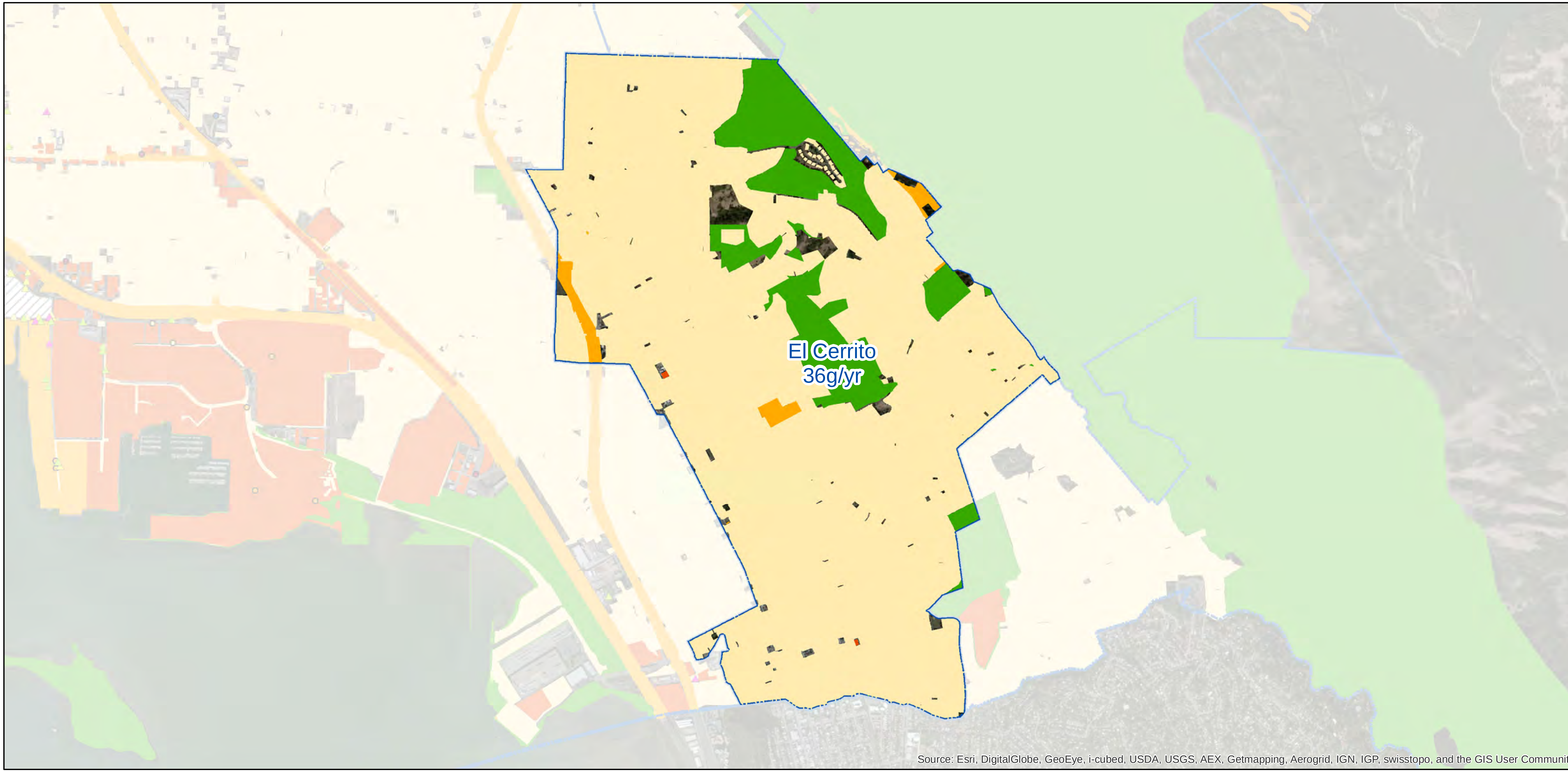

PBC Sources, Site Samples, and Land Use in Contra Costa County

Agency: El Cerrito

Contra Costa Public Works

Rev. 3/15/2014

PCB Sites

- Transport/Shipping
- Creamation Facility
- Metals Manufacturing
- Cement
- Recycling - Metals
- Recycling - Drums
- Recycling - Automotive
- Recycling -General Waste
- Old Rebuilt Power Plants
- Old Power Plants
- New Power Plants

Sampling PCB Concentration (mg/kg)

- 0.0 - .2
- 0.2 - 0.5
- 0.5 - 3.0

Land Use

- Old_Industrial
- Old_Urban
- County_GP_Openspace
- New_Urban_and_Other
- High_Opportunity
- City and County Limits

0 1 2 Miles

N

Land Use Load (grams PCBs/year)

CITY	Old_Industrial	Old_Urban	New_Urban_and_Other	Open_Space	High_Opportunity	Total
ANTIOCH	11.2	1.1	0.2	9.2	0	22
BRENTWOOD	3.5	0	0	3.2	0	7
CLAYTON	0	12.9	1.4	2.5	0	17
CONCORD	9	175.8	12.4	14	0	211
CONTRA COSTA COUNTY	221.4	228.1	15.5	169.2	0	634
DANVILLE	0.3	75.7	5.3	8.2	0	89
EL CERRITO	0	34.8	0.1	0.9	0	36
HERCULES	6.5	5.5	3.3	3.1	0	18
LAFAYETTE	0	98.9	1.2	2.2	0	102
MARTINEZ	21.4	47	3.6	5.9	0	78
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TOTAL	529.8	1120.6	64.7	279.6	300	2295

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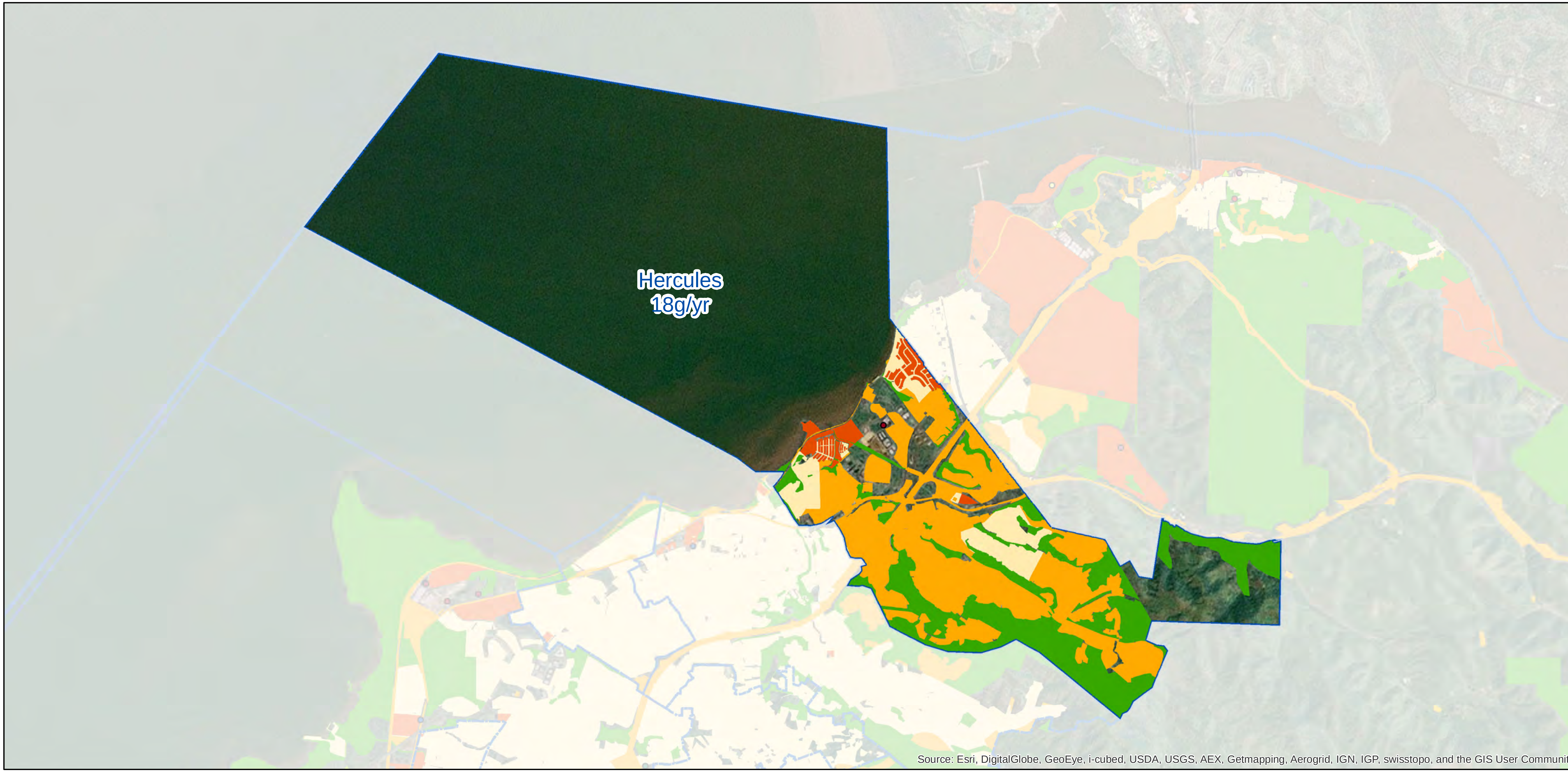

PBC Sources, Site Samples, and Land Use in Contra Costa County

Contra Costa Public Works

Agency: Hercules

PCB Sites

- Transport/Shipping
- Creamation Facility
- Metals Manufacturing
- Cement
- Recycling - Metals
- Recycling - Drums
- Recycling - Automotive
- Recycling -General Waste
- Old Rebuilt Power Plants
- Old Power Plants
- New Power Plants

Sampling PCB Concentration (mg/kg)

- 0.0 - .2
- 0.2 - 0.5
- 0.5 - 3.0

Land Use

- Old_Industrial
- Old_Urban
- County_GP_Openspace
- New_Urban_and_Other
- High_Opportunity
- City and County Limits

N

0 1 2 4 6 Miles

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Land Use Load (grams PCBs/year)

CITY	Old_Industrial	Old_Urban	New_Urban_and_Other	Open_Space	High_Opportunity	Total
ANTIOCH	11.2	1.1	0.2	9.2	0	22
BRENTWOOD	3.5	0	0	3.2	0	7
CLAYTON	0	12.9	1.4	2.5	0	17
CONCORD	9	175.8	12.4	14	0	211
CONTRA COSTA COUNTY	221.4	228.1	15.5	169.2	0	634
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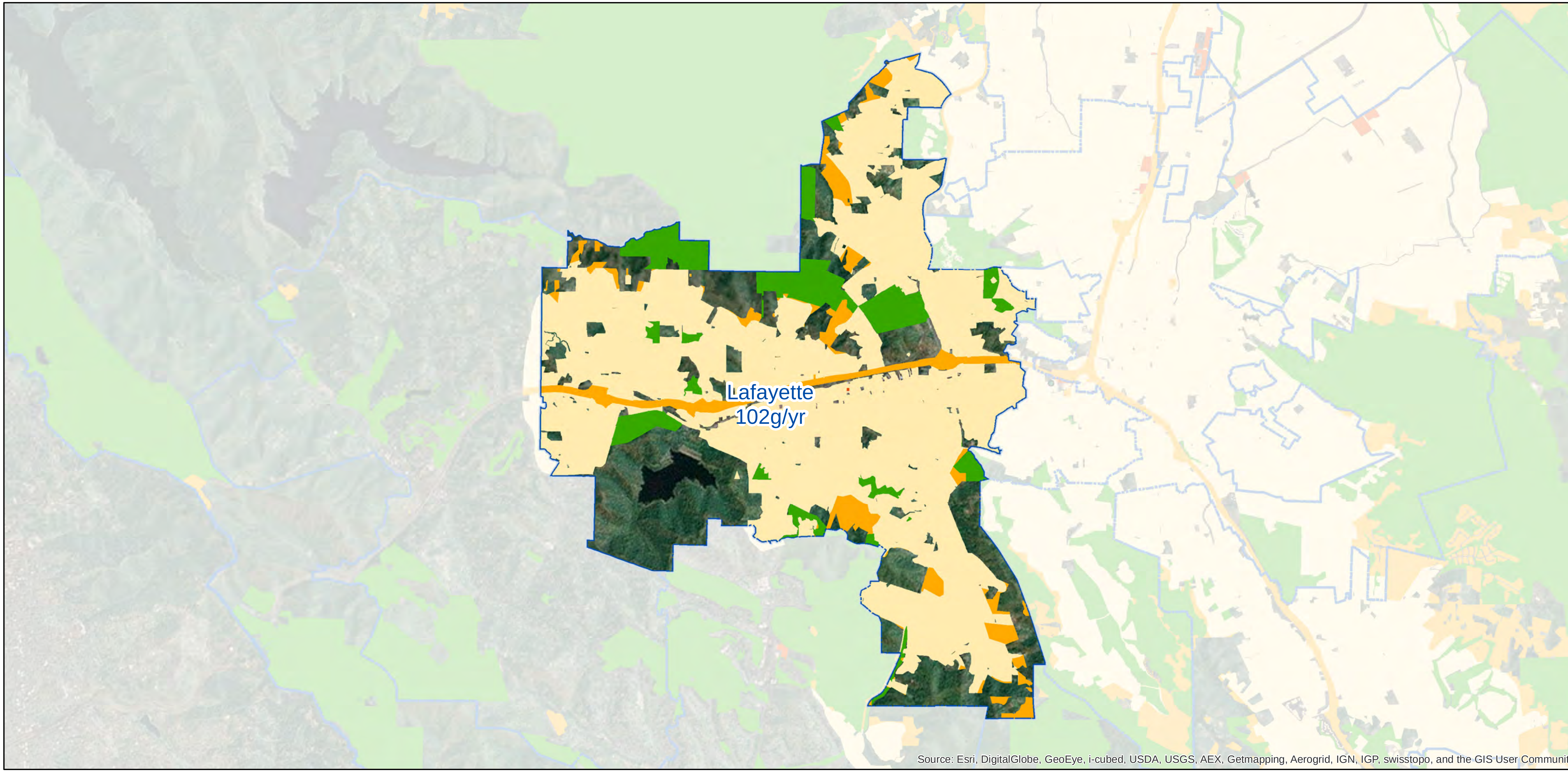
SAN RAMON	0	29.6	11	11.5	0	52
WALNUT CREEK	1.9	128.5	1.7	11.1	0	143
TOTAL	529.8	1120.6	64.7	279.6	300	2295



PBC Sources, Site Samples, and Land Use in Contra Costa County

Contra Costa Public Works

Rev. 3/15/2014

Agency: Lafayette

PCB Sites

- Transport/Shipping
- Creamation Facility
- Metals Manufacturing
- Cement
- Recycling - Metals
- Recycling - Drums
- Recycling - Automotive
- Recycling -General Waste
- Old Rebuilt Power Plants
- Old Power Plants
- New Power Plants

Sampling PCB Concentration (mg/kg)

- 0.0 - .2
- 0.2 - 0.5
- 0.5 - 3.0

Land Use

- Old_Industrial
- Old_Urban
- County_GP_Openspace
- New_Urban_and_Other
- High_Opportunity
- City and County Limits

0 1 2 4 6 Miles

N

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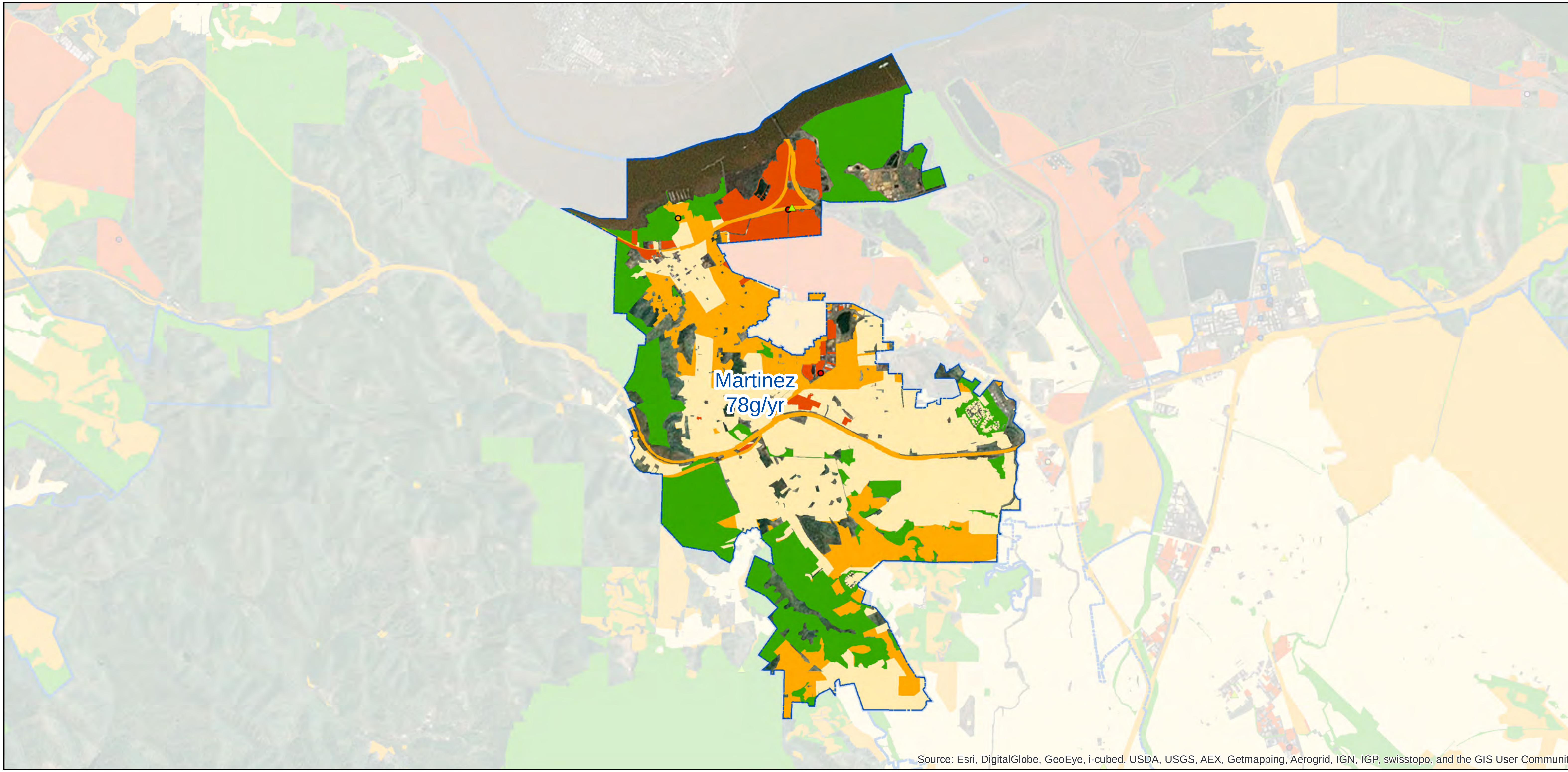
Land Use Load (grams PCBs/year)

CITY	Old_Industrial	Old_Urban	New_Urban_and_Other	Open_Space	High_Opportunity	Total
ANTIOCH	11.2	1.1	0.2	9.2	0	22
BRENTWOOD	3.5	0	0	3.2	0	7
CLAYTON	0	12.9	1.4	2.5	0	17
CONCORD	9	175.8	12.4	14	0	211
CONTRA COSTA COUNTY	221.4	228.1	15.5	169.2	0	634
DANVILLE	0.3	75.7	5.3	8.2	0	89
EL CERRITO	0	34.8	0.1	0.9	0	36
HERCULES	6.5	5.5	3.3	3.1	0	18
LAFAYETTE	0	98.9	1.2	2.2	0	102
MARTINEZ	21.4	47	3.6	5.9	0	78
MORAGA	1.1	3.1	0.1	5.8	0	10
OAKLEY	11.3	0	0	1.1	0	12
ORINDA	0	2.1	0.1	3.4	0	6
PINOLE	1.4	33	0.6	1.9	0	37
PITTSBURG	70.7	50.7	4.4	7.2	0	133
PLEASANT HILL	1	61.9	0.7	1.4	0	65
RICHMOND	167.1	107.6	3.3	17.6	300	596
SAN PABLO	1.8	24.5	0.1	0.2	0	27
SAN RAMON	0	29.6	11	11.5	0	52
WALNUT CREEK	1.9	128.5	1.7	11.1	0	143
TOTAL	529.8	1120.6	64.7	279.6	300	2295



PBC Sources, Site Samples, and Land Use in Contra Costa County

Contra Costa Public Works

Rev. 3/15/2014

Agency: Martinez

PCB Sites

- Transport/Shipping
- Creamation Facility
- Metals Manufacturing
- Cement
- Recycling - Metals
- Recycling - Drums
- Recycling - Automotive
- Recycling -General Waste
- Old Rebuilt Power Plants
- Old Power Plants
- New Power Plants

Sampling PCB Concentration (mg/kg)

- 0.0 - .2
- 0.2 - 0.5
- 0.5 - 3.0

Land Use

- Old_Industrial
- Old_Urban
- County_GP_Openspace
- New_Urban_and_Other
- High_Opportunity
- City and County Limits

0 1 2 4 6 Miles

N

Land Use Load (grams PCBs/year)

CITY	Old_Industrial	Old_Urban	New_Urban_and_Other	Open_Space	High_Opportunity	Total
ANTIOCH	11.2	1.1	0.2	9.2	0	22
BRENTWOOD	3.5	0	0	3.2	0	7
CLAYTON	0	12.9	1.4	2.5	0	17
CONCORD	9	175.8	12.4	14	0	211
CONTRA COSTA COUNTY	221.4	228.1	15.5	169.2	0	634
DANVILLE	0.3	75.7	5.3	8.2	0	89
EL CERRITO	0	34.8	0.1	0.9	0	36
HERCULES	6.5	5.5	3.3	3.1	0	18
LAFAYETTE	0	98.9	1.2	2.2	0	102
MARTINEZ	21.4	47	3.6	5.9	0	78
MORAGA	1.1	3.1	0.1	5.8	0	10
OAKLEY	11.3	0	0	1.1	0	12
ORINDA	0	2.1	0.1	3.4	0	6
PINOLE	1.4	33	0.6	1.9	0	37
PITTSBURG	70.7	50.7	4.4	7.2	0	133
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SAN PABLO	1.8	24.5	0.1	0.2	0	27
SAN RAMON	0	29.6	11	11.5	0	52
WALNUT CREEK	1.9	128.5	1.7	11.1	0	143
TOTAL	529.8	1120.6	64.7	279.6	300	2295

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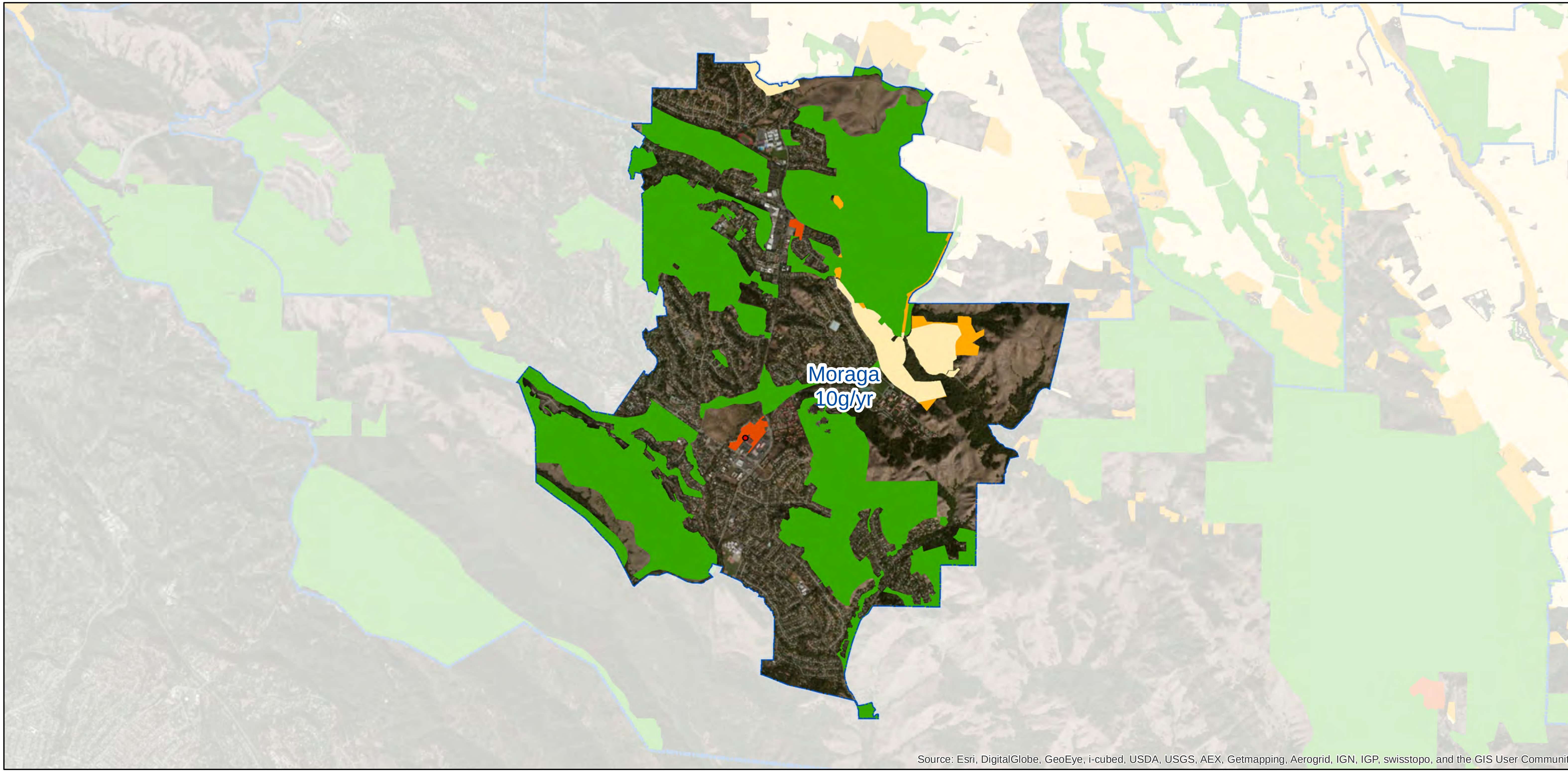

PBC Sources, Site Samples, and Land Use in Contra Costa County

Contra Costa Public Works

Rev. 3/15/2014

Agency: Moraga

PCB Sites

- Transport/Shipping
- Creamation Facility
- Metals Manufacturing
- Cement
- Recycling - Metals
- Recycling - Drums
- Recycling - Automotive
- Recycling -General Waste
- Old Rebuilt Power Plants
- Old Power Plants
- New Power Plants

Sampling PCB Concentration (mg/kg)

- 0.0 - .2
- 0.2 - 0.5
- 0.5 - 3.0

Land Use

- Old_Industrial
- Old_Urban
- County_GP_Openspace
- New_Urban_and_Other
- High_Opportunity
- City and County Limits

0 1 2 4 Miles

N

Land Use Load (grams PCBs/year)

CITY	Old_Industrial	Old_Urban	New_Urban_and_Other	Open_Space	High_Opportunity	Total
ANTIOCH	11.2	1.1	0.2	9.2	0	22
BRENTWOOD	3.5	0	0	3.2	0	7
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CONTRA COSTA COUNTY	221.4	228.1	15.5	169.2	0	634
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PINOLE	1.4	33	0.6	1.9	0	37
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SAN PABLO	1.8	24.5	0.1	0.2	0	27
SAN RAMON	0	29.6	11	11.5	0	52
WALNUT CREEK	1.9	128.5	1.7	11.1	0	143
TOTAL	529.8	1120.6	64.7	279.6	300	2295

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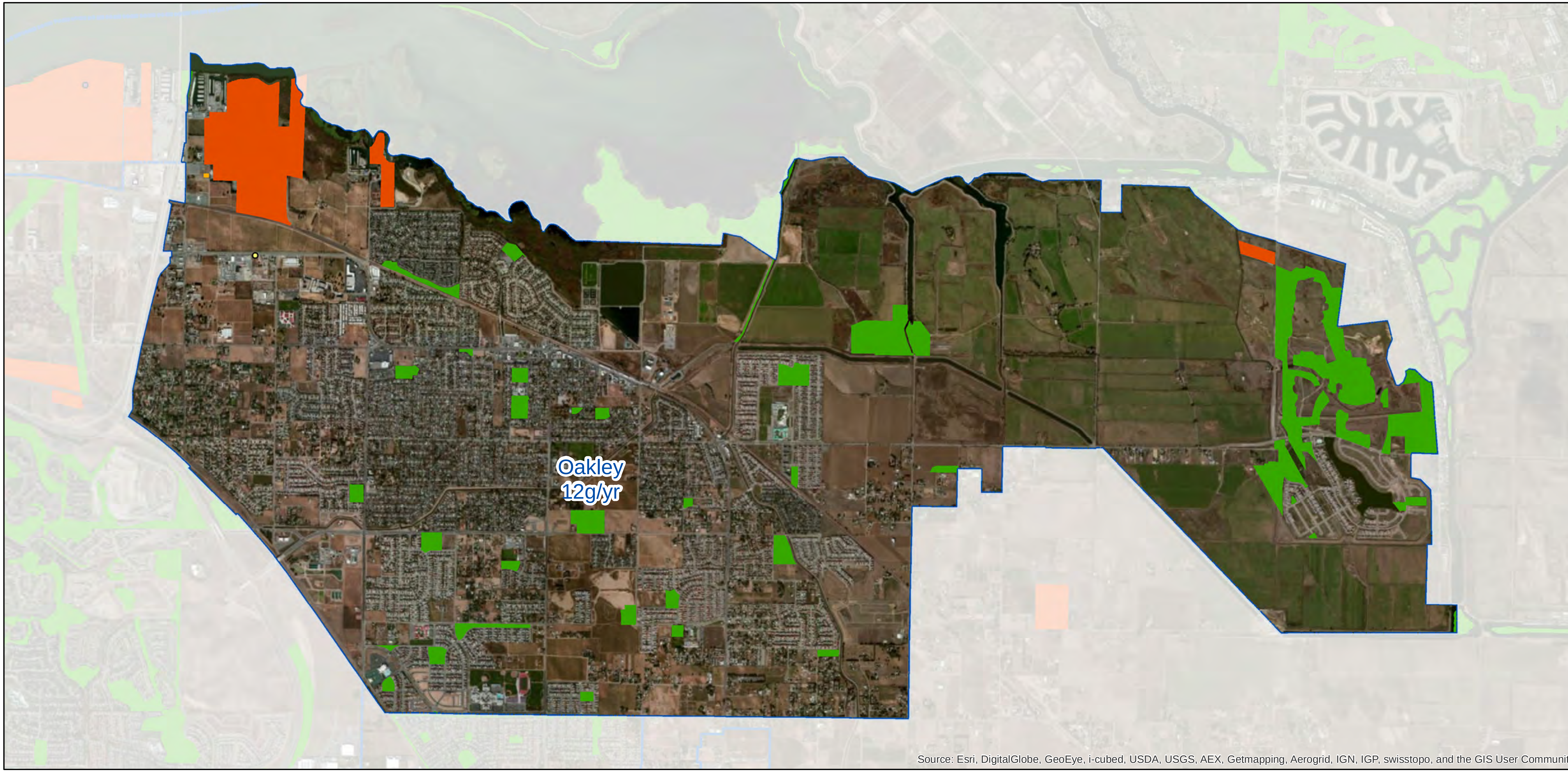

PBC Sources, Site Samples, and Land Use in Contra Costa County

Contra Costa Public Works

Rev. 3/15/2014

Agency: Oakley

PCB Sites

- Transport/Shipping
- Creamation Facility
- Metals Manufacturing
- Cement
- Recycling - Metals
- Recycling - Drums
- Recycling - Automotive
- Recycling -General Waste
- Old Rebuilt Power Plants
- Old Power Plants
- New Power Plants

Sampling PCB Concentration (mg/kg)

- 0.0 - .2
- 0.2 - 0.5
- 0.5 - 3.0

Land Use

- Old_Industrial
- Old_Urban
- County_GP_Openspace
- New_Urban_and_Other
- High_Opportunity
- City and County Limits

0 1 2 4 Miles

N

Land Use Load (grams PCBs/year)

CITY	Old_Industrial	Old_Urban	New_Urban_and_Other	Open_Space	High_Opportunity	Total
ANTIOCH	11.2	1.1	0.2	9.2	0	22
BRENTWOOD	3.5	0	0	3.2	0	7
CLAYTON	0	12.9	1.4	2.5	0	17
CONCORD	9	175.8	12.4	14	0	211
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OAKLEY	11.3	0	0	1.1	0	12
ORINDA	0	2.1	0.1	3.4	0	6
PINOLE	1.4	33	0.6	1.9	0	37
PITTSBURG	70.7	50.7	4.4	7.2	0	133
PLEASANT HILL	1	61.9	0.7	1.4	0	65
RICHMOND	167.1	107.6	3.3	17.6	300	596
SAN PABLO	1.8	24.5	0.1	0.2	0	27
SAN RAMON	0	29.6	11	11.5	0	52
WALNUT CREEK	1.9	128.5	1.7	11.1	0	143
TOTAL	529.8	1120.6	64.7	279.6	300	2295

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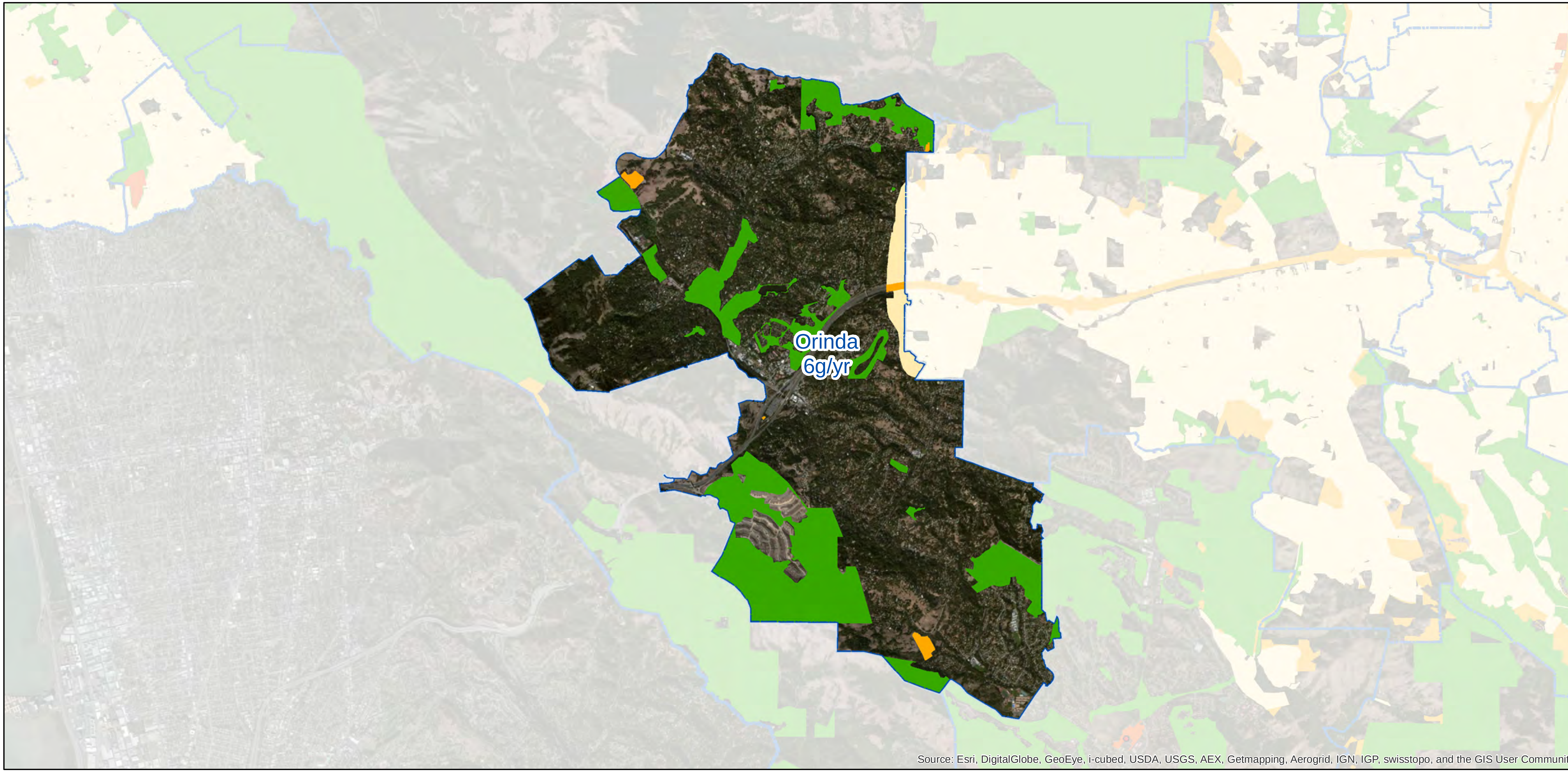

PBC Sources, Site Samples, and Land Use in Contra Costa County

Contra Costa Public Works

Rev. 3/15/2014

Agency: Orinda

PCB Sites

- Transport/Shipping
- Creamation Facility
- Metals Manufacturing
- Cement
- Recycling - Metals
- Recycling - Drums
- Recycling - Automotive
- Recycling -General Waste
- Old Rebuilt Power Plants
- Old Power Plants
- New Power Plants

Sampling PCB Concentration (mg/kg)

- 0.0 - .2
- 0.2 - 0.5
- 0.5 - 3.0

Land Use

- Old_Industrial
- Old_Urban
- County_GP_Openspace
- New_Urban_and_Other
- High_Opportunity
- City and County Limits

0 1 2 4 6 Miles

N

Land Use Load (grams PCBs/year)

CITY	Old_Industrial	Old_Urban	New_Urban_and_Other	Open_Space	High_Opportunity	Total
ANTIOCH	11.2	1.1	0.2	9.2	0	22
BRENTWOOD	3.5	0	0	3.2	0	7
CLAYTON	0	12.9	1.4	2.5	0	17
CONCORD	9	175.8	12.4	14	0	211
CONTRA COSTA COUNTY	221.4	228.1	15.5	169.2	0	634
DANVILLE	0.3	75.7	5.3	8.2	0	89
EL CERRITO	0	34.8	0.1	0.9	0	36
HERCULES	6.5	5.5	3.3	3.1	0	18
LAFAYETTE	0	98.9	1.2	2.2	0	102
MARTINEZ	21.4	47	3.6	5.9	0	78
MORAGA	1.1	3.1	0.1	5.8	0	10
OAKLEY	11.3	0	0	1.1	0	12
ORINDA	0	2.1	0.1	3.4	0	6
PINOLE	1.4	33	0.6	1.9	0	37
PITTSBURG	70.7	50.7	4.4	7.2	0	133
PLEASANT HILL	1	61.9	0.7	1.4	0	65
RICHMOND	167.1	107.6	3.3	17.6	300	596
SAN PABLO	1.8	24.5	0.1	0.2	0	27
SAN RAMON	0	29.6	11	11.5	0	52
WALNUT CREEK	1.9	128.5	1.7	11.1	0	143
TOTAL	529.8	1120.6	64.7	279.6	300	2295

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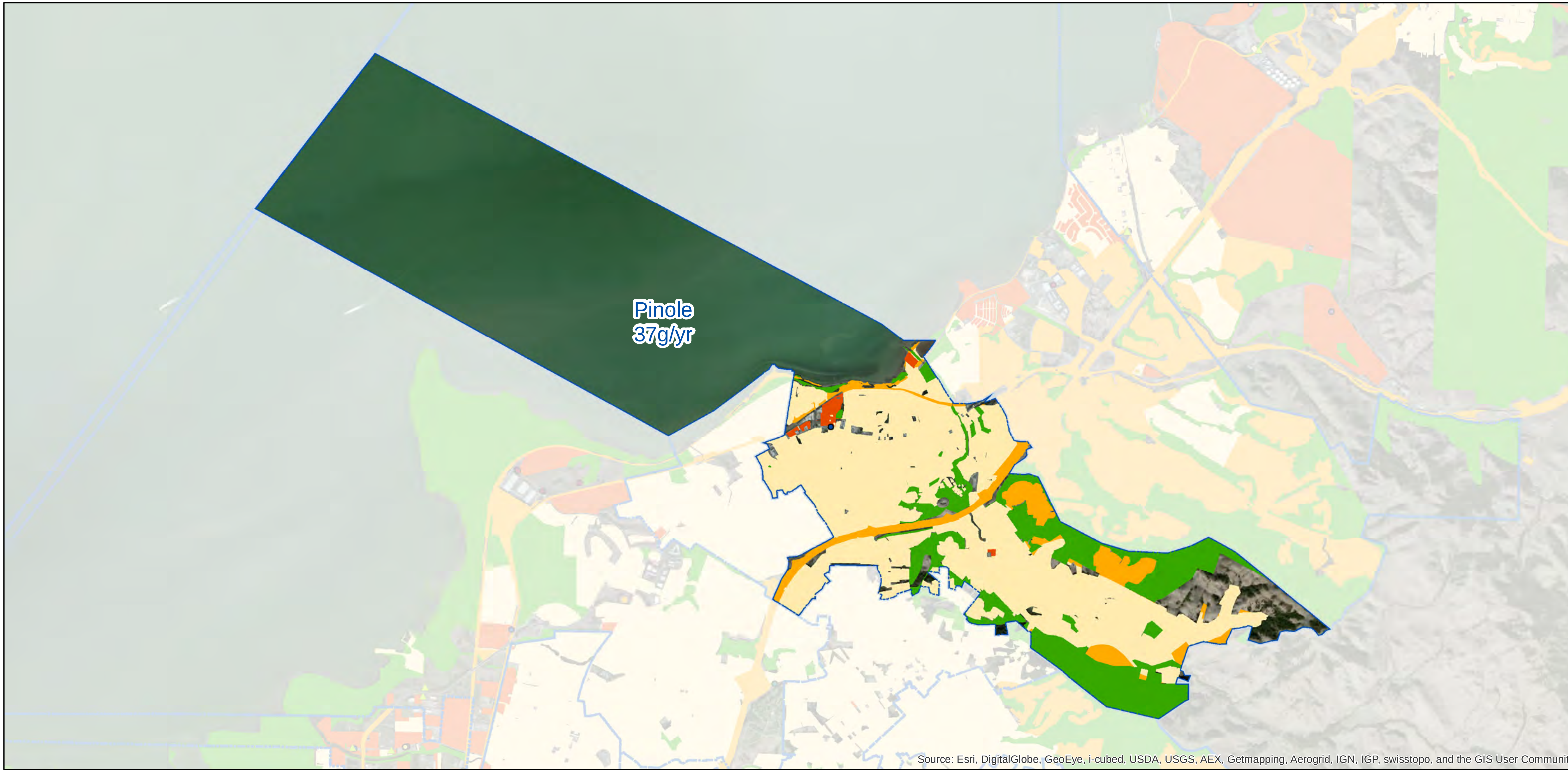

PBC Sources, Site Samples, and Land Use in Contra Costa County

Contra Costa Public Works

Rev. 3/15/2014

Agency: Pinole

PCB Sites

- Transport/Shipping
- Creamation Facility
- Metals Manufacturing
- Cement
- Recycling - Metals
- Recycling - Drums
- Recycling - Automotive
- Recycling -General Waste
- Old Rebuilt Power Plants
- Old Power Plants
- New Power Plants

Sampling PCB Concentration (mg/kg)

- 0.0 - .2
- 0.2 - 0.5
- 0.5 - 3.0

Land Use

- Old_Industrial
- Old_Urban
- County_GP_Openspace
- New_Urban_and_Other
- High_Opportunity
- City and County Limits

0 1 2 4 6 Miles

N

Land Use Load (grams PCBs/year)

CITY	Old_Industrial	Old_Urban	New_Urban_and_Other	Open_Space	High_Opportunity	Total
ANTIOCH	11.2	1.1	0.2	9.2	0	22
BRENTWOOD	3.5	0	0	3.2	0	7
CLAYTON	0	12.9	1.4	2.5	0	17
CONCORD	9	175.8	12.4	14	0	211
CONTRA COSTA COUNTY	221.4	228.1	15.5	169.2	0	634
DANVILLE	0.3	75.7	5.3	8.2	0	89
EL CERRITO	0	34.8	0.1	0.9	0	36
HERCULES	6.5	5.5	3.3	3.1	0	18
LAFAYETTE	0	98.9	1.2	2.2	0	102
MARTINEZ	21.4	47	3.6	5.9	0	78
MORAGA	1.1	3.1	0.1	5.8	0	10
OAKLEY	11.3	0	0	1.1	0	12
ORINDA	0	2.1	0.1	3.4	0	6
PINOLE	1.4	33	0.6	1.9	0	37
PITTSBURG	70.7	50.7	4.4	7.2	0	133
PLEASANT HILL	1	61.9	0.7	1.4	0	65
RICHMOND	167.1	107.6	3.3	17.6	300	596
SAN PABLO	1.8	24.5	0.1	0.2	0	27
SAN RAMON	0	29.6	11	11.5	0	52
WALNUT CREEK	1.9	128.5	1.7	11.1	0	143
TOTAL	529.8	1120.6	64.7	279.6	300	2295

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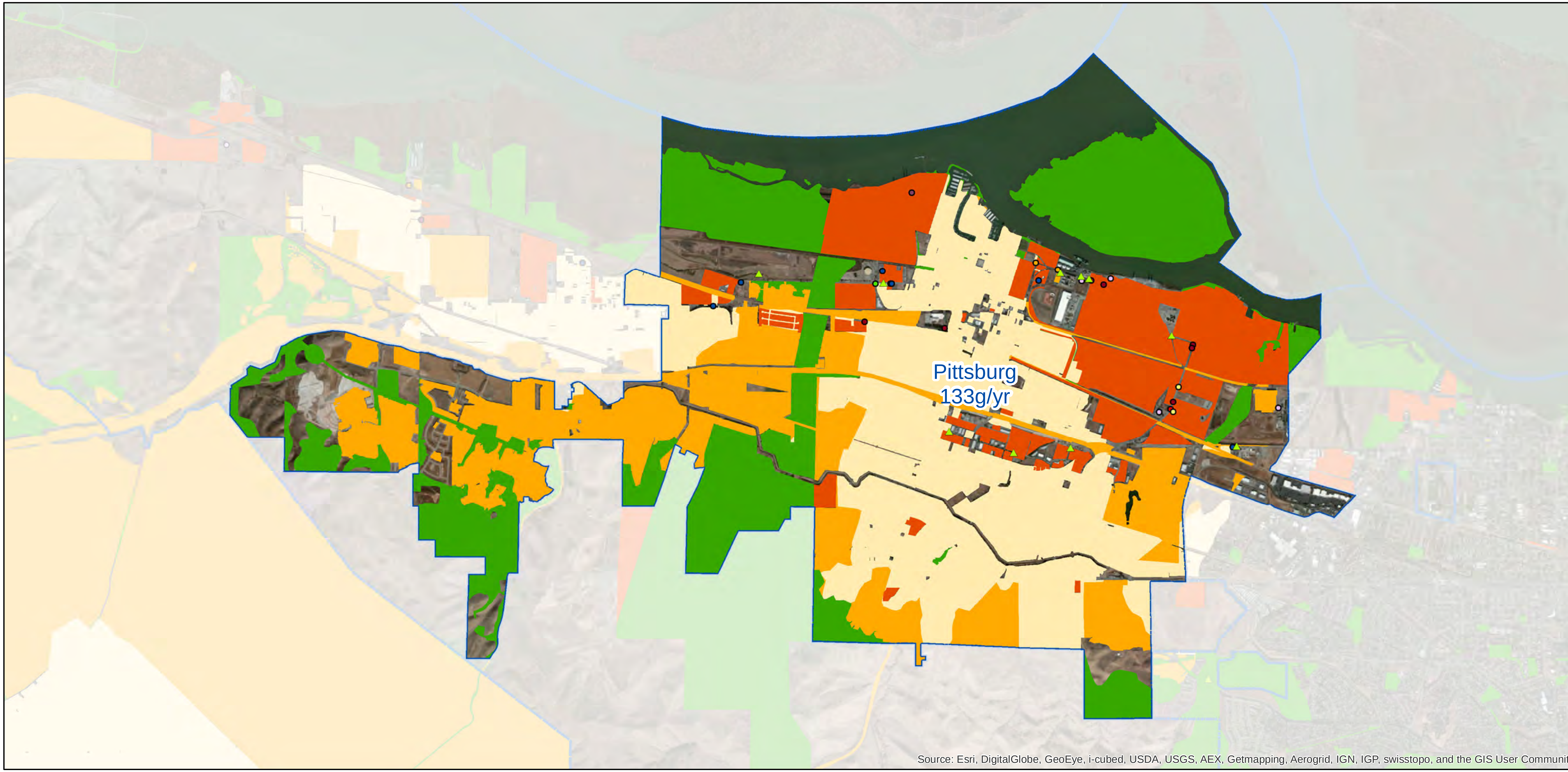

PBC Sources, Site Samples, and Land Use in Contra Costa County

Contra Costa Public Works

Rev. 3/15/2014

Agency: Pittsburg

PCB Sites

- Transport/Shipping
- Creamation Facility
- Metals Manufacturing
- Cement
- Recycling - Metals
- Recycling - Drums
- Recycling - Automotive
- Recycling -General Waste
- Old Rebuilt Power Plants
- Old Power Plants
- New Power Plants

Sampling PCB Concentration (mg/kg)

- 0.0 - .2
- 0.2 - 0.5
- 0.5 - 3.0

Land Use

- Old_Industrial
- Old_Urban
- County_GP_Openspace
- New_Urban_and_Other
- High_Opportunity
- City and County Limits

0 1 2 4 6 Miles

N

Land Use Load (grams PCBs/year)

CITY	Old_Industrial	Old_Urban	New_Urban_and_Other	Open_Space	High_Opportunity	Total
ANTIOCH	11.2	1.1	0.2	9.2	0	22
BRENTWOOD	3.5	0	0	3.2	0	7
CLAYTON	0	12.9	1.4	2.5	0	17
CONCORD	9	175.8	12.4	14	0	211
CONTRA COSTA COUNTY	221.4	228.1	15.5	169.2	0	634
DANVILLE	0.3	75.7	5.3	8.2	0	89
EL CERRITO	0	34.8	0.1	0.9	0	36
HERCULES	6.5	5.5	3.3	3.1	0	18
LAFAYETTE	0	98.9	1.2	2.2	0	102
MARTINEZ	21.4	47	3.6	5.9	0	78
MORAGA	1.1	3.1	0.1	5.8	0	10
OAKLEY	11.3	0	0	1.1	0	12
ORINDA	0	2.1	0.1	3.4	0	6
PINOLE	1.4	33	0.6	1.9	0	37
PITTSBURG	70.7	50.7	4.4	7.2	0	133
PLEASANT HILL	1	61.9	0.7	1.4	0	65
RICHMOND	167.1	107.6	3.3	17.6	300	596
SAN PABLO	1.8	24.5	0.1	0.2	0	27
SAN RAMON	0	29.6	11	11.5	0	52
WALNUT CREEK	1.9	128.5	1.7	11.1	0	143
TOTAL	529.8	1120.6	64.7	279.6	300	2295

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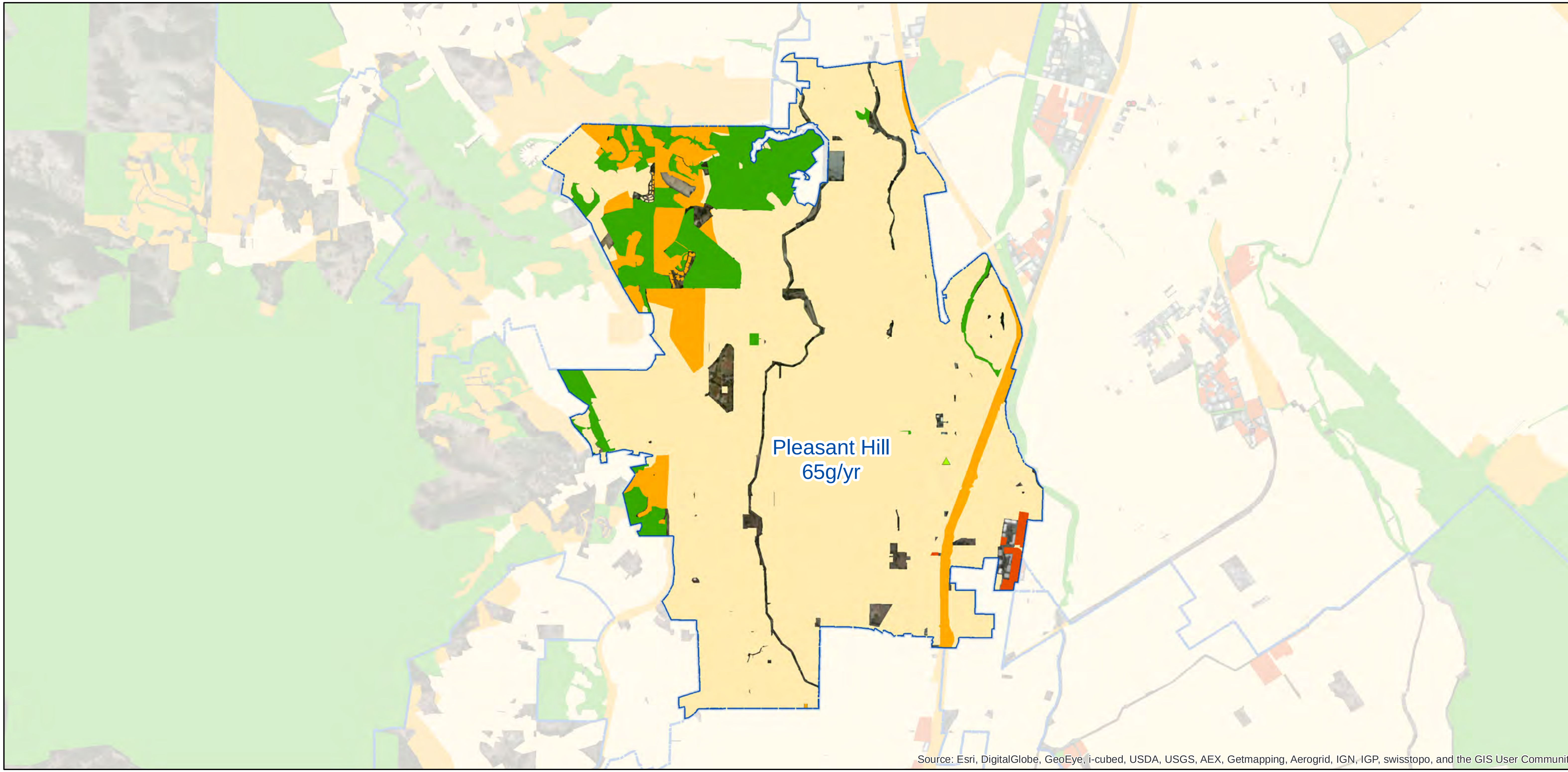

PBC Sources, Site Samples, and Land Use in Contra Costa County

Contra Costa Public Works

Rev. 3/15/2014

Agency: Pleasant Hill

PCB Sites

- Transport/Shipping
- Creamation Facility
- Metals Manufacturing
- Cement
- Recycling - Metals
- Recycling - Drums
- Recycling - Automotive
- Recycling -General Waste
- Old Rebuilt Power Plants
- Old Power Plants
- New Power Plants

Sampling PCB Concentration (mg/kg)

- 0.0 - .2
- 0.2 - 0.5
- 0.5 - 3.0

Land Use

- Old_Industrial
- Old_Urban
- County_GP_Openspace
- New_Urban_and_Other
- High_Opportunity
- City and County Limits

N

0 1 2 4 Miles

Land Use Load (grams PCBs/year)

CITY	Old_Industrial	Old_Urban	New_Urban_and_Other	Open_Space	High_Opportunity	Total
ANTIOCH	11.2	1.1	0.2	9.2	0	22
BRENTWOOD	3.5	0	0	3.2	0	7
CLAYTON	0	12.9	1.4	2.5	0	17
CONCORD	9	175.8	12.4	14	0	211
CONTRA COSTA COUNTY	221.4	228.1	15.5	169.2	0	634
DANVILLE	0.3	75.7	5.3	8.2	0	89
EL CERRITO	0	34.8	0.1	0.9	0	36
HERCULES	6.5	5.5	3.3	3.1	0	18
LAFAYETTE	0	98.9	1.2	2.2	0	102
MARTINEZ	21.4	47	3.6	5.9	0	78
MORAGA	1.1	3.1	0.1	5.8	0	10
OAKLEY	11.3	0	0	1.1	0	12
ORINDA	0	2.1	0.1	3.4	0	6
PINOLE	1.4	33	0.6	1.9	0	37
PITTSBURG	70.7	50.7	4.4	7.2	0	133
PLEASANT HILL	1	61.9	0.7	1.4	0	65
RICHMOND	167.1	107.6	3.3	17.6	300	596
SAN PABLO	1.8	24.5	0.1	0.2	0	27
SAN RAMON	0	29.6	11	11.5	0	52
WALNUT CREEK	1.9	128.5	1.7	11.1	0	143
TOTAL	529.8	1120.6	64.7	279.6	300	2295

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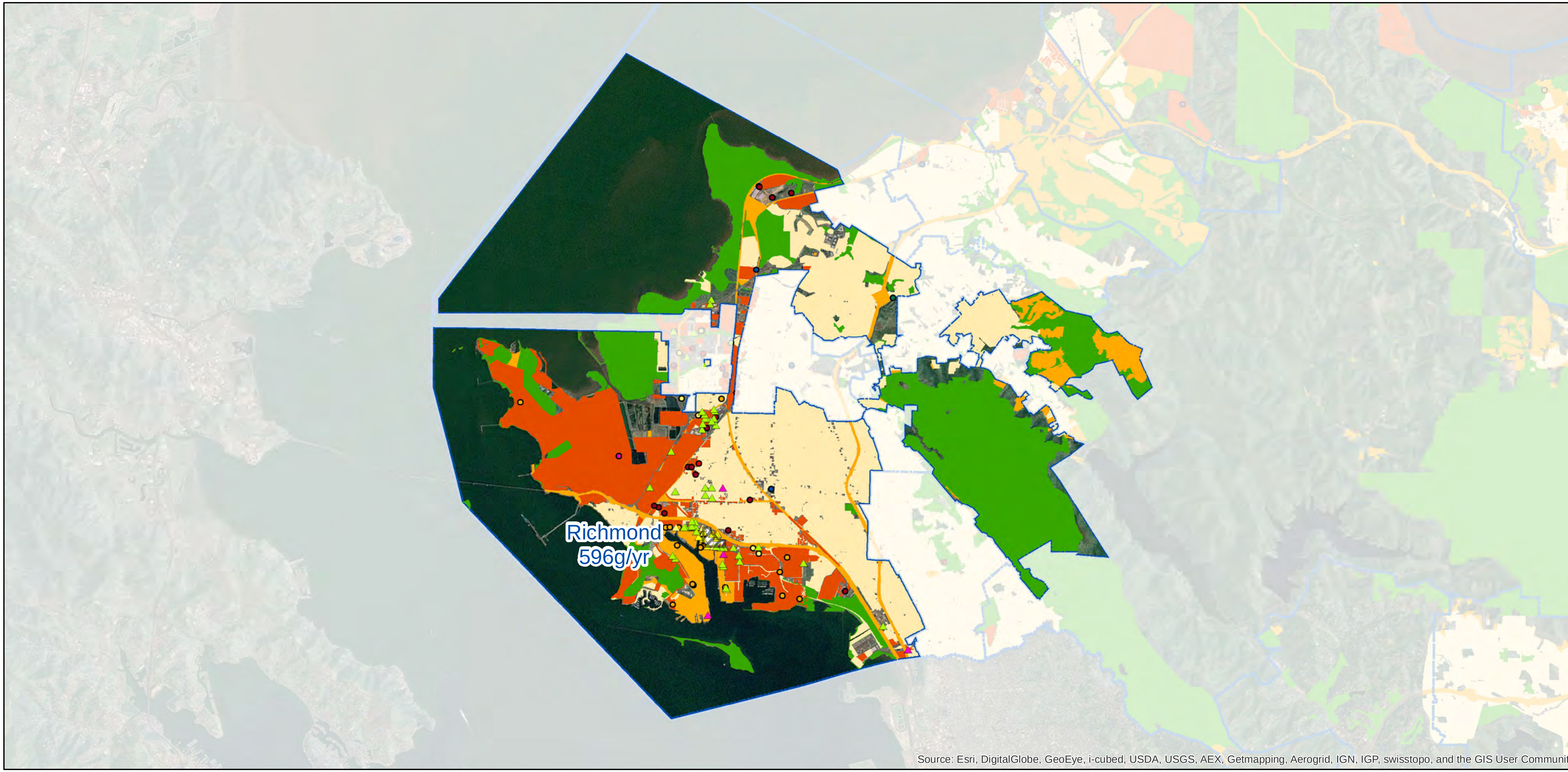

PBC Sources, Site Samples, and Land Use in Contra Costa County

Contra Costa Public Works

Agency: Richmond

PCB Sites

- Transport/Shipping
- Creamation Facility
- Metals Manufacturing
- Cement
- Recycling - Metals
- Recycling - Drums
- Recycling - Automotive
- Recycling -General Waste
- Old Rebuilt Power Plants
- Old Power Plants
- New Power Plants

Sampling PCB Concentration (mg/kg)

- 0.0 - .2
- 0.2 - 0.5
- 0.5 - 3.0

Land Use

- Old_Industrial
- Old_Urban
- County_GP_Openspace
- New_Urban_and_Other
- High_Opportunity
- City and County Limits

0 1 2 4 6 8 10 12 Miles

N

Land Use Load (grams PCBs/year)

CITY	Old_Industrial	Old_Urban	New_Urban_and_Other	Open_Space	High_Opportunity	Total
ANTIOCH	11.2	1.1	0.2	9.2	0	22
BRENTWOOD	3.5	0	0	3.2	0	7
CLAYTON	0	12.9	1.4	2.5	0	17
CONCORD	9	175.8	12.4	14	0	211
CONTRA COSTA COUNTY	221.4	228.1	15.5	169.2	0	634
DANVILLE	0.3	75.7	5.3	8.2	0	89
EL CERRITO	0	34.8	0.1	0.9	0	36
HERCULES	6.5	5.5	3.3	3.1	0	18
LAFAYETTE	0	98.9	1.2	2.2	0	102
MARTINEZ	21.4	47	3.6	5.9	0	78
MORAGA	1.1	3.1	0.1	5.8	0	10
OAKLEY	11.3	0	0	1.1	0	12
ORINDA	0	2.1	0.1	3.4	0	6
PINOLE	1.4	33	0.6	1.9	0	37
PITTSBURG	70.7	50.7	4.4	7.2	0	133
PLEASANT HILL	1	61.9	0.7	1.4	0	65
RICHMOND	167.1	107.6	3.3	17.6	300	596
SAN PABLO	1.8	24.5	0.1	0.2	0	27
SAN RAMON	0	29.6	11	11.5	0	52
WALNUT CREEK	1.9	128.5	1.7	11.1	0	143
TOTAL	529.8	1120.6	64.7	279.6	300	2295

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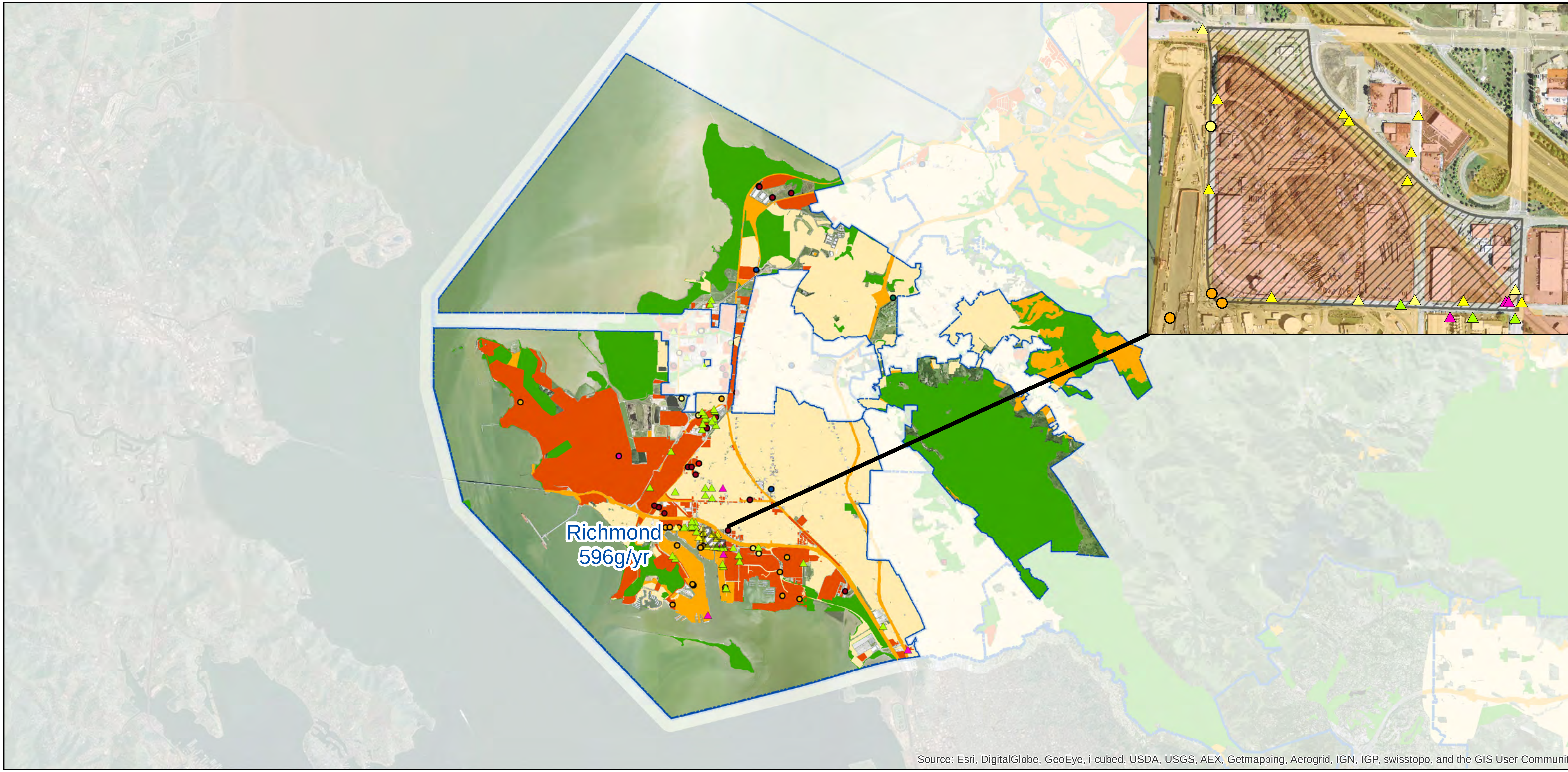

PBC Sources, Site Samples, and Land Use in Contra Costa County

Agency: Richmond + Richmond High Opportunity Area

Contra Costa
Public Works

Rev. 3/15/2014

PCB Sites

- Transport/Shipping
- Creamation Facility
- Metals Manufacturing
- Cement
- Recycling - Metals
- Recycling - Drums
- Recycling - Automotive
- Recycling -General Waste
- Old Rebuilt Power Plants
- Old Power Plants
- New Power Plants

Sampling PCB Concentration (mg/kg)

- 0.0 - .2
- 0.2 - 0.5
- 0.5 - 3.0

Land Use

- Old_Industrial
- Old_Urban
- County_GP_Openspace
- New_Urban_and_Other
- High_Opportunity
- City and County Limits

N

0 1 2 4 6 8 10 12 Miles

Land Use Load (grams PCBs/year)

CITY	Old_Industrial	Old_Urban	New_Urban_and_Other	Open_Space	High_Opportunity	Total
ANTIOCH	11.2	1.1	0.2	9.2	0	22
BRENTWOOD	3.5	0	0	3.2	0	7
CLAYTON	0	12.9	1.4	2.5	0	17
CONCORD	9	175.8	12.4	14	0	211
CONTRA COSTA COUNTY	221.4	228.1	15.5	169.2	0	634
DANVILLE	0.3	75.7	5.3	8.2	0	89
EL CERRITO	0	34.8	0.1	0.9	0	36
HERCULES	6.5	5.5	3.3	3.1	0	18
LAFAYETTE	0	98.9	1.2	2.2	0	102
MARTINEZ	21.4	47	3.6	5.9	0	78
MORAGA	1.1	3.1	0.1	5.8	0	10
OAKLEY	11.3	0	0	1.1	0	12
ORINDA	0	2.1	0.1	3.4	0	6
PINOLE	1.4	33	0.6	1.9	0	37
PITTSBURG	70.7	50.7	4.4	7.2	0	133
PLEASANT HILL	1	61.9	0.7	1.4	0	65
RICHMOND	167.1	107.6	3.3	17.6	300	596
SAN PABLO	1.8	24.5	0.1	0.2	0	27
SAN RAMON	0	29.6	11	11.5	0	52
WALNUT CREEK	1.9	128.5	1.7	11.1	0	143
TOTAL	529.8	1120.6	64.7	279.6	300	2295

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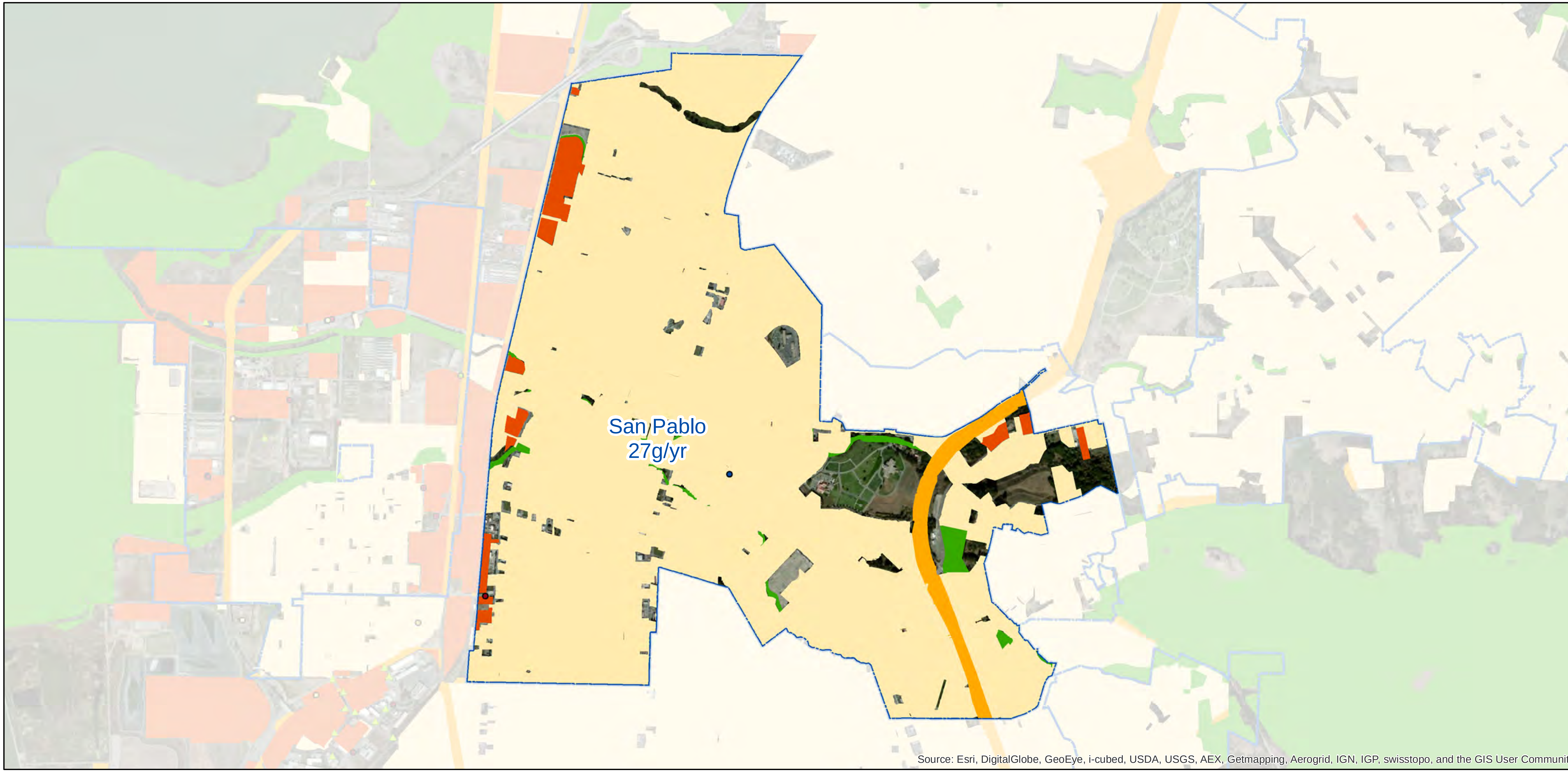

PBC Sources, Site Samples, and Land Use in Contra Costa County

Contra Costa Public Works

Rev. 3/15/2014

Agency: San Pablo

PCB Sites

- Transport/Shipping
- Creamation Facility
- Metals Manufacturing
- Cement
- Recycling - Metals
- Recycling - Drums
- Recycling - Automotive
- Recycling -General Waste
- Old Rebuilt Power Plants
- Old Power Plants
- New Power Plants

Sampling PCB Concentration (mg/kg)

- 0.0 - .2
- 0.2 - 0.5
- 0.5 - 3.0

Land Use

- Old_Industrial
- Old_Urban
- County_GP_Openspace
- New_Urban_and_Other
- High_Opportunity
- City and County Limits

0 1 2 Miles

N

Land Use Load (grams PCBs/year)

CITY	Old_Industrial	Old_Urban	New_Urban_and_Other	Open_Space	High_Opportunity	Total
ANTIOCH	11.2	1.1	0.2	9.2	0	22
BRENTWOOD	3.5	0	0	3.2	0	7
CLAYTON	0	12.9	1.4	2.5	0	17
CONCORD	9	175.8	12.4	14	0	211
CONTRA COSTA COUNTY	221.4	228.1	15.5	169.2	0	634
DANVILLE	0.3	75.7	5.3	8.2	0	89
EL CERRITO	0	34.8	0.1	0.9	0	36
HERCULES	6.5	5.5	3.3	3.1	0	18
LAFAYETTE	0	98.9	1.2	2.2	0	102
MARTINEZ	21.4	47	3.6	5.9	0	78
MORAGA	1.1	3.1	0.1	5.8	0	10
OAKLEY	11.3	0	0	1.1	0	12
ORINDA	0	2.1	0.1	3.4	0	6
PINOLE	1.4	33	0.6	1.9	0	37
PITTSBURG	70.7	50.7	4.4	7.2	0	133
PLEASANT HILL	1	61.9	0.7	1.4	0	65
RICHMOND	167.1	107.6	3.3	17.6	300	596
SAN PABLO	1.8	24.5	0.1	0.2	0	27
SAN RAMON	0	29.6	11	11.5	0	52
WALNUT CREEK	1.9	128.5	1.7	11.1	0	143
TOTAL	529.8	1120.6	64.7	279.6	300	2295

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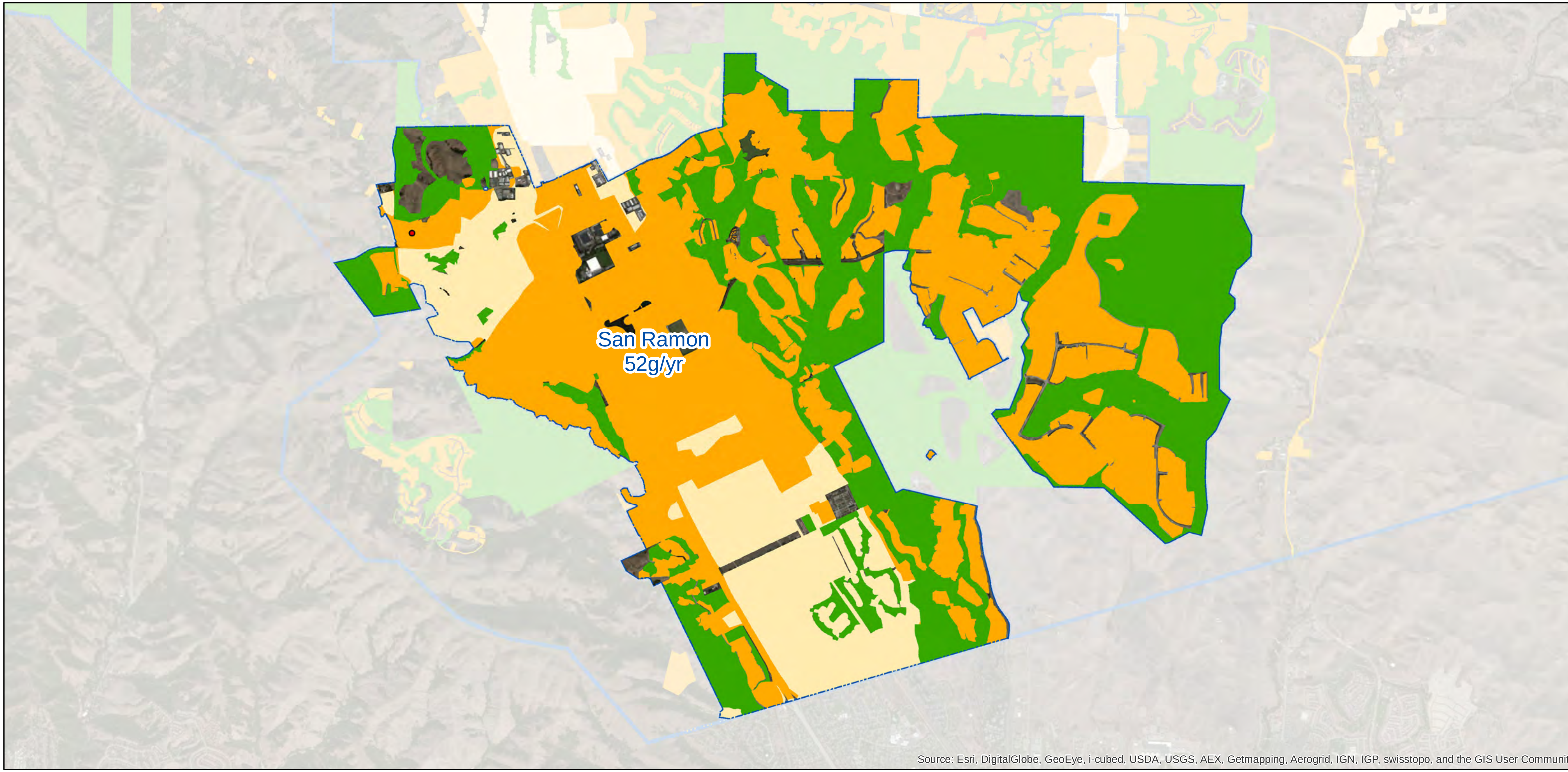

PBC Sources, Site Samples, and Land Use in Contra Costa County

Contra Costa Public Works

Rev. 3/15/2014

Agency: San Ramon

PCB Sites

- Transport/Shipping
- Creamation Facility
- Metals Manufacturing
- Cement
- Recycling - Metals
- Recycling - Drums
- Recycling - Automotive
- Recycling -General Waste
- Old Rebuilt Power Plants
- Old Power Plants
- New Power Plants

Sampling PCB Concentration (mg/kg)

- 0.0 - .2
- 0.2 - 0.5
- 0.5 - 3.0

Land Use

- Old_Industrial
- Old_Urban
- County_GP_Openspace
- New_Urban_and_Other
- High_Opportunity
- City and County Limits

0 1 2 4 6 Miles

N

Land Use Load (grams PCBs/year)

CITY	Old_Industrial	Old_Urban	New_Urban_and_Other	Open_Space	High_Opportunity	Total
ANTIOCH	11.2	1.1	0.2	9.2	0	22
BRENTWOOD	3.5	0	0	3.2	0	7
CLAYTON	0	12.9	1.4	2.5	0	17
CONCORD	9	175.8	12.4	14	0	211
CONTRA COSTA COUNTY	221.4	228.1	15.5	169.2	0	634
DANVILLE	0.3	75.7	5.3	8.2	0	89
EL CERRITO	0	34.8	0.1	0.9	0	36
HERCULES	6.5	5.5	3.3	3.1	0	18
LAFAYETTE	0	98.9	1.2	2.2	0	102
MARTINEZ	21.4	47	3.6	5.9	0	78
MORAGA	1.1	3.1	0.1	5.8	0	10
OAKLEY	11.3	0	0	1.1	0	12
ORINDA	0	2.1	0.1	3.4	0	6
PINOLE	1.4	33	0.6	1.9	0	37
PITTSBURG	70.7	50.7	4.4	7.2	0	133
PLEASANT HILL	1	61.9	0.7	1.4	0	65
RICHMOND	167.1	107.6	3.3	17.6	300	596
SAN PABLO	1.8	24.5	0.1	0.2	0	27
SAN RAMON	0	29.6	11	11.5	0	52
WALNUT CREEK	1.9	128.5	1.7	11.1	0	143
TOTAL	529.8	1120.6	64.7	279.6	300	2295

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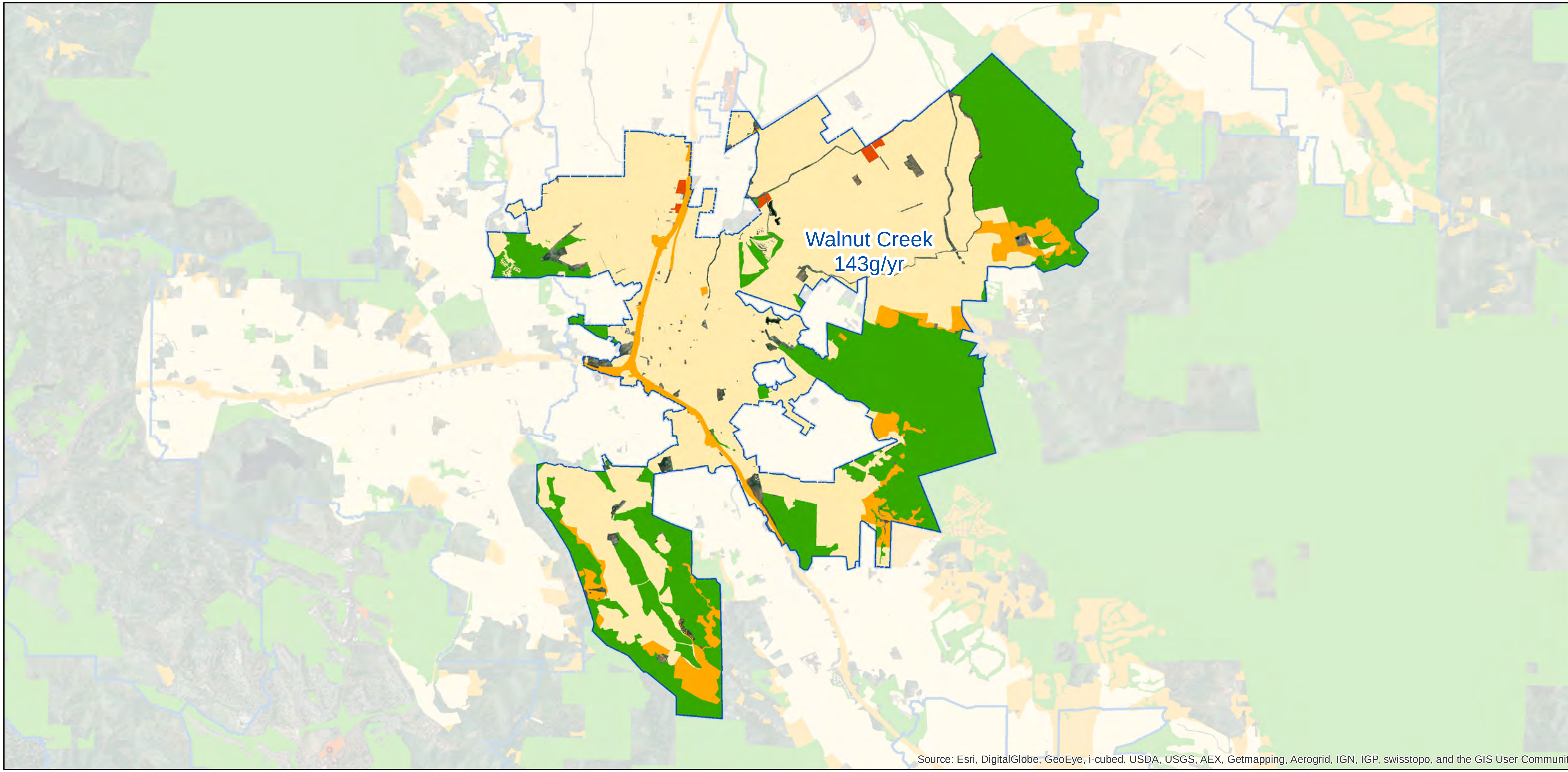


PBC Sources, Site Samples, and Land Use in Contra Costa County

Contra Costa
Public Works

Rev. 3/15/2014

Agency: Walnut Creek

PCB Sites

- Transport/Shipping
- Creamation Facility
- Metals Manufacturing
- Cement
- Recycling - Metals
- Recycling - Drums
- Recycling - Automotive
- Recycling -General Waste
- Old Rebuilt Power Plants
- Old Power Plants
- New Power Plants

Sampling PCB Concentration (mg/kg)

- 0.0 - .2
- 0.2 - 0.5
- 0.5 - 3.0

Land Use

- Old_Industrial
- Old_Urban
- County_GP_Openspace
- New_Urban_and_Other
- High_Opportunity
- City and County Limits

0 1 2 4 6 8 Miles

N

Land Use Load (grams PCBs/year)

CITY	Old_Industrial	Old_Urban	New_Urban_and_Other	Open_Space	High_Opportunity	Total
ANTIOCH	11.2	1.1	0.2	9.2	0	22
BRENTWOOD	3.5	0	0	3.2	0	7
CLAYTON	0	12.9	1.4	2.5	0	17
CONCORD	9	175.8	12.4	14	0	211
CONTRA COSTA COUNTY	221.4	228.1	15.5	169.2	0	634
DANVILLE	0.3	75.7	5.3	8.2	0	89
EL CERRITO	0	34.8	0.1	0.9	0	36
HERCULES	6.5	5.5	3.3	3.1	0	18
LAFAYETTE	0	98.9	1.2	2.2	0	102
MARTINEZ	21.4	47	3.6	5.9	0	78
MORAGA	1.1	3.1	0.1	5.8	0	10
OAKLEY	11.3	0	0	1.1	0	12
ORINDA	0	2.1	0.1	3.4	0	6
PINOLE	1.4	33	0.6	1.9	0	37
PITTSBURG	70.7	50.7	4.4	7.2	0	133
PLEASANT HILL	1	61.9	0.7	1.4	0	65
RICHMOND	167.1	107.6	3.3	17.6	300	596
SAN PABLO	1.8	24.5	0.1	0.2	0	27
SAN RAMON	0	29.6	11	11.5	0	52
WALNUT CREEK	1.9	128.5	1.7	11.1	0	143
TOTAL	529.8	1120.6	64.7	279.6	300	2295

Prepared by: Wiley Osborn, CCC Public Works Dept 03/01/2014 P:\GIS_NonStatic\GIS USERS - Projects\Cleanwater_PCBsourceAreas\Maps\mxd\PCB_DataDrivenPages.mxd

February 4, 2014

Proposed Mercury/PCBs Near-term Planning Tasks and Schedule

MRP 2.0 POC Workgroup

The MRP 2.0 Pollutants of Concern (POC) Workgroup has identified three separate but parallel and related tracks relative to Provision C.11/12 (mercury/PCBs controls) permit reissuance:[1]

1. **Existing pilot watersheds** - refine and enhance implementation planning for known high opportunity areas within five "pilot" mercury/PCB watersheds where pilot-scale control measure implementation began during MRP 1.0. Continue planning and implementing controls resulting in further load reductions (i.e., "focused implementation"). This implementation planning should remain ahead of new high opportunity areas identified during the process outlined below (see Track No.2).
    - June 2014 - preliminary plans submitted to RWB staff for focused implementation in each watershed, incorporating MRP 1.0 pilot results as available. RWB staff provides comments within two months.
    - December 2014 – final focused implementation plans for each watershed completed. Plans should show commitment to significant actions, be adequately robust, and include clear milestones that can be tracked.
    - February 2015 - Tentative Order which is informed by above final plans for each watershed is released for public comment.
2. **New high opportunity areas** - identify new "high opportunity" mercury/PCB management areas within old industrial areas (outside of pilot watersheds) and plan future focused implementation.
    - June 2014 - develop preliminary list and maps of high opportunity areas.
    - December 2014 - develop refined short list and maps of new high opportunity areas.
    - February 2015 - Tentative Order with proposed new high opportunity areas is released for public comment.
    - June 2015 - implementation planning completed for new high opportunity areas.
3. **Moderate opportunity areas** - identify process for long-term "watershed master planning" for funding and implementing green infrastructure retrofitting in "moderate opportunity" mercury/PCB areas. Consider opportunities for multiple drivers/benefits (e.g., green streets, trash controls, transportation projects, and redevelopment). Note nexus with Proposition 84 funded "Green Bay Area" project (pilots include City of San Mateo and San Jose).
    - June 2014 - develop preliminary list and maps of moderate opportunity areas.
    - December 2014 - develop refined short list and maps of moderate opportunity areas.
    - February 2015 - Tentative Order with proposed moderate opportunity areas is released for public comment.
    - June 2015 - initial implementation planning completed for moderate opportunity areas.

[1]For additional background and information about various terms (e.g., focused implementation, pilot watersheds and high and moderate opportunity areas) see the Integrated Monitoring Reports, Parts B and C.

Table 1 presents further details regarding the proposed 18-month process (January 2014 – June 2015) to identify new high and moderate opportunity areas and the associated implementation planning (Tracks 2 and 3 above). The framework divides the 18 months into three 6-month periods and provides a rough outline of the proposed schedule and tasks for Bay Area Phase I Stormwater Programs and Permittees. Notes regarding Table 1:

- The schedule may vary among Programs and Permittees by plus or minus two months. For example, some programs may not begin initiating the "windshield surveys" until July or August of 2014.
- The 18-month process would be completed coincident with the estimated MRP 2.0 effective date (July 1, 2015); thus the timing of permit reissuance and this process should be further discussed.
- Windshield surveys are from public right-of-way and do not necessarily include facility inspections.
- Based on existing sediment data collected on streets and in the MS4, new high opportunity areas may not have as high of PCB loading rates as existing known high opportunity areas.
- It is currently unclear what role (if any) the Regional Watershed Spreadsheet Model (RWSM) might play in the process outlined to identify new high opportunity areas. As a first step, BASMAA staff needs to further review and evaluate the most recent draft RWSM report (dated December 2013).
- Redirecting of resources currently earmarked for POC loads monitoring via the STLS to partly or wholly fund monitoring associated with identifying high opportunity areas should be discussed.
- Nexus with resources available in the 2015 RMP budget that are associated with STLS activities should be discussed. Preliminary ideas for use of resources (consistent with SPLWG discussion) include further testing of hypothesis that high opportunity areas identified via desktop work and sediment monitoring have high yields/loadings; and 2) to help further calibrate/validate RWSM or other models.

Table 1. Outline of proposed tasks and schedule for identifying new mercury/PCB high and moderate opportunity areas and associated implementation planning.

Schedule/Description	Program Tasks	Permittee Tasks
January – June 2014 Planning, desktop analysis and field screening. Preliminary mapping.	• Develop, refine and document process for identifying new high opportunity and moderate opportunity areas. • Identify relevant Permittees and staff that should be involved in implementation of the process. • Identify resources needed and more detailed schedule for implementation of the process. • Complete IMR Part C, which includes cost-benefit scenarios for high and moderate opportunity areas. • Conduct records review and/or windshield surveys. • Complete desktop analysis and preliminary maps showing features such as potential source areas. • Work with Permittees to further ground truth maps. • Develop preliminary list and maps of new high and moderate opportunity areas. • Plan for monitoring data collection to further identify new high opportunity areas. Evaluate field screening techniques such as ELISA.	• Participate in workgroups facilitated by countywide programs. • Participate in or conduct windshield surveys. • Help ground truth maps and other data.
July – December 2014 Field monitoring and begin implementation planning. Refine mapping.	• Conduct sediment monitoring (possibly in conjunction with other field screening techniques such as ELISA) to identify new high opportunity areas. • Refine preliminary list and maps of new high and moderate opportunity areas as monitoring and other new data become available. • Possibly conduct reconnaissance level water monitoring during 2014/15 wet season. • Begin implementation planning for newly identified high and moderate opportunity areas.	• Assist Programs with monitoring (e.g., selecting locations, access). • Work with Programs on implementation planning.
January – June 2015 Complete mapping and implementation planning.	• Refine high and moderate opportunity area maps. Use to inform February 2015 T.O. • Complete implementation planning for new high opportunity and initial planning for moderate opportunity areas.	• Continue to work with Programs on mapping and implementation planning.

LID Retrofit Stormwater Treatment and Hydro-modification Management Demonstration Project for Upper Grayson Creek Watershed: Contra Costa County Public Works Department (Phase 1)

Work Plan

I. Introduction

Project Overview

The complete *LID Retrofit Stormwater Treatment and Hydro-modification Management Demonstration Project for Upper Grayson Creek Watershed* (project) provides long term water quality improvements for a 27-acre area, including the Contra Costa County Public Works Department (PWD/County) campus in Martinez. The project will have two phases, for which Prop 84 Stormwater Grant Program (SWGP) funding is presently being requested for Phase 1. Key project components are described below by phase and are shown on Map 2:

PHASE 1

1. **Retrofit of Existing Parking Lot Drainage Structures.** This portion of the project will demonstrate a simple and cost-effective, way to implement LID in existing parking lots. Bio-retention facilities will intercept surface flows to two existing catch basins. The PWD's approach requires no new pipes and no re-grading or replacement of the surrounding pavement. The parking lot would be re-striped to accommodate the new facilities, with loss of about 20 parking spaces to be replaced by the third project component of installing pervious pavement in an overflow parking lot. This component provides a vivid and effective means to provide an LID retrofit of an existing parking lot. Map 4 shows the bio-retention facilities and storm drain system. Charts 1 and 2 describe the function of each pipe and drainage catch basin in the stormwater treatment system.

2. **Pervious Pavement.** To provide a practical and integrated demonstration of another LID implementation strategy, while also replacing parking that will be lost to the bio-retention areas in the PWD parking lot, the County will improve an adjacent existing graveled parking lot by using pervious concrete pavement on half of it, and porous asphalt pavement on the other half. The County will track implementation issues and capital costs and estimate long-term maintenance costs for each of the two options. The final report will include a qualitative and quantitative comparison of the infiltration and treatment advantages and disadvantages of each of the two porous paving approaches.

3. **Downspout Disconnection.** Many of the existing downspouts from the PWD building roof will be disconnected from the existing storm drain system and the drainage re-directed to a variety of new LID features including cisterns, small self-treating/self-retaining areas, infiltration planters, flow-through planters, or (depending on space limitations) to new bio-

retention facilities. These downspout locations are visible from the building entrances, and from some conference rooms used by County staff to plan public projects and to meet with private land development professionals regarding project infrastructure options. An evaluation report will include "Lessons Learned", regarding the extent to which the proposed LID features provide storm water treatment, infiltration, and/or hydromodification, and the installation cost for each LID type. A typical flow-through planter can be seen in Figure 1, taken from the Contra Costa Clean Water Program's Stormwater C3 Guidebook.

4. **Rainwater Harvesting and Re-use.** As a demonstration of the value of cisterns for irrigation purposes, four downspouts of the two Public Works Department buildings' roofs will be re-directed to rain barrels. Collected runoff will be used for irrigation of foundation landscaping, as well as of a native plant nursery that the County has recently established to re-vegetate areas impacted by County infrastructure projects. This LID component will be implemented in partnership with New Leaf Leadership Academy, a local alternative high school program for at-risk students, which has a long history of working on environmental and stormwater projects. The PWD will track how many gallons of rainwater are harvested in a water year, and how many gallons are used.

5. **Public Education and Outreach.** This component will have two primary features: a) interpretive panels, tours, and materials; and b) an interpretive trail (that will also be developed in Phase 2). Interpretive features consist of a self-guided walking tour of the different LID treatment demonstrations and cisterns on-site that will be developed for use by the interested public and permit applicants. We will also develop brochures and on-site signage to explain the LID elements and their benefits to local streams and creeks. The Department will report on how the brochures and interpretive panels were developed, how many people that visited the building were shown the LID features, and how many tours were given.

6. **Community-based Planting Program.** The County will partner with the New Leaf Leadership Academy and with volunteer Public Works Department and other County employees to plant drought-tolerant native plants in place of the PWD front entry lawn area in Phase 1, and to install rain-garden plantings and revegetate the riparian area of Upper Grayson Creek in Phase 2.

7. **Monitoring** will focus on flow performance verification of the bio-retention facilities in both Phases 1 and 2 of the project. Continuous Turbidity monitoring at the bio-retention inlet will be calibrated with grab samples for suspended sediment concentrations (SSC), using SSC as a surrogate for pollutants of concern. Limited inlet and outlet grab sampling will be used to confirm source area concentrations and removal of pyrethroid pesticides and methyl-mercury. Monitoring wells within the bio-retention facilities will allow for accurate estimation of infiltration rates to underlying soils; estimates of the long-term proportion of runoff infiltrated and discharged can be derived from this data.

8. **Stormwater Treatment Program Development.** Two new programs resulting from this project that will be funded by the County and not the SWGP grant will that will potentially greatly expand stormwater treatment in the built landscape.

- The County Flood Control and Water Conservation District will conduct an evaluation and feasibility study of the potential to apply the neighborhood-scale treatment procedure throughout the County as an Alternative Compliance program.

- The County will also evaluate and conduct a feasibility study on the potential to apply the parking lot and drainage retrofit at other County-owned facilities.

PHASE 2:

9. **Neighborhood-scale Retrofit of Municipal Storm Drain Systems to LID**. This project will divert and treat and/or provide infiltration for drainage from about 27 acres of mostly impervious area, including city streets and County-owned buildings and parking lots. Drainage from this area is currently discharged untreated to the headwaters of Grayson Creek. This project will route drainage to two new bio-retention basins within a 3.6 acre open space area, where all dry weather flows and a portion of wet-weather flows—approximately 80% of long-term flow volume—will be detained and bio-filtered. A portion of the treated flow will be infiltrated to groundwater, and the remainder discharged to the creek at a reduced rate. Interpretive signage and a loop trail system will be strategically installed in this open space area to provide both educational and recreational values to create a multi-purpose drainage area. This is shown on Map 4.

10. **Residential-scale Rain Garden Demonstration Area.** A rain garden demonstration area for homeowners and developers is proposed for the central plaza and walkway between the two PWD buildings. As part of this demonstration garden the existing largely paved and un-used space would be transformed into a more lively, attractive, social and educational environment through use of green infrastructure. This component would consist of disconnecting up to 8 downspouts and redirecting them to one or more of the following features: rain barrel; and planter boxes (lined or infiltration variety). This feature would provide an educational experience for PWD employees, their children who use the day care facility that is off of the walkway and by developers and homeowners who visit the PWD.

11. **Upper Grayson Creek Restoration.** The PWD will revegetate with native species a 500–foot long riparian corridor of the headwaters of Grayson Creek that are within the open space area where the two bio-retention basins are proposed. The creek has relatively sparse vegetation presently that is dominated by non-native species including fan palms. These will be replaced and the corridor planted with riparian species native to Contra Costa County, which may include sycamore, elderberry, Fremont cottonwood, and/or California

walnut. An interpretive trail described under the "Public Education" component will be constructed near the basins and riparian area.

12. **Community-based Planting Program.** The County will partner with the New Leaf Leadership Academy and with volunteer Public Works Department and other County employees to plant the native/Mediterranean beds and planter boxes in the rain garden area and to revegetate the riparian area of Upper Grayson Creek.

13. **Public Education and Outreach.** The interpretive trail as the second feature of this component would be located in the 3.6 acre open space area (shown in Map 4) and will consist of a loop path that will begin at the existing native plants nursery and will run alongside both bio-retention basins and the riparian area to be restored. This trail will have interpretive panels and recreational value as well for public works employees and members of the public who may come to regard this as an informal park.

A. Overall Project Goals and Objectives:

1. **Provide a "Home Show" approach to demonstrate several types of LID stormwater treatment** at the very location where developers, engineers, and homeowners apply for permits and approvals for land development projects subject to Municipal Regional Stormwater NPDES Permit (MRP) Provision C.3.

2. **Test a variety of site-specific treatment facilities** at a County building complex to help develop the feasibility of a comprehensive and integrated stormwater treatment retrofit program for all 250 County-owned buildings and 400 properties and a Countywide program for Alternative Compliance per MRP Provision C.3.e. In Phase 2 we will be testing **neighborhood-scale treatment facilities** with the inclusion of bio-retention basins.

3. **Develop "Lessons Learned" for public agencies to retrofit existing facilities.** This will include an evaluation of the effectiveness of each treatment, cost to plan and install each facility, and an overall project evaluation that will provide guidance for County facilities' grounds retrofit/ renovation.

4. **Evaluate effectiveness of LID treatment for removing pyrethroid pesticides** to address provision C.8.d.i (Stressor source ID studies) and C.8.d.ii (BMP Effectiveness Evaluation) of the MRP, and for removing methylmercury to address Provision C.11.l of the NPDES Stormwater Permit issued by the Central Valley Regional Water Quality Control Board.

5. **Provide a prototype of a large scale, multiple benefit and multi-purpose LID project for Contra Costa County.** The benefits of this project include on-site treatment for several TMDLs, the reduction of concentration of a number of pollutant loads to Grayson Creek, furnishing groundwater recharge and reduction of stormwater runoff, implementation of several policies of the County's General Plan and Climate Action Plan, and providing for stormwater re-use as irrigation, as well as flood risk reduction, public education, plus

neighborhood scale stormwater treatment, recreational benefits and stream corridor enhancement in Phase 2.

B. Purpose and Need

This project will demonstrate and test a number of innovative, cost-effective techniques for retrofitting conventional drainage infrastructure, at a site-specific scale (Phase 1) and neighborhood scale (Phase 2), to incorporate Low Impact Development (LID) features and facilities in Upper Grayson Creek, which is part of the Walnut Creek watershed. The demonstrations will help promote the implementation of LID techniques required of land development professionals in the San Francisco Bay Area.

Interpretive signage, brochures and outreach materials will showcase the purpose and benefits of the proposed permanent LID features to developers, contractors, planners, engineers, and landscape architects who visit the Public Works Department in connection with planning and permitting public and private infrastructure development projects.

Phase 1 of this project will treat stormwater at the site scale. The site scale consists of the County Public Works Department building complex and property which covers an area of almost 4 acres. Stormwater will also be treated at the neighborhood scale in Phase 2 of the project, which consists of a 22.6-acre area and includes upstream County facilities and private development that drain to the Public Works parking lot. Map 1 shows the area of the Public Works building complex and the upstream neighborhood area draining to its parking lot, of which more than 90% is impervious surface. The large open space or natural areas are shown on Map 3 which delineates pervious and impervious surfaces within the tributary area. Of the total approximate 27 acres draining to the stormwater treatment basins, approximately 2 acres are natural and 25 acres are impervious. The land uses in the upstream neighborhood include the Juvenile Hall complex, the Office of Emergency Services, Sheriff's offices and Coroner facilities and the County's Recycling Center. There are also several buildings used for storage or warehouse type uses. The Recycling Center processes all of the paper waste from County buildings for recycling. There are approximately 765 parking stalls for the County employees that work at these facilities. These land uses combined generate typical urban stormwater pollutants such as pesticides, PCBs, hydrocarbons and aerial deposited mercury. The roofs and pavement are directly connected to the storm drains and Grayson Creek, providing a rapid and unimpeded pathway for high-energy, erosive flows, and the associated load of pollutants, to reach Grayson Creek.

Similar to stormwater treatment, the quantity of stormwater will be flowing to the project from an upstream neighborhood drainage area and from the Public Works building complex. The Public Works building complex consists of approximately 4 acres and is mostly covered with impervious surfaces, including a parking lot at the back of the building, the building complex, and main parking lot in front of the building. Storm water treatment of drainage from the building complex will focus on the main parking lot and front of the building. The Flood Control District isohyet map shows this area receives, on average, 17 inches of rainfall per year. The main parking lot is approximately 1.4 acres and will therefore generate approximately 85,000 cubic feet of storm water during the course of a typical year. The parking lot will be modified to accept surface flows from the paved areas into a stormwater treatment facility and the storm drain system modified to restrict flows into the catch basin until they exceed the capacity of the stormwater treatment facility. Downspouts along the front of the building will be disconnected and roof water will drain into LID planter box infiltration and treatment facilities. Each downspout will generate approximately 1400 cubic feet of storm water during the course of a typical year, which will drain into a cistern or into the treatment medium and flow control storage gravel at the bottom of a treatment facility.

Phase 2 will treat storm water from the upstream neighborhood, which consists of about 22.6 acres of County government uses and is approximately 90% covered with impervious surfaces and is shown on Map 3. This area will generate approximately 1.25 million cubic feet of storm water during the course of a typical water year and flow into the bio-retention basins from three different storm drain lines, one on the west and two to the north. The more highly polluted dry weather flows and first flush wet weather flows will be directed to the upper bio-retention basin for treatment. Wet weather flows that exceed the capacity of the bio-retention basins will be directed to the creek where historical flows have drained to.

C. <u>Sustainability</u>

This project supports long-term water quality improvements by providing developers, engineers, and homeowners a "Home Show" style opportunity to see what the LID features look like and how they function, and informational brochures to enhance their understanding of how they work and how they are constructed. Properly designed and constructed bio-retention facilities can have a useful life of 30 years or more with minimal inputs for landscape maintenance.

D. <u>Regional Map</u>

Map 5 shows the Grayson Creek watershed as tributary to the larger Walnut Creek watershed and the project site at the upper end of the Grayson Creek watershed. The project site and surrounding areas are largely composed of institutional (governmental) land uses with some residential land uses. The institutional land uses include the Sheriff's Office, Coroner's facility, Office of Emergency Services, Juvenile Hall, and Public Works complex.

E. <u>Project Map</u>

Map 3 shows the total area to be treated through project LID features. Map 5 shows the Section 303-d listed water bodies that the project drains to, and shows the project location. Map 2 shows the key project components/elements.

F. Impaired Waters

All urban creeks in the Bay Area are on the 303-d list listed for pesticide toxicity. The CCCWP's Water Quality Monitoring data have detected toxicity to benthic amphipods in storm water and sediments of Grayson Creek (CCCWP, 2014). In response, the CCCWP is conducting a stressor source identification study on Grayson Creek to confirm the working hypothesis that pyrethroid pesticides cause the observed toxicity.

The Contra Costa Clean Water Program's (CCCWP) Bioasessment Monitoring data indicate that the degree of urbanization is a significant factor affecting creek health (CCCWP 2014). LID implementation through the demonstration project will ameliorate impacts of urbanization.

The project will provide information benefits related to 303-d listings for mercury in Marsh Creek and in the Sacramento San Joaquin River Delta. Both of those listings lead to a need to develop control measures for methylmercury loads. This project will provide information on how LID works to reduce methylmercury concentrations in stormwater.

G. Watershed Description

The applicant regards the project as occurring within a "High Priority Watershed" since Walnut Creek, into which Grayson Creek flows, is an impaired watershed (as shown on the EPA's Section 303-d list); furthermore, there have been documented sightings of Chinook salmon and other special status species in Walnut Creek and efforts to restore their habitat within the creek and its tributaries have been underway for more than a decade.

H. Project Timing and Phasing

Upon execution of a grant contract with the State, the County will immediately begin design work on the project. Preliminary design work has already been completed to determine feasibility of project components. It will take 18-24 months to fully plan, design, permit, and construct the project.

II. Proposed Work Tasks

A. Work Tasks and Deliverables

The following table identifies the various tasks for this project and provides a task description and the deliverables for each task:

Task	Description	Deliverables
1	Direct Project Administration	
1.1 Project Administration	This task involves general project administration including coordination with project partners in preparation of grant invoices. In addition, this task includes coordination between the various Public Works Department Divisions and consultants that will be involved in planning, permitting, designing and constructing the project.	Project invoices.
1.2 Reporting	This task involves developing and submitting regular progress reports to the granting agency. In addition, at the conclusion of the project, preparing and submitting a final project summary and other reports required at the conclusion of the project.	Progress reports, final project summary, natural resource projects inventory survey, draft final project report, final project report.
2	Planning/Design/Engineering/Environmental	
2.1 Planning	This task includes efforts to define the scope of the project, identify the locations that are feasible to locate stormwater treatment facilities, investigation of potential utility conflicts, preparing base mapping for preliminary design efforts, researching files for information on Public Works building complex parking lot and open space areas for preliminary sizing of stormwater diversion facilities and budgeting for the project elements.	Concept maps for the grant application, feasibility level sizing of stormwater treatment facilities for the grant application, preliminary project budget.
2.2 Design	This task consists of developing preliminary design including geotechnical investigation and testing and analysis if necessary, 30%, 60% and 90% design plan stages, finalize design plans and complete bid documents.	Plans, specifications, bid documents.
2.3 Environmental Documentation	This task includes the CEQA initial study, development and analysis to determine the proper level of CEQA documentation to prepare for the project. During the planning/feasibility stage of the project development, it is anticipated this project will require a categorical exemption.	Certified CEQA document.
2.4	This task involves securing project approvals	Stormwater Permit,

Task	Description	Deliverables
Permitting	and permits from the State Water Resources Control Board general permit (NPDES compliance if required) for stormwater discharges associated with the construction activity and Stormwater Pollution Prevention Plan.	Stormwater Pollution Prevention Plan
2.5 Easement Acquisition	There is no acquisition of right of way or easements, temporary or permanent, necessary for this project. This project is planned and implement totally on County property.	Not Applicable
3	Construction/Implementation	
3.1 Construction Contracting	This task includes preparing copies of plans for advertising, advertising for bids, holding a pre-bid meeting, verifying the bid for the low bidder, awarding the construction contract and issuing a notice to proceed.	Bid advertisement, Pre-bid meeting, Contract Award, Notice to Proceed
3.2 Construction Administration	This task includes managing the contract documents, preparing contract change orders, preparing monthly contractor payments, responding and coordinating any requested modifications to the plans as a result of construction conflicts and responding to claims from the contractor.	Monthly contract payments, contract change orders, as-built plans.
3.3 Labor Compliance	This task includes development of a labor compliance plan verifying payroll from the contractor to employees, satisfying the labor compliance plan, preparing reports for review by the County's Labor Compliance Officer and interviewing contractor employees as necessary.	Labor compliance program, prevailing wage reports.
3.4 Environmental Compliance/ Mitigation	This task includes monitoring of project during construction to ensure compliance with regulatory permit conditions, pre-construction meeting with contractor to review regulatory permit requirements, tailgate meetings with contractor employees to review permit regulatory permit requirements, coordination	Construction monitoring reports.

Task	Description	Deliverables
	with the project inspector to ensure compliance with regulatory permit and oversee the implementation of any project mitigation work.	
3.5 Construction	This task includes physical construction activities including excavation, erosion control, foundation preparation for cisterns, drainage basin construction, drainage pipe installation, asphalt concrete paving, porous asphalt paving, pervious concrete paving, stormwater treatment facilities and riparian vegetation planting.	Inspection reports, final punch list, accepted construction contract upon completion.
4	Equipment Purchases over $5,000	
4.1 Equipment Purchases	This project does not have any active or mechanical components. The project stormwater treatment facilities are all planned to be passive in nature. There are no equipment purchases for this project.	Not applicable.
5	Monitoring/Performance	
5.1 Project Assessment and Evaluation Plan	This task includes revision of Preliminary project assessment and evaluation plan (PAEP)	Draft PAEP
5.2 Monitoring Plan Development	Preparation of a LID performance monitoring plan for the projects' components, focusing on flow performance verification of the bio-retention system; i.e., turbidity monitoring for suspended sediment concentrations and water quality	Draft Performance Monitoring
5.3 QAPP Development	A Quality Assurance Project Plan will be developed that described the data quality objectives (DQO) and process for evaluating data quality against the DQOs	A draft and final QAPP
5.4 Monitoring	Water quality sampling will be used to monitor pyrethroids, mercury, methelmercury and suspended sediment concentrations. Monitoring gravel layer in the bio-retention basin at 15 minute intervals during and following storms, analyze source area	A draft and final Sampling and Analysis Plan Annual Data Reports

Task	Description	Deliverables
	concentrations and removal effectiveness for pollutants, evaluate effectiveness of LID using quantitative statistical comparisons and determine long-term operations and maintenance costs for LID facilities.	
5.5 Data Reporting	This task includes collecting the data gathered from monitoring activities and retaining them in a data base for development of reports to be used for management of the stormwater treatment facilities and developing reports on their effectiveness and identification of lessons learned.	Data base development, report on quantities of stormwater collected in cisterns, lessons learned report, alternative compliance feasibility study, feasibility study on retrofitting County parking lots.
6	Education/Outreach	
6.1 Outreach Events	This task includes planning and implementing specific outreach events throughout the project, including ribbon cutting, project planting and ground breaking ceremonies, advertising the events through various organizations and media outlets, working with the local New Leaf Leadership Academy (a local alternative high school program for at risk students which has a long history of working on environmental and stormwater projects).	Three or more project related outreach events conducted.
6.2 Signage	This task includes planning, developing, constructing and installing signage for the various LID features, informational signage along the trail around the bio-retention facilities and other LID features, planning, developing, building and installing an interpretive panel explaining the entire project concept.	Interpretive panel, informational signage.
6.3 Brochures	This task includes working with the New Leaf Leadership Academy to develop informational brochures for Engineers, developers, homeowners and others on the benefits and construction techniques for LID landscape	Informational brochures.

Task	Description	Deliverables
	features.	
6.4 Public Media	This task includes working with the County Public Information Officer to establish a Media Contact List, sending out press releases at various stages of the project, developing a communication plan for the media and giving media tours of the site to explain the LID features and build a news story.	Media contact list, press releases, published project stories.

B. Procedures

There are several coordinating entities and organizations with which we are coordinating with on this project. The **New Leaf Leadership Academy** is a local alternative High School program for at risk students. They have a long history of working on environmental and stormwater projects within the nearby watersheds. We will be coordinating with the New Leaf Academy particularly on the education and outreach portion of the project as the school kids will be involved in that aspect of the project along with planting the riparian corridor and performing some monitoring. We will also be coordinating with the **Contra Costa Clean Water Program**, which is an organization governed by the 19 cities, County and Flood Control District to meet the requirements of the Municipal Regional Stormwater Permit issued by the Regional Water Quality Control Board. The **Contra Costa County Flood Control and Water Conservation District** is also a partner that will provide expertise in hydrology and stormwater treatment design and sizing. The District is currently under contract with the Clean Water Program to monitor and evaluate LID features at two sites to calibrate the Clean Water Program's sizing calculator for LID stormwater treatment facilities. We will also be coordinating with the **City of Martinez.** The County Public Works building complex is located in the City of Martinez and we will coordinate with the City on the design of the project. We will be coordinating with our **neighbors** surrounding the project site, including the Sherriff's Office and Probation Department and Recycling Center in addition to the residential neighborhoods to the south and west.

C. Implementation

Urban drainage currently drains across a neighborhood that is significantly covered (approximately 90%) with impervious surfaces generating pollutants that drain directly into the upper watershed of Grayson Creek. Our approach is to provide a demonstration of several types of LID stormwater treatment for the public to view. We will also attempt to treat stormwater and provide flow control for the Public Works building complex to the greatest extent practicable. It will be instructive to understand how much stormwater treatment can be delivered on a typical urban landscape. The goal of providing stormwater treatment will be achieved through construction of bio-retention basins, LID infiltration type planter boxes and parking lot type infiltration and stormwater treatment facilities. Feasibility level, design and project scoping has been performed to verify the feasibility of the proposed stormwater treatment facilities. The Contra Costa Clean Water Program C3 Guidebook was used to design and size the bio-retention facilities and flow-through planters. Figure 1 shows a typical flow-through planter and Figure 2 shows a typical bio-retention facility. The feasibility level design work was performed by civil engineers in the Public Works Department and the stormwater treatment sizing was performed by the County Flood Control District's Hydrologist. In Phase 2 we will attempt to treat stormwater at a neighborhood-scale to the maximum extent practicable with the land available, which is shown on Map 4.

D. Existing Data and Studies

BASMAA's **Green Streets Pilot Projects Summary Report** issued in August 2013 describes fulfilment of an MRP requirement that permittees implement at least 10 such projects region wide. The report documents 20 projects that have been built, are in construction or are in design and notes experiences and lessons learned. The report includes modeling to estimate reductions and pollutant discharge overall and analyzes water quality data collected at one of the projects. The results of monitoring and data collection at the proposed project site can be compared to the results of the report.

The Clean Water Program's **IMP Monitoring Report**, also issued in August 2013, documents a study to determine the flow control effectiveness of three bio-retention facilities at a site in Pittsburg and two bio-retention facilities in Walnut Creek. The facilities in Pittsburg retained all runoff during water years 2011-2012 and 2012-2013. Saturation levels in the facilities were continuously monitored and this data was used to calibrate a model of bio-retention performance, which can be used for comparison purposes on the proposed project.

The Clean Water Program's **Methylmercury Control Study Plan**, approved by the Central Valley Regional Water Quality Control Board in October 2013, documents existing knowledge about the relationship between methylmercury and suspended sediment concentrations in receiving waters impacted by urban stormwater.

The Clean Water Program's **Stressor Source Identification Study Concept Plan**, submitted to the San Francisco Bay Regional Water Quality Control Board and the Central Valley Regional Water Quality Control Board in September 2013 documents the presence of toxicity in urban stormwater and the approach to testing the working hypothesis that pyrethroid pesticides cause toxicity in urban stormwater.

E. Integrated Elements

As soon as the grant contract agreement is executed, the County will complete the planning process and finalize the scope of improvements. This will entail final sizing and placement of the stormwater treatment facilities, geotechnical investigations of the bio-retention site as necessary, and determining the design method of separating polluted low flows from high storm flows that exceed the treatment capacity.

Upon completing the planning and preliminary design work the project will be defined enough to begin the environmental permitting process and design process. The environmental process will be minimal since the project will only require a Stormwater Control Plan. The environmental process also includes preparing documentation for the California Environmental Quality Act (CEQA) requirements. The design process will progress through 35%, 65%, 90%, and final design stages. Each stage will be reviewed by the various project stakeholders to provide comments. The design stage concludes with final construction drawings and project specifications.

When the design is complete, the bid package has been prepared, and the environmental permits are acquired, the project will be ready for advertising. The project will be advertised for at least three weeks, and at the end of this period the bids will be opened, verified for completeness, and a contract awarded. A Notice to Proceed will be issued to the contractor. The contractor will begin work and construct the project while the contract administrator/inspector will assure quality construction and contract compliance with labor, environmental, and public contracting code requirements. After construction is complete the site will be monitored for post-construction regulatory permit compliance requirements (if any) and project objective requirements for stormwater treatment and hydro-modification management.

Elements of the education and outreach component will start at the beginning of the planning and design phase, but the bulk of this work will begin after the project is completed. The project will take about one and a half to two years to complete from beginning to end, depending on when the contract agreement is executed in relationship to construction windows due to weather and/or regulatory permits.

All work for this project will take place on County owned property so no right of way work, easements or third party agreements are needed.

F. <u>Deliverables</u>

The deliverables are identified in Section A above, “Work Tasks and Deliverables”.

G. <u>Permitting and Environmental Review</u>

A State Water Resources Control Board Stormwater Pollution Prevention Plan will be needed for this project. An initial study will be performed and environmental document prepared for review and approval by the County's Planning Department, which represents the lead agency under CEQA, with final adoption by the Board of Supervisors for the project. There is no right-of-way, easements, or third party agreements needed for this project as it will all take place on County owned property.

H. Plans and Specifications

Feasibility level plans have been prepared for the bio-retention facilities and parking lot stormwater treatment facilities. Preliminary design will begin upon execution of the grant contract.

I. Data Management

A brief data management plan will be developed that defines the protocols for data management. The plan will describe procedures to compile data in a format compatible with the State's Surface Waters Ambient Monitoring program. The process and timeline for uploading data to the California Data Exchange Network will be defined.

J. Education and Outreach

Several types of education materials will be developed for the project. These will include an interpretive panel that will describe and define what Low Impact Development is and does for the environment. Each landscape based infiltration planter box at the downspouts will have a sign next to them describing what type of LID feature it represents and the plants within the planter box. The project will also develop brochures that will describe in detail each of the planter boxes, the design requirements, the construction details and how it can be designed with the Clean Water Program's sizing calculator in their Stormwater C.3 Guidebook (see Figure 1). There will also be a self-guided tour and trail around the bio-retention facilities and the rain barrels and/or cisterns used to irrigate the native plant nursery. Many aspects of the education and outreach materials will be developed with the New Leaf Leadership Academy. Several media events will be conducted as part of the project that will include a ground breaking ceremony, a planting ceremony and ribbon cutting ceremony. Press releases and media stories will be released as the project is developed.

Getting to Ninety Percent:
Enhancement of the North Richmond Pump Station Diversion Project
Initial Proposal for USEPA Region 9 San Francisco Bay Area Water Quality Fund
July 9, 2013

1.0 Project Scope and Approach

This project will advance progress towards ninety percent load reductions of polychlorinated biphenyls (PCBs) from urban stormwater, as required by the San Francisco Bay PCBs Total Maximum Daily Load (TMDL). The project builds on lessons learned during the initial development stages of the North Richmond Stormwater Pump Station (NRSPS) Pilot Diversion Project, which is currently being carried out under the "Estuary 2100" grant project. The NRSPS Pilot Diversion Project is evaluating the feasibility and benefits of diverting dry weather urban runoff and first flush stormwater into a nearby sanitary sewage treatment plant. This proposed project will expand the load reduction benefits of the NRSPS Pilot Diversion project by utilizing the diversion infrastructure in conjunction with dedicated stormwater treatment located at the NRSPS and by identifying opportunity areas for stormwater conveyance, storage and treatment. The expected outcome is improvement of a moderate PCB load reduction attainable via diversion to a sanitary sewage system alone to a more substantial load reduction through coordinated management actions. This project represents a logical next step in the implementation of an integrated watershed strategy to reduce PCBs and other pollutants discharged to San Francisco Bay from the NRSPS.

The **Water Quality Problem** is that PCB concentrations in San Francisco Bay fish are a risk to people and wildlife. The San Francisco Bay PCBs TMDL has established aggressive goals for load reductions from urban stormwater. The expectation set by the TMDL is that ninety percent load reductions of PCBs discharged from Municipal Separate Storm Sewer Systems (MS4s) into the Bay will be attained in the next fifteen years. The San Francisco Bay Mercury TMDL also sets aggressive goals (fifty percent) for mercury load reductions from urban stormwater.

This planning goal of ninety percent load reduction has been implemented in the Municipal Regional Permit (MRP) for Urban Stormwater issued to countywide stormwater programs, including the Contra Costa Clean Water Program (CCCWP). The first phase of the MRP, adopted by the San Francisco Bay Regional Water Quality Control Board in 2009 (Order No. R2-2009-0074) includes requirements to implement pilot projects to reduce and avoid PCB loads, including pilot diversion projects into publicly owned treatment works, pilot treatment retrofit projects, and pilot projects to evaluate enhanced municipal operations and maintenance (O&M).

Lesson learned from MRP-driven pilot projects under way in Contra Costa County that inform this initial proposal are:

Retrofitting flood control infrastructure to meet water quality goals is more complicated and costly than initially assumed. The amount of rehabilitation needed at the NRSPS to allow construction of the diversion is substantially greater that was assumed when the diversion pilot grant proposal was first awarded. During development of the pilot project, it also became apparent that safeguards needed to avoid sanitary sewer overflows, upsets to the WCWD activate sludge treatment system, and other unintended consequences are far more rigorous than originally assumed.

- **PCB concentrations are not as concentrated in space as initially assumed**. An assumption made during PCB TMDL development was that a few highly contaminated locations, such as the Ettie Street watershed in Oakland, or the Santa Fe Channel watershed in Richmond, where part per million (ppm) PCB concentrations in sediment are found in MS4 systems, could account for much of the needed TMDL load reductions. Instead of just a few highly contaminated watersheds, it appears that the needed reductions will come from many (i.e., up to a hundred or more) watersheds more typical of the NRSPS catchment, where PCB concentrations in suspended sediments are a few tenths of a ppm. Progress towards an overall ninety percent reduction in PCBs from all Bay Area MS4 discharges will require actions in many watersheds like the NRSPS drainage area, instead of just a few highly contaminated areas as was initially assumed.

- **PCB concentrations are not as concentrated in time as initially assumed** . The project to pilot test a "first flush" diversion into a sanitary sewer was premised on the assumption that stormwater from the leading edge of the hydrograph would have higher suspended sediment concentrations (SSC), and/or that SSC in the initial flow from the MS4 system would have higher PCB concentrations. Now that pre-diversion monitoring has been completed at the NRSPS, it appears that PCB loads are more evenly distributed across the hydrograph than originally assumed.

Based on lessons learned, it appears that first flush diversions alone could account for, at best, ten percent of the needed load reductions from the NRSPS watershed. To attain ninety percent load reductions from the NRSPS watershed, a strategy is needed to reduce PCB loads entering the NRSPS from upstream, while concurrently expanding the conveyance, storage, and treatment capacity available for co-management of urban stormwater and wastewater treatment systems. This proposal focuses on the latter approach – expanding conveyance, storage, and treatment capacity available to the NRSPS.

Project activities in this initial proposal are:

- Completion of the NRSPS Pilot Diversion Project and evaluation of outcomes.
- Design, construction, and evaluation of onsite stormwater treatment at the NRSPS
- Inspection and maintenance of the onsite treatment system and reporting on the long term maintenance needs and costs
- Development of conceptual designs and cost estimate for additional conveyance, storage and treatment capacity serving the NRSPS.

Completion of NRSPS Pilot Diversion Project - The NRSPS pilot diversion project faces a current shortfall of approximately $638,000. Most of this shortfall results from the fact that the probable construction cost estimate is approximately $817,000, as compared to the initial assumption of $287,000. The remaining shortfall is caused by the need for more monitoring and vigilance than initially assumed, because of the risks associated with utilizing a substantial portion of WCWD's of treatment and conveyance capacity. The NRSPS rehabilitation will be completed, including installation of new low-flow pumps and installation of diversion infrastructure allowing direct connection of the NRSPS to the WCWD conveyance system aligned along Gertrude Avenue, adjacent to the NRSPS.

The diversion infrastructure will significantly improve monitoring capabilities at the NRSPS by allowing the incorporation of sampling ports and continuous monitoring probes directly into the diversion piping. Also, operation of the NRSPS with minimum volumes of standing water in the wet well at the onset of a storm will better enable the detection of subtle first flush elevations of SSC and / or PCBs, should such a first flush phenomenon be present at the NRSPS.

Stormwater Treatment - While planning the NRSPS Diversion Pilot, it was recognized that WCWD conveyance capacity could limit the benefits achievable by diversion to WCWD alone. Based on this insight, the diversion concept design has been refined to allow three possible directions for the diverted water to flow: back to the flood control channel, as per normal operation, to WCWD's conveyance system, or to an offline stormwater treatment system.

Offline treatment will be designed and constructed on property owned by the NRSPS Joint Powers Authority (JPA) at the NRSPS. The space available onsite at the NRSPS could potentially treat up to 20 gallons per minute (gpm), i.e. about the average dry weather inflow rate to the NRSPS. During this proposed project, stormwater treatment will be operated in conjunction with storage available in the wet well of the NRSPS to treat dry weather flows and first flush flows. Additionally, the stormwater treatment system will be used in this project to treat process water that results from street washing and / or pipe flushing pilots described below.

Stormwater diversion treatment system inspection, maintenance and reporting. The stormwater treatment system installed will be inspected and maintained during the assistance period. An annual report of maintenance activities will be developed, including photo documentation, diagrams, a list of materials, standard operating procedures, and a summary of effort and cost. At the conclusion of the assistance period, the annual reports will be synthesized into an updated Operations and Maintenance manual for the stormwater pump station that describes equipment rehabilitations and upgrades, provides guidance for operation and maintenance of the diversion system for diverting stormwater to sanitary sewers and onsite treatment systems, and provides an estimate of annual costs that the JPA owners of the pump station will need to plan for following the assistance period.

Expanded conveyance, storage and treatment - To provide reasonable assurance that ninety percent load reductions can be attained, contingency plans are needed for expanded stormwater treatment at the NRSPS. This task will develop concept designs and evaluate the cost and feasibility of four different alternatives identified in the map provided in Attachment A: (1) temporary offline storage in the adjacent stormwater detention ponds owned by Chevron; (2) conveyance and treatment via a bioswale constructed on or adjacent to the northern levee of the Chevron ponds; (3) development of bioretenion basins in land to the north of Gertrude Avenue.

Timeframe - Design of the NRSPS Pilot Diversion infrastructure is planned for calendar year 2014, ending December 31, 2014. Construction is anticipated to take place in the summer of 2015. Design of the onsite stormwater treatment would also take place in calendar year 2014, with construction completed in the summer of 2015. Evaluation of the onsite stormwater treatment and diversion to sanitary sewer would take place in the 2015 – 2017 time frame. Development of concept designs for expanded storage, conveyance and treatment would take place in the 2014 – 2016 time frame. Reporting on the project outcomes would be completed by June 2017.

CCMP Objectives and Actions - This project addresses the San Francisco Estuary Partnership's Comprehensive Conservation and Management Plan (CCMP) Objective PO-3 (remediate pollution threats to public health and wildlife), Action PO-3.3 (Funding of large scale infrastructure improvements).

2.0 Environmental Results

Quantitative Benefits - This project will provide infrastructure improvements that lead to specific and quantifiable tangible benefits in the reduction of PCB and mercury loads discharged to the Bay. As a result of restoring low flow pumps, standing water in the wet well of the NRSPS will decrease from four feet to only one foot. The resulting reduced residence time will significantly improve chemical oxygen demand (COD), dissolved oxygen (DO), and bacteria present in dry weather discharges from the NRSPS. Combined with the capability for cost-effective onsite treatment of dry weather flows at the NRSPS, year-round benefits can be achieved because all non-stormwater discharges can be treated. The reduction of standing water in the NRSPS will also increase storage capacity of the wet well by at least 60,000 gallons, which allows that much more of first flush flows to be either diverted to

WCWD or treated onsite at the NRSPS. Providing treatment onsite at the NRSPS for dry weather flows as an alternative to diversion into the sanitary sewer will significantly reduce risks to WCWD, such as introduction of contaminants as a result of accidental spills in the watershed. Development of an updated O&M will assist with proper ongoing operation of the new infrastructure after the assistance period ends. Evaluation of expanded conveyance, conveyance and treatment alternatives will provide “shovel ready” project plans for future implementation, while holding off on commitment of capital resources until the need is confirmed.

Context – This next step towards ninety percent reduction in the NRSPS watershed is an important model for how other Bay Area watersheds with moderate levels of PCB contamination in sediments could be managed. The PCBs TMDL sets a load reduction goal of 18,000 grams per year from all of urban stormwater. The NRSPS watershed, during the wet weather periods monitored from 2010 to 2012, discharged approximately 10 grams. A ninety percent load reduction from the NRSPS watershed would reduce PCB loads by about nine grams per year. While this is relatively small compared to the 200 – 400 gram per year PCB load reductions potentially achievable by source control in highly contaminated watersheds such as Ettie Street and the Santa Fe Channel, there do not appear to be many such highly contaminated opportunity areas. To attain the goals of the PCBs TMDL, actions would likely be needed in many – even hundreds, of small, moderately contaminated urban catchments in the Bay Area.

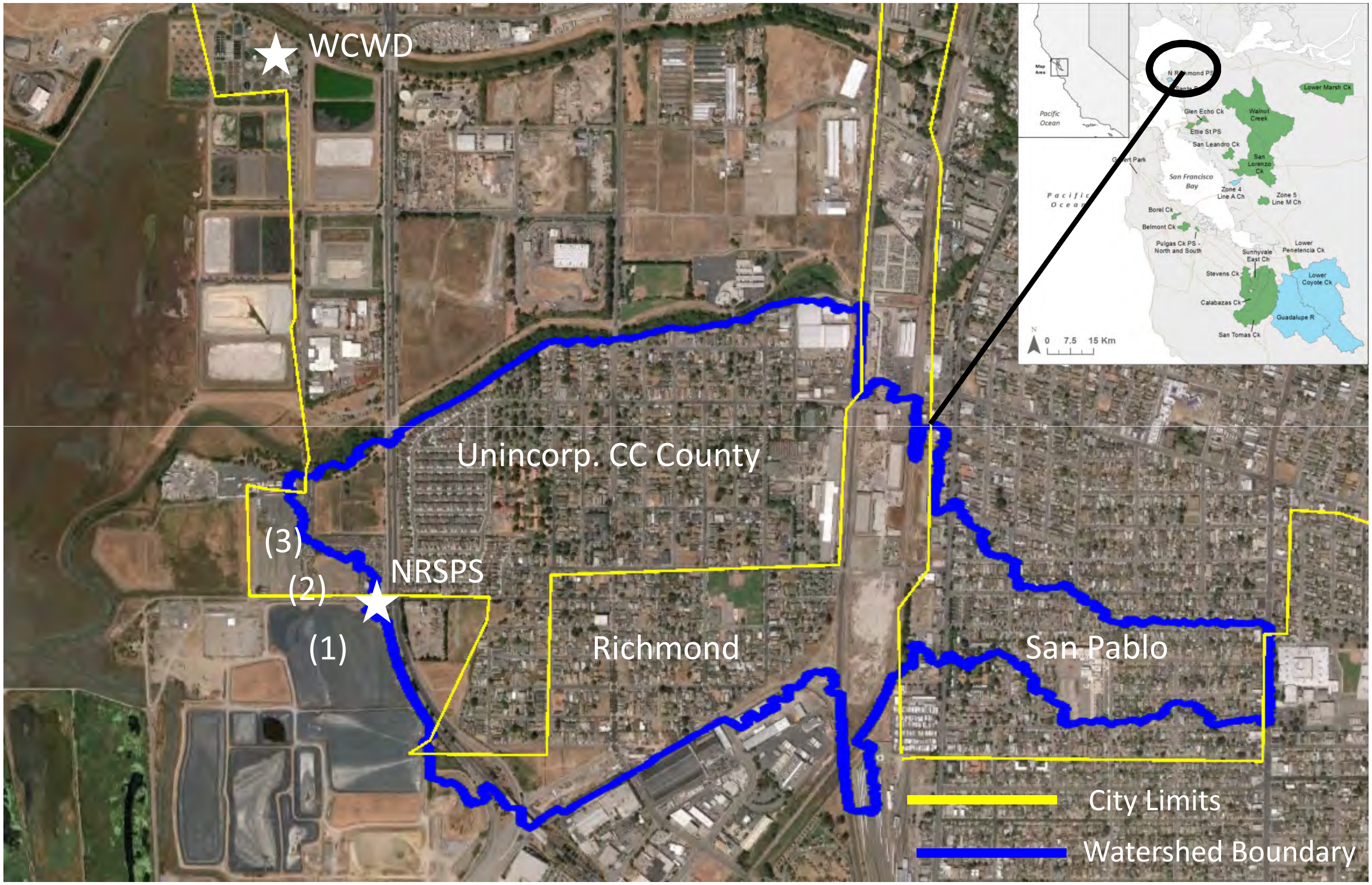
Extended Timeframe – The outputs of this project will have long-term benefits. Restored storage capacity in the NRSPS wet well, onsite stormwater treatment, and updated O&M guidance to reflect the new infrastructure capabilities will allow ongoing activities to reduce and avoid PCB loads. At the same time, development of concept plans for expanded storage and treatment provides a backstop of reasonable assurance for future load reductions.

Tracking – Project outputs will include: (1) plans specifications and estimates for the diversion infrastructure; (2) constructed diversion infrastructure; (3) plans specifications and estimates for onsite stormwater treatment at the NRSPS; (4) constructed onsite stormwater treatment at the NRSPS; (4) a sampling and analysis plan (SAP) and quality assurance project plan (QAPP) to monitor PCB loads avoided via diversion to WCWD and onsite treatment, and street washing / pipe flushing; (5) a report on the outcomes of the pilot diversions to WCWD and onsite stormwater treatment; (6) annual maintenance reports; (7) an updated O&M Manual for the NRSPS; and (8) a report on conceptual designs, cost estimates, and feasibility of expanded conveyance, storage and treatment.

Project outcomes will be measured in terms of PCB loads that were prevented from discharging to the Bay. PCB loads will be measured based on flows, SSC, PCB grab and / or composite samples, and the ratio of PCBs to SSC. Additional water quality benefits will be assessed by measuring the COD, bacteria, oil and grease, and metal concentrations in diverted / treated water.

The overall outcome desired is a ninety percent reduction of PCB loads discharged from the NRSPS. Achieving that outcome may be beyond the assistance agreement funding period, as it will likely involve capital improvement projects to implement upstream source control and / or additional enhancement of downstream stormwater conveyance, storage and treatment over a longer time frame. However, because of the diffuse, widespread nature of PCBs in older industrial areas, the actions to be funded in this project are absolutely essential as next steps to achieve timely attainment of load reduction goals required by the PCBs TMDL.

Attachment A - Project Area Map
Gettting to Ninety Percent:
Enhancement of the North Richmond Pump Station Diversion Project



NRSPS = North Richmond Stormwater Pump Station

WCWD = West County Wastewater District

(1) = Chevron Ponds Alternative
(2) = Northern Levee Alternative
(3) = Bioretention N. of Gertrude Alternative

The North Richmond Stormwater Experiment Station

A PROPOSAL BY THE CONTRA COSTA COUNTY WATERSHED PROGRAM TO THE EPA WATER QUALITY IMPROVEMENT FUND
September 12, 2012

INTRODUCTION

This project will reduce loads of polychlorinated biphenyls (PCBs) and Mercury (Hg) from urban stormwater required by the San Francisco Bay Total Maximum Daily Loads (TMDL) for PCB and Hg, as well as advance knowledge for future reduction efforts. It will complete needed infrastructure improvements at a critical pump station in Richmond to test and implement a variety of treatment systems and maintenance practices to reduce PCBs and Hg flowing into San Francisco Bay.

The project builds on lessons learned during the initial development stages of the US EPA funded “Estuary 2100” grant project, the NRSPS Pilot Diversion Project (Diversion Project). The Diversion Project is evaluating the feasibility and benefits of diverting dry weather urban runoff and first flush stormwater into a nearby sanitary sewage treatment plant. The Diversion Project is evaluating the feasibility and benefits of diverting dry weather urban runoff and first flush stormwater into a nearby sanitary sewage treatment plant. The Diversion Project will make necessary upgrades to the 40 year old pump station and conduct a pilot diversion project of both summer low flows and a portion of a first flush storm, as required by the Municipal Regional Permit. The Estuary 2100 grant has sufficient funds to make some, but not all upgrades to the pump station needed to build permanent diversion infrastructure. This proposed project would provide funds needed to construct and operate a permanent diversion.

One important lesson learned from the Diversion Project is that sanitary sewage conveyance and treatment capacity is a constraint during storm events. The proposed project will expand the load reduction benefits of the Diversion Project by utilizing the newly constructed diversion infrastructure to treat stormwater on site at the NRSPS, test the efficacy of different maintenance regimes to treat stormwater, and identify opportunities for additional future stormwater conveyance, storage and treatment.

The expected outcome of this project is an improved understanding of the efficacy and cost of different methods to remove PCBs and Hg from moderately contaminated watersheds. The methods tested at NRSPS have the potential to achieve PCB and Hg load reductions in other Bay Area watersheds.

This project represents a logical next step in the implementation of an integrated watershed strategy to reduce PCBs and other pollutants discharged to San Francisco Bay from the NRSPS. This project will install permanent infrastructure to divert stormwater to a variety of treatment systems. This project will achieve immediate stormwater treatment benefits within the watershed, but will also augment the infrastructure and initiate pilot testing of methods to capture, treat, and potentially re-use urban stormwater.

PARTNERSHIPS

This project will enhance the working relationship of existing partnerships in the community. The NRSPS is co-owned by **Contra Costa County** (County) (62 percent) and the **City of Richmond** (38 percent), and also provides drainage service for a portion of the **City of San Pablo**. All three municipalities are permittees of the **Contra Costa Clean Water Program** (Program), which has an existing requirement to pilot test stormwater diversions to sanitary sewers under the San Francisco Bay Regional Water Quality Control Board's Municipal Regional Permit (MRP) for Urban Stormwater.

The co-owners of the NRSPS utilize staff of the **West County Wastewater District** (WCWD) for operation and maintenance (O&M) of the NRSPS. WCWD is also the facility that would receive and treat diverted stormwater for treatment at their sewage treatment plant. Project leaders have strengthened institutional relationships by reaching out to WCWD staff and board members with a conceptual plan for the diversion, and by responding to comments and concerns raised by WCWD staff and board members. The proposed task to develop a new O&M manual for the NRSPS will help provide clear direction to WCWD and the NRSPS owners for effective use and maintenance of the NRSPS after the grant assistance period ends.

TEAM ROLES AND MATCHING FUNDS

The County will be the lead on his project, providing staff for contract administration and project management. The County will initiate and manage contracts for monitoring, design, and construction. County resources will also perform hydrodynamic modeling for the analysis of potential future storage and conveyance alternatives (Task 4).

Permittees of the Program have agreed to provide $200,000 in program funds as match for this grant. These funds will be used to ensure a permanent diversion to the WCWD sewage treatment facility will be constructed that will provide additional opportunities for future diversions as part of this proposed project. Additionally, the Program has supported the Estuary 2100 grant project with $90,000 of leveraged consultant support for development of technical information, including an engineering assessment of the probably construction cost and a conceptual plan for the diversion. A letter of support approved by all permittees of the Program is attached. The remainder of the required 50 percent match for this grant will be provided by the County.

The West County Wastewater District will continue to provide staff who support operation of the pump station and equipment maintenance under a service contract with the NRSPS owners. WCWD has affirmed in its attached letter that they support the concept of developing and testing onsite stormwater treatment as an alternative to relying exclusively on their facility.

The San Francisco Estuary Institute (SFEI) will support this project with monitoring and data analysis. SFEI successfully monitored the NRSPS to establish baseline flows and loads.

Their final technical report on that baseline monitoring was completed in January, 2012. Since completion of the baseline monitoring, SFEI has continued to monitor the NRSPS as a special study of the **San Francisco Bay Regional Monitoring Program** (RMP), at the specific request of the **Bay Area Stormwater Management Agencies Association** (BASMAA). That leveraged effort, valued at $300,000, has provided monitoring continuity and resulted in improvements to the monitoring approach, such as continuous monitoring of stormwater pump speeds, in addition to pump run times.

The schedule for activities led by the County and undertaken by project partners is shown in Figure 1 below.

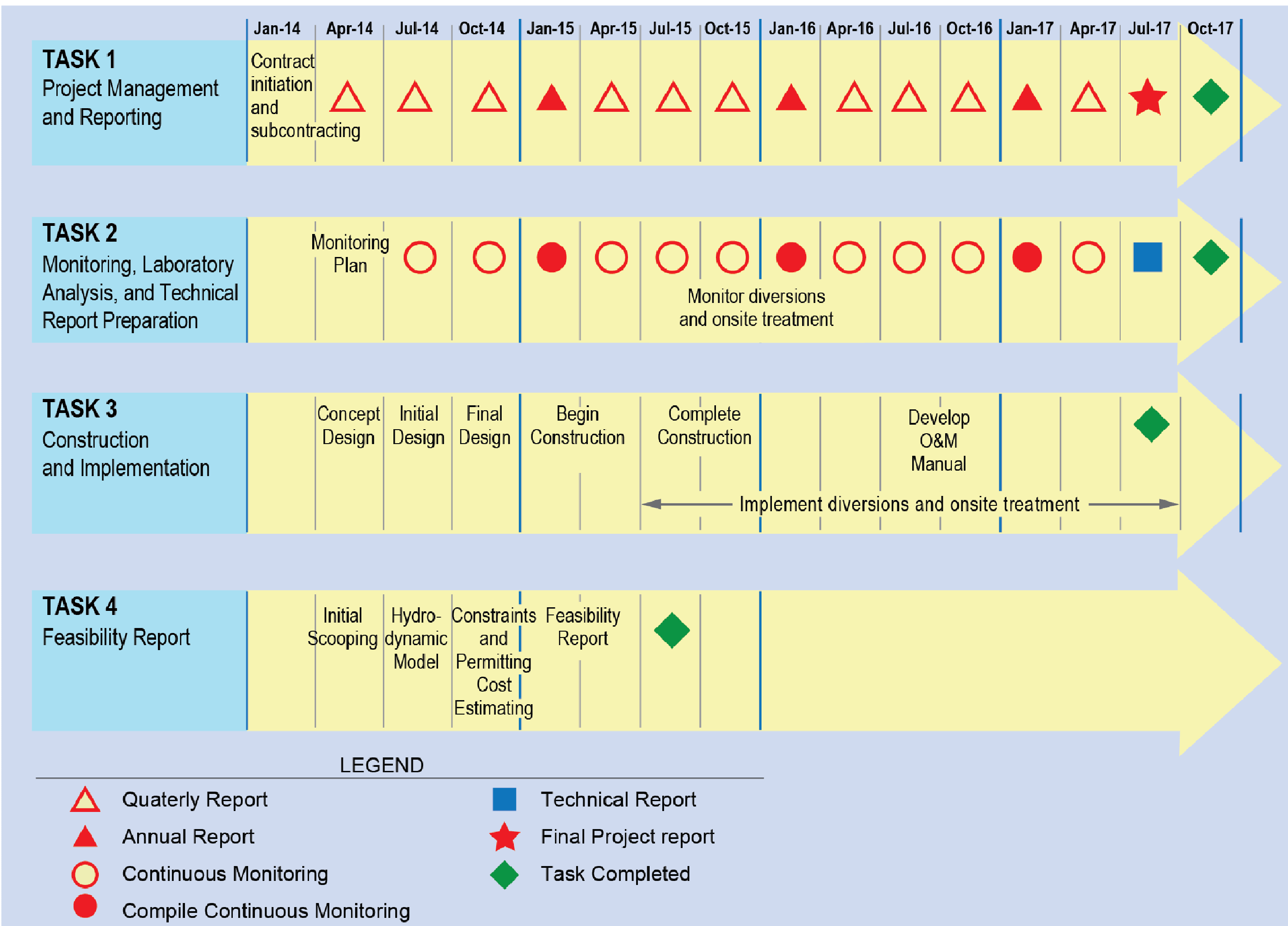


Figure 1. Schedule of Activities

COST-EFFECTIVENESS AND BUDGET DETAIL

The Project will help lead Bay Area planners towards more holistic integration of municipal infrastructure rehabilitation and improvement with water quality goals. Diversion infrastructure that can reach either the nearby WCWD sewage treatment plant or onsite treatment facilities will provide options for either co-management of urban stormwater and sanitary sewage or separate stormwater treatment.

With the added value enhancements of this proposal, the community will have a pump station capable of treating dry weather flows and a portion of storm flows, and the flexibility to provide that treatment either onsite or via WCWD. The community will also have identified options for potential expansion of the onsite treatment capacity that could be implemented in the future, subject to available funding. This project will also test potential enhanced municipal maintenance activities, such as street washing and pipe flushing, which can also help to reduce the average PCB concentration in sediments that reach the NRSPS. The techniques developed at the North Richmond Stormwater Experiment Station will provide tangible benefits that are achieved at a reasonable cost because of local match and leveraged resources.

Budget details for the proposed grant are presented in Table 1 below. Additional detail on the probable construction cost estimate is presented in Attachment 1 at the end of this proposal; the construction cost estimate comes from a December 2012 technical memorandum developed by Brown and Caldwell on behalf of the Program which is available on request.

The budget details below are based on the assumption that unexpended Estuary 2100 grant funds and match will be expended to perform basic rehabilitation and improvements that would support a short term diversion. This Project is needed to provide resources necessary to implement a permanent diversion to WCWD and to provide additional onsite stormwater treatment.

PROGRAMMATIC CAPABILITY AND PAST PERFORMANCE

The County has already demonstrated an ability to meet grant deadlines and effectively manage resources for an EPA Water Quality grant through its participation in the Estuary 2100 grant project led by SFEP. The County has consistently met project reporting deadlines, and has kept the SFEP contract manager informed of the challenges and issues that have come up during the project. In addition to the Estuary 2100 grant, Federal grant programs successfully administered by the County within the last three years include a $1.4 million grant from the Department of Housing and Urban Development for a Homelessness Prevention and Rapid Re-Housing Program (CDFA number 14.257) and a $750,000 grant from the Department of Justice's Second Chance Re-entry program for a recidivism reduction program.

Project controls implemented to assure that grant funds are expended in a timely and efficient manner include development of a project management plan that defines schedule, roles, and lines of communication, project updates to senior management at weekly staff meetings, and quarterly internal audits to verify that schedules are being met within budget.

Table 1. Budget Detail

	Quarter	Federal Grant	Match	Leverage	Outputs / Deliverables
Task 1. Project Management and Reporting					
1.1 General Project Administration (workflow, contract management, project coordination)	1 - 16	6,000	6,000		
1.2 Procure field services contractor	1	3,000	3,000		RFQ, including documentation of Good Faith Effort on outreach to disadvantaged businesses and other Federal Procurement Requirements
1.3 Procure diversion design services	1	3,000	3,000		
1.4 Procure onsite treatment design services	1 - 2	3,000	3,000	27,000	
1.5 Reporting	1 - 16	15,000	15,000		Quarterly and annual progress reports on project.
Cost effectiveness: This task will be led by County staff. A model for contractor procurement following federal guidelines has been established by the Program's consultant through participation in the Clean Watersheds for a Clean Bay grant project led by BASMAA. That model will be relied upon by the County for procurement consistent with federal guidelines, and therefore provides $27,000 worth of leveraged assistance.					
Task 2. Monitoring, Laboratory Analysis, and Report Preparation					
2.1 Develop monitoring plan	2	2,500	2,500	25,000	Monitoring plan
2.2 Continuous monitoring	1 - 12	10,000	10,000	300,000	Annual compilation of continuous monitoring results
2.3 Toxicity screening	3 - 4	10,000	10,000		Data report on toxicity of storm water and dry weather flows to activated sludge
2.4 Compile and review continuous monitoring data	5, 9, 13	5,000	5,000		Data report
2.5 Monitor diversion and onsite treatment	7 – 10	52,800	52,800		Data report

Table 1. Budget Detail

	Quarter	Federal Grant	Match	Leverage	Outputs / Deliverables
2.6 Develop technical report of findings, lessons learned and recommendations	14 - 15	25,000	25,000		Technical Report
Cost effectiveness: Development of the monitoring plan can proceed cost effectively because of work already completed to develop monitoring approaches that address WCWD concerns and because of existing monitoring projects carried out by the RMP. That work completed provides $25,000 worth of leveraged effort. Continuous monitoring data collected through this grant will be augmented by two years worth of monitoring data collected by the RMP, providing leveraged value of $300,000.					
Task 3. Construction and Implementation					
3.1 Design onsite treatment	2 – 4	25,000	25,000		Design report
3.2 Procure construction contractor(s)	5	2,500	2,500		RFP, including documentation of Good Faith Effort on outreach to disadvantaged businesses and other Federal Procurement Requirements
3.3 Construct diversion *	6 - 7	181,000	181,000		Constructed diversion to WCWD
3.4 Construct onsite treatment	6 - 7	100,000	100,000		Constructed treatment system
3.5 Implement diversion and onsite treatment	7 - 10	50,000	50,000		Treated stormwater and dry weather flows
3.6 Develop O&M Manual	11 – 12	10,000	10,000		O&M Manual
Cost effectiveness: Development of the design will be facilitated by pre-design work contributed by the Program in the form of a diversion concept technical memorandum, analysis of flow data and pump station design drawings, and a technical memorandum on the probable construction cost estimate. This adds $65,000 worth of leveraged value. As with the design procurement, procurement of construction contractors following Federal guidelines will be facilitated by the Program's experience with the Clean Watersheds for a Clean Bay grant; the leveraged benefit is not double counted in Task 3.1 because it has already been noted in Task 1.4 above. As described in the footnote below, grant resources for design and construction of the permanent diversion will be augmented by unexpended Estuary 2100 grant resources. Development of onsite treatment will benefit from using land belonging to the NRSPS owners, rather than acquiring new land. Costs of diversion to WCWD are being contained to a reasonable level by incorporating precautionary measures in the design and by including alternatives to diversion to WCWD.					

Table 1. Budget Detail

	Quarter	Federal Grant	Match	Leverage	Outputs / Deliverables
Task 4. Feasibility Report					
4.1 Alternatives scoping and definition	2	2,500	2,500		Detailed alternatives
4.2 Hydrodynamic modeling of alternatives	3	7,500	7,500		Model results
4.3 Evaluation of costs and constraints	4	7,500	7,500		Cost estimates and constraints analysis
4.4 Develop Feasibility of Alternatives Report	5 – 6	7,500	7,500		Feasibility report
Cost effectiveness: Hydrodynamic modeling will be undertaken by County staff. County staff also have access to real property information, including easements and restrictions, and can readily obtain utility locations and other information necessary to identify constraints and develop cost estimates.					

*Note: For Task 3.3, the probable construction cost estimate for all rehabilitation and construction of a permanent diversion is $717,602 (See Attachment 1). The Estuary 2100 Grant Project has unexpended funds. $355,602 of the unexpended Estuary 2100 funds will be will be applied to rehabilitation of the NRSPS to meet the total construction costs.

North Richmond Pump Station
Diversion Project
Conceptual

Description		Total w/ Markups Allocated
--- Base Estimate ---		717,602
001 - GENERAL SITE CONDITIONS		
01 - General Requirements		120,842
02 - Site Construction		31,090
11 - Equipment		43,298
13 - Special Construction		10,260
15 - Mechanical		30,603
	001 - GENERAL SITE CONDITIONS Total	236,093
002 - BYPASS PUMPING		
11 - Equipment		40,024
15 - Mechanical		3,593
	002 - BYPASS PUMPING Total	43,616
003 - DEMOLITION		
15 - Mechanical		9,282
	003 - DEMOLITION Total	9,282
004 - ROOF ABETEMANT AND RESTORATION		
07 - Thermal & Moisture Protection		60,019
13 - Special Construction		19,640
	004 - ROOF ABETEMANT AND RESTORATION Total	79,659
005 - MECHANICAL UPGRADES		
01 - General Requirements		629
02 - Site Construction		21,167
03 - Concrete		1,404
05 - Metals		1,289
09 - Finishes		4,372
11 - Equipment		40,813
15 - Mechanical		49,895
	005 - MECHANICAL UPGRADES Total	119,569
006 - ELECTRICAL SUB-CONTRACT		
17 - Instrumentation		229,382
	006 - ELECTRICAL SUB-CONTRACT Total	229,382
	Grand Total	717,602

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Attachment 1. Probable Construction Cost Estimate for NRSPS Rehabilitation and Diversion. From Brown and Caldwell (December, 2012)

Technical Memorandum

Prepared for:	Contra Costa Clean Water Program
Project Title:	Pump Station Diversion Pilot Project – Technical Support
Project No:	141823

Technical Memorandum

Subject:	Concept Plan for North Richmond Pump Station Diversion Project
Date:	November 2, 2012
To:	Cece Sellgren, Stormwater Manager, Contra Costa County Watershed Program
From:	Dr. Khalil Abusaba, Supervising Scientist, Brown and Caldwell
Copy to:	Tom Dalziel, Program Manager, Contra Costa Clean Water Program (CCCWP)

1. Introduction

This technical memorandum presents a proposal for diversion of dry weather urban runoff and first flush stormwater from the North Richmond Stormwater Pump Station (NRSPS) into the West County Wastewater District (WCWD) collection system for treatment. This concept proposal was developed to assist the Contra Costa County Watershed Program (the County) in discussions with WCWD as the two parties seek to identify a mutually acceptable approach for the Contra Costa Clean Water Program (CCCWP) to fulfill a permit requirement to conduct a pilot diversion project. The County, as a co-permittee of the CCCWP, intends to apply to WCWD for permission to divert dry weather and initial storm eventurban runoff for treatment. To comply with requirements established by the San Francisco Bay Regional Water Quality Control Board (SFRWQCB), the County would like to explore the possibility of extending the dry weather urban runoff diversion to capture some amount of first flush stormwater, to the extent that a first flush diversion can be safely and economically accomplished.

Permitting a pilot project to divert dry weather and first flush urban runoff from the NRSPS into the WCWD provides both tangible and intangible benefits to WCWD. Direct benefits of the dry weather diversion include increasing the amount of water available for sale to recycled water customers. Intangible benefits include cost-recoverable use of publicly owned treatment works to protect water quality of the public surface waters of San Francisco Bay. In addition, permitting a diversion project would build goodwill for WCWD with both the SFRWQCB, who requires CCCWP to implement a pilot diversion project, and countywide stormwater co-permittees who are required to implement a diversion project.

There are potential negative impacts that need to be considered so that they can be addressed and appropriately mitigated. Conveyance system capacity may be limited – WCWD has provided information indicating that the nearest sewage conveyance has only 0.6 million gallons per day (mgd) of available capacity during wet weather (5 year, 24 hours storm event). This is an important consideration, in that WCWD was named in a lawsuit by San Francisco Baykeeper and the West County Toxics Coalition against the City of Richmond (a co-owner of the NRSPS) and Richmond's water contractor Veolia Water for sanitary sewer overflows (SSOs). The resulting consent decree with the City of Richmond required substantive measures to prevent introduction of stormwater into the wastewater conveyance system to avoid SSOs; therefore, deliberate diversion of stormwater into the sanitary collection system is a sensitive issue in this community. Additionally, WCWD's treatment system would incur additional risks from spills of hazardous materials that enter the storm drain and toxicity to activated sludge microorganisms from stormwater constituents. These issues and potential mitigation measures needed are essential to be a part of the conversation between WCWD, CCCWP, the City of Richmond, and the County.

Figure 1-1. Conveyance system capacity in the vicinity of the NRSPS.

Figure and Data Provided by Ken Cook, District Engineer, WCWD on 10/9/2012

CONTRA COSTA
CLEAN WATER
PROGRAM

2. Background

The San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) has required pilot projects to evaluate dry weather and first flush stormwater diversions into publicly owned treatment works (POTWs) as a possible tool for reducing loads of polychlorinated biphenyls (PCBs) and mercury to San Francisco Bay. A Total Maximum Daily Load (TMDL) has been established requiring PCB and mercury load reductions and other management actions from all dischargers to San Francisco Bay that have NPDES permits.

Stormwater programs are required to reduce PCB loads by 90 percent over the next two decades. Old industrial urban areas have been shown to have elevated concentrations of PCBs in sediments, often with widespread, diffuse distributions. Stormwater programs are also required to reduce mercury loads by 50 percent over the next two decades. The regulatory approach is to focus on PCB load reductions, assuming that if they are attained the mercury load reductions will concurrently be attained.

PCBs are present in urban stormwater as a result of legacy releases from areas where they were manufactured and used. These tend to be primarily older areas near the bayshore that had industrial land uses in the past. In these older industrialized areas, PCB concentrations in sediments can be found ranging from 75 to as much as 2,000 ppb, well above the goal of 1 ppb established for Bay sediments by the TMDL. Mercury in urban areas tends to result primarily from atmospheric deposition. As a result, mercury is distributed more diffusely than PCBs in the urban environment,

Both of these challenging pollutants will require substantive measures by stormwater programs to attain load reduction goals established by the TMDLs. Diversion into POTWs is one of many tools being evaluated by stormwater programs. Other tools include identification and abatement of significant source areas, enhanced municipal maintenance (e.g., street sweeping), and stormwater treatment retrofits.

The CCCWP is facilitating design of a pilot project (Project) to divert urban runoff from the NRSPS into the WCWD. NRSPS is jointly owned by Contra Costa County (61 percent) and City of Richmond (39 percent) based on the 1974 agreement. WCWD is currently under a separate contract to maintain and operate the NRSPS.

The Project is being implemented by the County, a co-permittee of the CCCWP. The County sought and obtained grant funding administered by the San Francisco Estuary Project through U.S. EPA's San Francisco Bay Area Water Quality Improvement Fund. The project is one of several in the "Estuary 2100 Phase 2: Building Partnerships for Resilient Watersheds" program. The grant provides $496,649 in EPA funds, matched by $165,550 from the County to plan, design, construct, and monitor an engineered diversion into WCWD.

The Project is being implemented to comply with the requirements of Provisions C.11.f and C.12.f of the Municipal Regional Permit (MRP) for Urban Stormwater (MRP, Order Number R2-2011-0083). Provisions C.11.f (for mercury) and C.12.f (for PCBs) state that:

> i. **Task Description** – The Permittees shall evaluate the reduced loads of (mercury and PCBs) from diversion of dry weather and first flush stormwater flows to sanitary sewers. The knowledge and experience gained through pilot implementation will be used to determine the implementation scope of urban runoff diversion in subsequent permit terms. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of urban runoff diversion projects in subsequent permit terms.

ii. **Implementation Level** – The Permittees shall implement pilot projects to address the role of pump stations as a source of pollutants of concern (primarily PCBs and secondarily mercury). This work is in addition to Provisions C.2 and C.10 that address dissolved oxygen depletion and trash impacts in receiving waters. The objectives of this provision are: to implement five pilot projects for urban runoff diversion from stormwater pump stations to POTWs; evaluate the reduced loads of mercury and PCBs resulting from the diversion; and gather information to guide the selection of additional diversion projects required in future permits. Collectively, the Permittees shall select five stormwater pump stations and five alternates by evaluating drainage characteristics and the feasibility of diverting flows to the sanitary sewer.

(1) The Permittees should work with the local POTW on a watershed, program, or regional level to evaluate feasibility and to establish cost sharing agreements. The feasibility evaluation shall include, but not be limited to, costs, benefits, and impacts on the stormwater and wastewater agencies and the receiving waters relevant to the diversion and treatment of the dry weather and first flush flows.

(2) From this feasibility evaluation, the Permittees shall select five pump stations and five alternates for pilot diversion studies. At least one urban runoff diversion pilot project shall be implemented in each of the five counties (San Mateo, Contra Costa, Alameda, Santa Clara, and Solano). The pilot and alternate locations should be located in industrially dominated catchments where elevated PCB and mercury concentrations are documented.

(3) The Permittees shall implement flow diversion to the sanitary sewer at the five pilot pump stations. As part of the pilot studies, they shall monitor and measure PCB and mercury load reduction.

The language of the Permit clearly establishes that SFRWQCB staff consider co-management of urban stormwater and wastewater systems to be a viable tool for continuous improvement of water quality. In planning meetings with SFRWQCB staff on the subject of diversions, Dr. Thomes Mumley (Assistant Executive Officer) has stated that the SFRWQCB wants to see communities evaluating opportunities to integrate diversion projects into the necessary rehabilitation and management of low lying pump stations, particularly those stations serving older urban-industrial areas known to have legacy pollution, and at pump stations where other water quality problems, such as low dissolved oxygen (DO), are known to exist. The NRSPS fits all three of these criteria. Low DO has been identified at the NRSPS and is currently being managed by mechanical aeration. The pump station serves an older urban drainage area, with PCBs in storm borne sediments ranging from 100 to 200 ppb (SFEI, 2012). The pump station is currently in need of rehabilitation, with both dry weather pumps out of service and only one wet weather pump currently functional.

Discussions with SFRWQCVB staff have indicated that they intend to expand requirements for pilot diversions to requirements for more permanent diversions in the next re-issuance of the MRP, if diversions prove to be feasible and provide water quality benefits. At present, the costs, risks, and benefits of a long-term commitment to diversion from the NRSPS is unknown. The scope of this proposal is entirely focused on a diversion project of finite duration. The duration will be negotiated between the County and WCWD.

3. Project Setting

North Richmond Storm Drain Project

The North Richmond Storm Drain Project, of which the NRSPS is a part, is designed to manage the stormwater for a portion of the City of Richmond, San Pablo and the unincorporated County area of North Richmond. The project consists of a network of stormwater collection sewers which drain into the wet well of the pump station. The stormwater is then pumped into the discharge channel of the pump station which drains by gravity into a 78-inch discharge pipeline.

The project site is located in a watershed comprised mainly of industrial and residential land (Figure 3-). The storm drain collection system delivers stormwater to the NRSPS located on the southwest corner of Gertrude Avenue and Richmond Parkway. The station's 78-inch discharge pipeline runs westward from the pump station along an easement on the Chevron Chemical Company property just south of Gertrude Avenue. At about 950 feet downstream of the pump station, the pipeline expands into an 8-foot by 4-foot box culvert which crosses Gertrude Avenue and runs into a trapezoidal earth channel that drains to Wildcat Creek.

The storm drain collection system consists of over 14,000 linear feet of reinforced concrete pipe in sizes ranging from 15 inches to 84 inches in diameter. The collection system drains an approximate 339 acres area west of 13th Street between Wildcat Creek to the north and Castro Street to the south. A main interceptor line runs west along the south side of Chesley Avenue from just east of the Santa Fe Railroad to the west end of Chesley Avenue. There it turns south to Gertrude Avenue, then west along the south side of Gertrude Avenue to the NRSPS. Feeder lines were installed to drain the area north and south of Chesley Avenue within the study area.

Pump Station Structure and Operation

The NRSPS's structure consists of a 3-level main structure and a discharge channel. The lowest level of the main structure, approximately 25 feet below ground, is the pump station wet well where stormwater from the collection system is received. Stormwater entering the station is routed to two compartments where it is lifted to the station's discharge channel by the stormwater pumps. The station discharge channel is a chamber, with its lower half below ground level, where the discharge from the stormwater pumps is collected and drained into the 78-inch discharge pipeline. An overflow weir is built around the end of each of the discharge pipes from the larger pumps, and flap gates are installed at the ends of the discharge pipes from the smaller pumps to prevent discharge water from flowing back into the wet well .

During the original design, the County established that the capacity of the NRSPS shall be the peak flow of a 10-year storm (Table 1). Based on these hydraulic criteria, the NRSPS is designed for a firm capacity of 135,000 gpm. On this basis, four pumps, each capable of pumping 45,000 gpm of stormwater, are provided in the station. Three of these pumps provide for the firm capacity of the station while the fourth one serves as the standby unit. At present, only one of these wet weather pumps is operational. Two of the wet weather pumps are being rebuilt.

The pumping station is designed to handle smaller dry-weather flows as well as storm flows. During dry weather, there is a continuous small flow into the pumping station from the infiltration of groundwater into the pipeline system and from the surface runoff resulting from various sources such as irrigation runoff, street washing, and water main flushing. Based on the original estimates, the dry-weather flows in the North Richmond area range from 70 gpm to 675 gpm (0.1 to 1.0 MGD). Based on recent pumping records, current dry weather flows are approximately 250 gpm (0.4 MGD), which is about three percent of the of the average dry weather flow design capacity of the entire WCWD treatment plant.

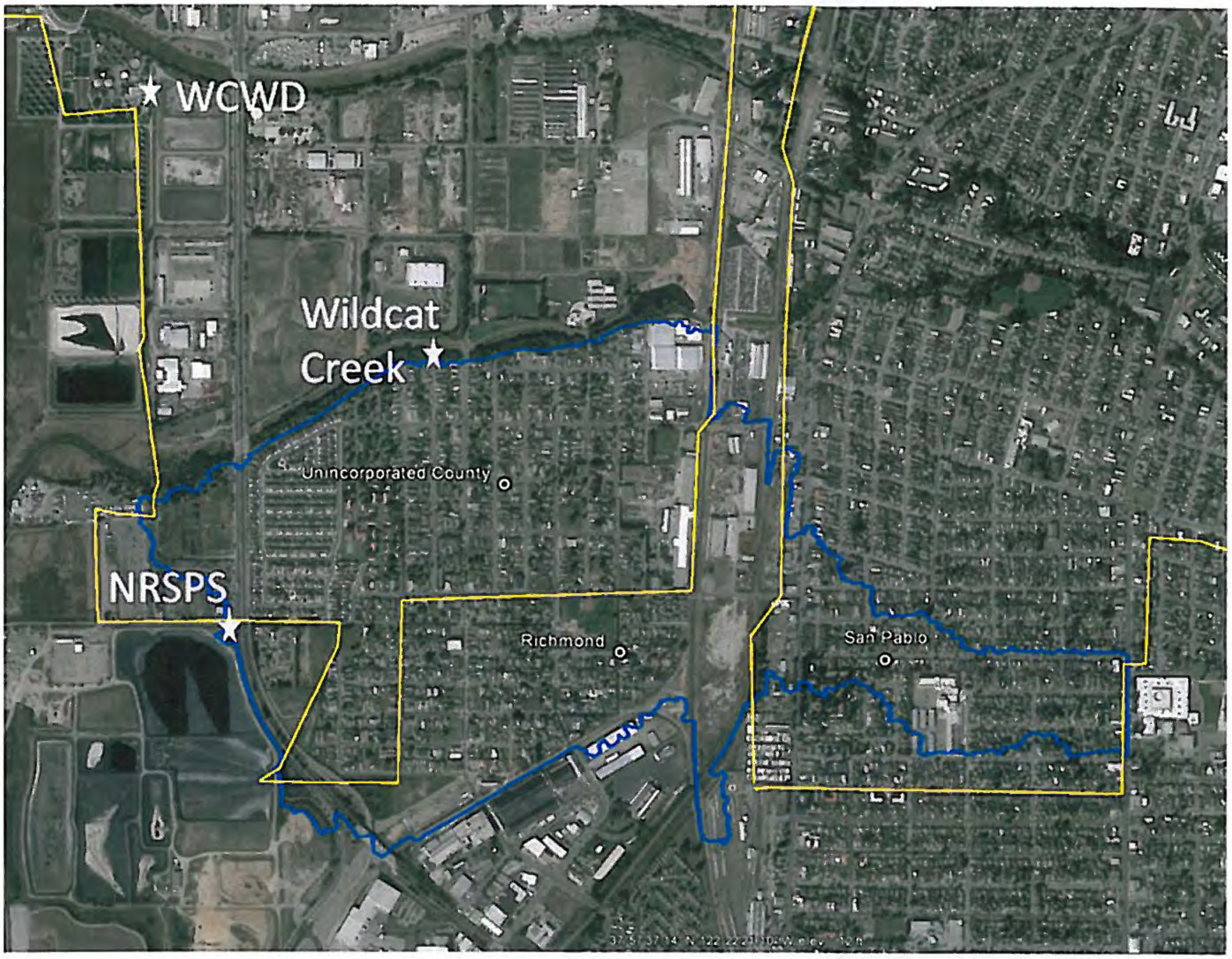

Figure 3-1. Project site map

Blue lines indicate approximate watershed boundary.

Yellow lines indicate municipal boundaries of Unincorporated Contra Costa County, Richmond, and San Pablo.

Table 1. Information Summary for NRSPS		
NRSPS Components	**Original Design**	**Current Condition**
Wet weather pumps:	4 vertical, propeller type, natural gas engine driven pump rated at 45,000 gpm with a TDH of 19.2 feet.	1 Pump currently in service
Dry weather pumps:	2 vertical, propeller type, electric motor driven pump rated at 3,500 gpm with a TDH of 11 feet.	Both pumps are out of order
Wet Well Dewatering pumps	2 submersible nonclog type, electric motor driven pump rated at 40 gpm with a TDH of 21 feet.	Both pumps are out of order and removed.
Wet weather discharge	48-inch	48-inch
Dry weather discharge	14-inch	14-inch
Pump operation	Controlled by water level in the wet well. Wet Weather pumps operate only when inflow is high, such as during a rainfall event. Dry weather pumps are intended to provide less frequent pump runs with longer run times outside of storm conditions.	Wet Weather pumps operate approximately 5-10 minutes every 1-3 days to lower the wet well water level.
Wet weather Flow	10-year storm, 135,000 gpm	45,000 gpm
Dry weather Flow	0.65 mgd	~0.4 mgd

Current pump station condition information as provided by Craig Gridley (WCWD, Maintenance Supervisor).

Pump Station Condition Assessment

CCCWP has provided the services of their Program Management consultant, Brown and Caldwell (BC) to facilitate this project. BC was the original designer of the NRSPS. BC brought wastewater design specialists to perform a site visit with County and City staff on 10/11/12. The team assessed the condition of the pump station and evaluated criteria that will be critical to the design and construction of the diversion project. The site visit reviewed the condition of the pumps and mechanical systems, power distribution system, and instrumentation and controls, They also noted and recommended that certain pumping plant modifications or repairs be completed prior to the diversion pilot project design. These include the following:

- Reroute the conduits that enter the top of the MCC control section from the roof.
- Hazardous Area Classifications should be determined. Per NFPA 820, the pump station wet well should be Class I, Division 2, and should include a combustible gas detector. The dry well (grade level) should be Class I, Div.2 as well, however, the NFPA 820 allows the room to be unclassified if the air changes are greater than 6 per hour or if the room is pressurized per NFPA 496.
- Verification and coordination with PG&E for connection of the two new pump motors (approx 20hp) at 240V. PG&E might require soft starters or VFD's to reduce voltage dip to the distribution system on startup.
- A new feeder breaker will have to be installed in a spare bucket in the existing MCC. Due to the age of the existing MCC and signs of corrosion it should be inspected first prior to installation of the new breaker (estimated to be around 150A) for signs of corrosion on the interior. If the inspection results are not in favor of using the existing MCC, a different means of getting power to the pump motors will have to be investigated.

Nearby Sanitary Sewer Conveyances

Sanitary sewer and stormwater conveyances owned by WCWD are identified in Figure 1-1-1. Adjacent to the NRSPS, there is a 30 inch ductile iron pipe (DIP) that feeds into a 36 inch vitrified clay pipe (VCP). The 30 inch DIP in the project area receives flow from a smaller 24 inch VCP that collects residential wastewater from housing along Gertrude Avenue.

Conveyance of Treated Effluent

WCWD and the City of Richmond are joined in a joint powers authority, the West County Agency, to discharge through a common outfall. In addition, to discharge through an outfall, WCWD also currently sends treated effluent to the East Bay Municipal Utility District (EBMUD) North Richmond Water Recycling Facility (NRWRF), where secondary effluent is treated to tertiary standards and recycled for gold course irrigation. In addition, WCWD sends secondary effluent to the EBMUD Richmond Advanced Recycled Expansion (RARE) facility, where it is treated to tertiary standards, further purified by reverse osmosis, and sold to Chevron for use as refining process water, in lieu of using potable water.

The City of Richmond is currently working to reduce stormwater discharges into the sanitary sewer system from industrial areas, and to reduce inflow and infiltration, in order to avoid system upsets and sanitary sewer overflows. Both agencies are concerned about the risks of system upsets that could result from the unpredictable nature of stormwater flow and composition. Discussions with decision makers from both agencies indicate that a meaningful, written commitment to regulatory relief from the SFRWQCB with regard to potential system upsets as a result of diversions may be required for them to agree to accept a diversion.

Water Quality Characterizations

The San Francisco Estuary Institute (SFEI) conducted a baseline study of water quality from September 2010 through January 2012. The work performed on behalf of the Contra Costa County Watershed Program was to provide background data needed to evaluate the potential benefits of a diversion project and to evaluate the potential for exceeding local limits should a diversion project be implemented. Constituents monitored by SFEI are listed in Table 2 below.

Table 2. Constituents Characterized by SFEI 2010 - 2012

Nutrients and Conventional Parameters	Toxic Pollutants
• Ammonia • Total nitrogen • Total Phosphorus • Alkalinity • Suspended Sediment Concentration • Nitrate • Ortho-Phosphate	• Cyanide • Volatile organics • Semi-volatile organics • Dioxins • OC Pesticides • PAHs • PCBs • Mercury and methylmercury • Trace elements (As, Cd, Cr, Cu, Pb, Ni, Se, Ag, Zn, Sb, Ba, Be, Co, Mo, Tl, V)

The draft SFEI study concluded pollutant concentrations in dry and storm flow samples measured to date are all below limits established by WCWD. Dry weather and storm flow samples did, at times, exceed effluent limits established for WCWD for some constituents: i.e., Dioxin-TEQs, mercury, PCBs, and selenium. All other pollutants of regulatory concern were below established the effluent limits.

The water quality characterizations from the NRSPS, along with assessments of sediments in the NRSPS drainage area, indicate that mercury and PCB concentrations in sediments are high enough to provide significant benefits for stormwater management in that watershed. Mercury to suspended sediment ratios are the third highest of twenty two Bay Area watersheds characterized by SFEI (Yee and McKee, 2010). PCB to suspended sediment ratios are the fifth highest of Bay Area watersheds assessed in that same study.

SFEI will continue to monitor storm flows and water quality at the NRSPS as part of the Bay Area Stormwater Management Agencies Association (BASMAA) regional collaboration to implement pollutants of concern monitoring required by the MRP. That monitoring project will provide ongoing opportunities to conduct additional needed characterizations that would help assess the risk of effluent limit exceedances or treatment system upsets.

4. Recommended Diversion Approach

The recommended approach is a "hard-piped" diversion, with flows routed directly into the nearest sanitary sewer collection system. A main low-flow pump and a backup low-flow pump would be installed at the NRSPS. The pump size proposed is 250 gpm (0.4 mgd), based on current estimated dry weather flows into the NRSPS and constraints on the conveyance capacity identified by WCWD (See Figure 1-1 above). For context, the WCWD treatment plant has a design flow rate of 12.5 mgd during dry weather, and a hydraulic capacity of 21 mgd during wet weather. In other words, the proposed diversion would use about 5 percent of the excess wet weather hydraulic capacity that the plant is designed for. This diversion would connect via an existing manhole to the existing 36 inch vitrified concrete pipe (VCP) that runs along Gertrude Avenue. Conceptual illustrations of this approach are provided in Attachments 1 - 3.

The diversion would include the installation of a 250 gpm bypass pump and a 250 gpm backup bypass pump in the NRSPS wet well. The bypass pumps would have manual shutoff controls at the NRSPS. In addition, the bypass pumps would be controlled by a supervisory control and data acquisition (SCADA) system. The SCADA would be configured to allow operators at WCWD to shut off the diversion at any time.

The SCADA would be connected to two water level sensors in the receiving conveyance pipe to shut off the diversion in the event that the conveyance is nearing its capacity. Two water level sensors would be used to provide verification readings that they are accurately recording water levels. The SCADA would also be connected to continuous water quality probes that monitor pH, conductivity, and other water quality indicators that could be used to detect spills (e.g., UV absorbance or dielectric constant to detect petroleum spills). The capability of selected continuous monitoring to detect spills would be evaluated and documented using bench-scale tests prior to implementation at the NRSPS.

The diversion pumps would be configured such that they would shut off automatically if communication with the SCADA is ever lost. The SCADA would be programmed to turn off the pumps if threshold water levels in the receiving pipes are reached, or if water levels from the two level sensors do not agree within a specified tolerance. The SCADA would also turn off the pumps if sudden or significant changes in water quality indicators are detected by the continuous monitoring probes. In addition to SCADA monitoring of water levels and water quality, a mechanical float switch would be installed in the collection system that would shut off the diversion in the event that water levels rise to a point indicating capacity is being reached.

This diversion would connect the bypass pumps directly to the manhole. The diversion pipe would be designed with a side-tap to facilitate monitoring. The connection would allow the inflow to fall into the manhole, so that if the bypass pump fails sewage would not be siphoned back into the pump station. The connection would be designed with a valve connected to a pipe leading to the pump station cistern. When the pilot diversion project is completed, the valve could be turned to restore dry weather flows back to the flood control channel.

The initial diversion would take place over a period of one month during wet weather, likely in the fall. Prior to the diversion, the connecting valve would be set to send all dry weather urban runoff to the flood control channel, per normal operations. This operation would continue to keep the NRSPS wet well as empty as possible until the onset of wet weather. Weather reports would be monitored and when there is a significant probability of a storm (e.g., greater than 75 percent chance of at least 0.5 inches of rain in a 24 hour period), WCWD would be notified that a first flush diversion event is planned. Prior to the onset of the forecast storm, the valve would be set to divert flows into the WCWD collection system. A respirometer test would be conducted on water samples after storm flows commence.

The total amount of first-flush stormwater that can be diverted would be determined by the conveyance system capacity. The approach would be to cease the diversion when the receiving pipe is nearing capacity. Based on the data provided by WCWD, a five-year 24 hour event leaves 0.6 mgd available capacity in the receiving pipe. The SCADA and level sensors would be configured to turn off the diversion pumps when there is still at least 0.5 mgd of capacity in the pipe. Therefore, the diversion would likely be halted by storms smaller than the 5-year, 24-hour event. The amount of first flush that would be diverted would be modeled prior to implementing the diversion pilot as a means of assessing expected water quality benefits.

The diversion would resume after capacity is restored. This pattern of weather tracking, notification, and diversion would continue for one month.

Approximately six months after the first flush diversion was implemented and evaluated, a dry weather diversion would be tested. The dry weather diversion would be conducted for a summer season (e.g., June through August). A similar approach to the wet weather diversion would be taken, except that weather tracking would not be necessary,

Advantages and Risks with the Diversion

The diversion will be exploring merits in the context of the "pollutograph" concept that underlies the rationale of diverting first flush (Figure 4-1). The pollutograph concept is that as storm intensity builds, sediment, hydrocarbons, metals, bacteria and other pollutants present in the urban landscape are more concentrated in early parts of the storm. Later parts of longer, more intense storms are assumed to have lower pollutant concentrations.

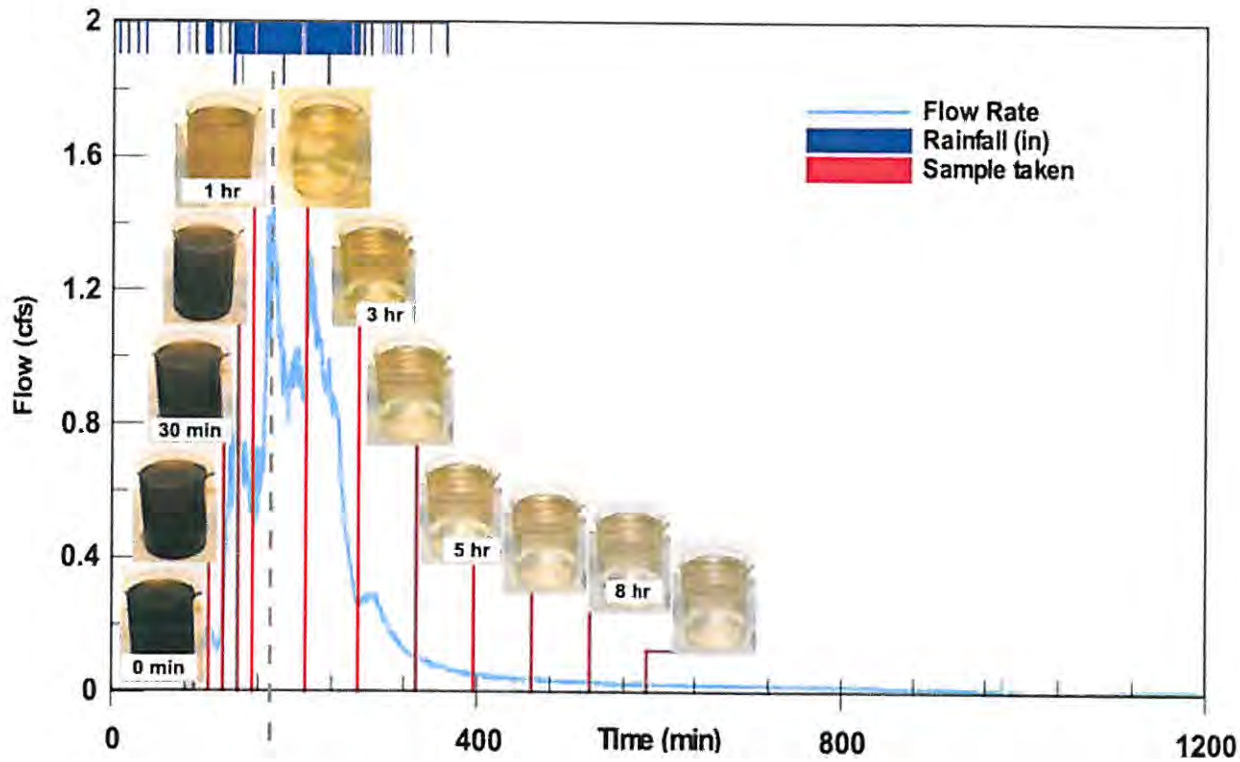

Figure 4-1. Conceptual example of a pollutograph

The learning benefit would be verifying hydraulic model predictions of how much first flush can be diverted prior to reaching conveyance capacity. Referring back to Figure 4-1, the question addressed in the diversion is "how much of the initial stages of the pollutograph can be diverted, and how much good will it do?"

The diversion provides both water quality benefits and learning opportunities. The water quality benefit would be the mass of pollutant captured during the duration of the allowed diversion. The learning opportunity is understanding how to manage first flush and dry weather diversion and exploring the boundaries of how much water can be diverted into the treatment plant. The other important learning benefit is the permitting issues and operational costs of the diversions.

The risks associated with the diversion are principally SSOs and treatment system upsets. Approaches to mitigate those risks that have been discussed above include:

- Real time monitoring of water levels with redundant sensors and a "kill-switch" SCADA. The bypass pumps would be operated with a contact closure switch that must have voltage applied from SCADA. If the SCADA fails, the contact closure voltage would drop and the pumps would cease.
- The SCADA would also turn off the bypass pumps if level sensors indicate capacity thresholds are being reached, level sensors are not agreeing, or continuously monitored water quality parameters exceed trigger levels.

Another risk, primarily associated with the hard diversion because of the greater volume, is the potential for the diversion to cause an exceedance of effluent limits because of constituents present in stormwater. An important next step would be to compare the constituents in stormwater monitored by SFEI that did exceed effluent limits to influent concentrations of domestic waste typically treated by WCWD, to evaluate whether diversion of small flows of dry weather urban runoff or first flush storm flows would pose a risk of exceeding effluent limits.

Another issue raised by WCWD and the City of Richmond is the potential for treatment system upsets during the diversion. As discussed above, this concern could be ameliorated with some written commitment from the SFRWQCB to refrain from enforcement actions should an upset occur during the diversion pilot.

5. Case Studies of Dry Weather Diversions

Dry weather diversions are an established method for protecting coastal waters from impacts due to dry weather urban runoff, as noted in a recent report by the Bay Area Stormwater Management Agencies Association (BASMAA, 2010). In the Bay Area, the East Bay Municipal Utility District routinely accepts permitted discharges from the California Department of Transportation (Caltrans) to prevent Caldecott Tunnel washing discharges from discharging into Temescal Creek. Orange County Sanitation District (OCSD) and the South Orange County Wastewater Authority (SOCWA) have established programs to accept dry weather urban runoff diversions to protect beaches from bacteria. Similarly, the City of Santa Cruz has an ongoing dry weather diversion to prevent discharges into the San Lorenzo River.

The three beach communities mentioned provide important lessons learned about dry weather diversions. Staff of each of the implementing agencies were interviewed in 2009 by Brown and Caldwell to learn from their experiences. The staff interviewed were:

- OCSD - Tom Meregillano
- SOCWA - Paul D. Schmidtbauer
- City of Santa Cruz - Steve Wolfman

The principal drivers for treating dry weather urban runoff were beach warnings and closures in those coastal communities due to high bacterial counts. Additionally, foul smelling water around the beaches caused aesthetic concerns to beach users in the City of Santa Cruz. In all three examples, the Regional Water Quality Control Board's regulations to reduce pollution in urban runoff were motivating factors to seek solutions. In general, all POTW operators interviewed found that the dry weather urban runoff diversions had positive outcomes. Beach closures were reduced, and nuisance discharges were ameliorated. No major changes to infrastructure or operations were needed.

OCSD charges $1,007 per million gallons for flows in excess of 4 million gallons per day (mgd) for dischargers within OCSD service area. For dischargers outside the service area, OCSD charges $1,007 per million gallons of flow. Flow meters installed at every discharger's diversion structure helps keep track of flows. The City of Santa Cruz, in contrast, does not charge fees for the diversion because the City owns both the treatment plant and the pump station served by the diversion. As of 2008, the OCSD diversions were taking 0.6 to 3 mgd into OCSD, which has a treatment capacity of 245 mgd.

There are several different sources of dry weather urban runoff that are diverted to OCSD. On the coastal side, the main contributors are groundwater pumping. Inland, irrigation is the main contributor. Other sources include dewatering dischargers, washing cars and hosing down driveways.

The OCSD diversions are from pump stations with diversion bypass pumps that are configured to automatically shut off by float switches that are triggered when rains commence and wet wells are full to threshold levels. One negative impact identified by OCSD was that a tanker truck full of ammonia did spill its contents into the storm drain system, causing an upset at the treatment plant. That incident has informed some of the risk mitigation thinking in this proposal.

The six SOCWA treatment plants accepting dry weather urban runoff diversions have treatment plant capacities that range from 6 to 13 mgd. They each accept dry weather diversions totaling about 0.25 mgd into each treatment plant. Diversions in this area are manually operated. The principal source of dry weather urban runoff into the SOCWA treatment plants is from groundwater recovery systems. The cities served by SOCWA have been cleaning groundwater for potable use and the waste generated from this process includes water containing brine, iron and manganese. As a result, the SOCWA treatment plants have experienced an increase in the Total Dissolved Solids (TDS) concentrations of effluent. Although violations have not occurred so far (as of 2009), they are close to exceeding the water quality standards.

In Santa Cruz, the program of dry weather diversions began with 0.7 to 1 mgd initially, and was subsequently was extended to 2 mgd after the City began taking some first flush flows. The principal source of dry weather urban runoff in the area served by the diversion is natural seepage and irrigation.

As a treatment plant with an average dry weather flow capacity of 17 mgd, the City of Santa Cruz is a useful point of comparison for the WCWD to evaluate how accepting dry weather flows and first flush may affect operations. The City of Santa Cruz project is a permanent diversion. Dry weather urban runoff comes from an area that is primarily residential and commercial. The diversion project includes permanent infrastructure (Figure 5-1-1A) and small public information sign (Figure 5-1B). The diversion is manually operated.

(A) (B)

Figure 5-1. Dry weather diversion by the City of Santa Cruz at the San Lorenzo River.

The diversion features permanently installed pumps (A) and an information sign (B) to inform the public of the purpose and benefits of the project.

6. Next Steps

The next steps in the planning of this diversion project are to:

- Establish the appropriate permitting framework and fee structure;
- Conduct additional water quality studies to characterize the potential for treatment system upsets;
- Design the diversion.
- Apply for a permit based on the design parameters.

Permitting framework

A central question to be considered is the appropriate permitting framework. The County intends to seek permission from WCWD to implement a pilot diversion project. This activity could be permitted through an industrial pretreatment permit. Alternatively, WCWC and the County could enter into a joint powersaAgreement. Other permitting mechanisms could also be considered.

Water Quality Studies

As discussed above, water quality studies will be conducted in the coming year to address some of the uncertainties and concerns related to the diversion. These studies include additional characterization of constituents in stormwater by SFEI during the 2012 – 2013 wet season, a comparison of constituents identified in stormwater to influent concentrations already present, and an assessment of removal effectiveness and expected effluent concentrations.

Design

The design would be based on parameters established by the permitting framework and the capacity analysis results. The design would include plans, specifications, and estimates for bypass pumps, back pressure sensors, and other monitoring and control features needed to provide for safe operation of the diversion. As part of the design process, the appropriate permits and environmental clearances would be obtained.

CONTRA COSTA CLEAN WATER PROGRAM
NORTH RICHMOND PUMP STATION PILOT DIVERSION PROJECT
MONITORING NEEDS

Submitted to:
Contra Costa Clean Water Program
255 Glacier Drive
Martinez, California 94553

Submitted by:

AMEC Environment & Infrastructure, Inc.
San Diego, California

November 2013

AMEC Project No. 5025133001

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ACRONYMS AND ABBREVIATIONS

ADWF	Average Dry Weather Flow
BACWA	Bay Area Clean Water Agencies
BNA	Base/neutrals and Acids Extractable Organic Compounds
BASMAA	Bay Area Stormwater Management Agencies Association
BOD	Biochemical Oxygen Demand
CCCWP	Contra Costa Clean Water Program
COD	Chemical Oxygen Demand
County	Contra Costa County
Diversion Project	Stormwater Diversion Pilot Project
DTPY	Dry Tons Per Year
g	Grams
gpm	Gallons per Minute
I&I	Inflow and Infiltration
JPA	Joint Powers Authority
MGD	Million gallons per day
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
MRP	California Regional Water Quality Control Board San Francisco Bay Region Municipal Regional Stormwater NPDES Permit, Order No. R2-2009-0074, adopted October 14, 2009, revised November 28, 2011
MS4	Municipal Separate Storm Sewer System
ng	Nanogram
ng/L	Nanograms per liter
NPDES	National Pollutant Discharge Elimination System
NRSPS	North Richmond Stormwater Pump Station
O&G	Oil and Grease
OUR	Oxygen Uptake Rate
PCBs	Polychlorinated Biphenyls
pg/L	Picogram per liter
ppm	parts per million
POTWs	Publicly Owned Treatment Works
Richmond	City of Richmond
RWQCB	Regional Water Quality Control Board
SFBRWQCB	Regional Water Quality Control Board, San Francisco Bay Region
SSC	Suspended sediments concentrations
SSO	Sanitary Sewer Overflow
SOUR	Specific Oxygen Uptake Rate
TEQ	Toxic Equivalents
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
VCP	Vitrified Clay Pipe
WCA	West County Agency
WCWD	West County Wastewater District
WWTP	Wastewater Treatment Plant
µg/L	Micrograms per liter

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1.0 BACKGROUND

The Stormwater Diversion Pilot Project (Project) at the North Richmond Stormwater Pump Station (NRSPS) is being implemented as a requirement of the California Regional Water Quality Control Board San Francisco Bay Region Municipal Regional Stormwater NPDES Permit, Order No. R2-2009-0074 Municipal Regional Permit (MRP). MRP Permittees are collectively required to comply with the requirement to pilot test diversions of first flush and dry weather urban runoff into publicly owned treatment works (POTWs). The MRP provisions related to this project are for the implementation of Total Maximum Daily Loads (TMDLs) for mercury (Provision C.11.f) and polychlorinated biphenyls (PCBs) (Provision C.12.f). The NRSPS diversion project is one (1) of five (5) required pilot diversions being coordinated and implemented within the San Francisco Bay Region.

The Contra Costa Clean Water Program (CCCWP) is facilitating implementation of the Project, to divert urban storm water runoff from the NRSPS into the West County Wastewater District (WCWD) sewage treatment plant. NRSPS is jointly “owned” by Contra Costa County (County) and City of Richmond (Richmond) through a Joint Exercise of Powers Agreement (JEPA) executed in 1974. WCWD is currently under a separate contract with the County to maintain and operate the NRSPS.

The Project is being implemented by Contra Costa County (County), a Permittee of the CCCWP. The County sought and obtained grant funding administered by the San Francisco Estuary Partnership through the United States Environmental Protection Agency (USEPA) San Francisco Bay Area Water Quality Improvement Fund. The Project is one of several in the “Estuary 2100 Phase 2: Building Partnerships for Resilient Watersheds” program. The grant provides $496,649 in EPA funds, matched by $165,550 from the County to plan, design, construct, and monitor an engineered diversion into WCWD.

Baseline water quality monitoring was performed per the scope of the grant through two wet seasons between 2010 and 2012. WCWD staff had substantial input on the monitoring parameters for that baseline study. The baseline study was completed and reported in 2012 (Hunt et al., 2012).

Details of the diversion concept are discussed in a technical memorandum submitted to the WCWD in 2012 (CCCWP, 2012a). A probable construction cost estimate and preliminary schedule for the Project was developed by Brown and Caldwell in December 2012. CCCWP Management Committee Members have been regularly briefed on progress in scoping the diversion pilot project (CCCWP 2012b; CCCWP 2013). The County is moving forward with procurement of a design consultant to develop biddable plans, specifications and estimates for the Project.

Between January and April 2013, CCCWP staff, along with County and Richmond staff, engaged directly with WCWD staff who were authorized by the WCWD Plans and Programs Committee to discuss pilot diversion concepts with project proponents. In those discussions, details of specific technical concerns were fleshed out by WCWD. The purpose of this memorandum is to summarize those technical concerns and identify monitoring and assessment approaches to address those concerns. This memorandum evaluates the following concerns identified by WCWD:

- Potential stormwater impacts to conveyance capacity
- Potential for stormwater to upset activated sludge microorganisms
- Potential stormwater impacts to effluent quality
- Potential stormwater impacts to bio-solids quality
- Potential spills and illicit discharges into the storm sewer that impact sanitary treatment system

This memorandum concludes with a summary of monitoring and assessment intended to address WCWD concerns, along with a summary of Project costs and feasibility.

This analysis of risks may appear to be more detailed than measures taken prior to implementation of the East Bay Municipal Utility District (EBMUD) diversion pilot at the Ettie Street Pump station. One reason for increased scrutiny of risks and mitigation measures for the NRSPS Project is that the proportional flow of the diversion is greater. The Ettie Street pilot project diverted 75 gpm (0.11 million gallons per day [MGD]) into a treatment system with a capacity of 120 MGD average dry weather flow (ADWF), or 0.1 percent of the ADWF treatment capacity. This Project contemplates diverting 400 gpm (0.6 MGD) into a much smaller system, with a treatment capacity of 12.5 MGD ADWF; this proposed diversion corresponds to approximately or five percent of the total WCWD ADWF treatment capacity. The quantifiable impact of this proposed project on available treatment capacity is greater by fifty-fold as compared to the EBMUD diversion pilot.

Another important factor affecting risk management on the NRSPS Pilot Project is the multiple jurisdictions involved. The owner of the diversion in the Ettie Street was the owner of the sewage treatment plant itself, who was required to carry out the diversion as a supplemental environmental project to reduce the penalty for a previous violation. Cross jurisdictional issues were minimized – essentially needing permission from the City of Oakland to use their sewage conveyance pipe and Alameda County Flood Control and Water Conservation District to access the pump station.

The Project is a requirement of the Contra Costa Clean Water Program (CCCWP), which provides collective compliance to its twenty Permittees. The Permittee implementing the Project, the County, does not own the sewage treatment system. The treatment plant that would receive the diversion, owned by WCWD, shares a common outfall with a sewage treatment plant owned by another CCCWP Permittee, Richmond. Richmond has consistently stated it does not want to see introduction of stormwater into sanitary sewers. Both WCWD and Richmond are under considerable pressure through regulatory instruments and, in Richmond’s case, consent decrees, to reduce blending events by reducing inflow and infiltration of stormwater into the sanitary sewer. Owing to the multiple jurisdictions and increased regulatory scrutiny, the NRSPS project merits a higher level of caution with respect to potential problems caused by the diversion pilot.

2.0 A CAUTIOUS DIVERSION APPROACH

The primary response to address WCWD concerns while keeping the project costs reasonable is a cautious approach to the diversion. The diversion approach outlined in CCCWP 2012a has been refined to propose diverting dry weather and first flush flows that occur during normal business hours only, so that vigilant staff are present onsite at the pump station while the diversion is operating. Prior to initiating diverting a batch of water, samples will be collected from the wet well and from the upstream drainage pipe to characterize water stored in the conveyance system that would be diverted to WCWD. The characterization will focus on potential for toxicity to activated sludge bacteria, as described in Section 3.0 below. First flush from storms that occur outside normal business hours will not be diverted to WCWD during this pilot evaluation.

Implementing the cautious diversion approach requires balancing the constraints of the nearby WCWD collection system capacity, dry weather flow rates, and staff availability during normal business hours. A capacity analysis provided by WCWD indicates that the nearest conveyance, a 36 inch pipe aligned along Gertude Avenue, has between 400 and 1000 gpm (0.6 to 1.4 MGD) capacity during a 5-year, 24-hour storm event (WCWD, 2012, as cited in CCCWP 2012). To be conservative, the maximum diversion flow rate into that pipe would be no more than 400 gpm (0.6 MGD), or about five percent of the WCWD treatment plant's rated ADWF treatment capacity.

The estimated dry weather flow rates at the NRSPS are approximately 100 – 200 gpm (0.14 – 0.28 MGD). To completely remove all dry weather flows accumulated over a 24 hour period at a diversion rate of 400 gpm, the batch diversion would therefore take place over a six to twelve hour working day, depending on exact dry weather flow rates.

For planning purposes, it should be assumed that the diversion pilot will require staff to be present onsite for up to 14 hours per day, i.e. two shifts, during the diversion. If this staffing level is unacceptable for cost or other reasons, and it is determined to be a necessary staffing level as a result of higher (i.e., 200 gpm) dry weather flow rates, an alternative approach is to limit the staff working hours to an eight hour day, and accept that during the pilot test, some of the dry weather flows will be discharged to the Bay after normal working hours end.

The project will provide monitoring of dry weather flows diverted during normal business hours for a two-week period. In addition, the project will provide monitoring of a first-flush from a storm early in the rainy season that occurs during normal business hours. This will constitute the pilot program, which can then be used to gauge the level of risk and interest in further storm water diversion at the NRSPS.

The potential benefit to stormwater quality that could be achieved by this cautious, batch-diversion approach would be proof-of-concept for the use of the nearby WCWD treatment plant's capacity to maintain storage capacity in the stormwater conveyance system prior to storms. That in-system storage capacity may be useable in the future in conjunction with onsite constructed stormwater treatment systems[1].

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[1] The County has applied for grant funding to construct onsite stormwater treatment systems through USAEPA's 2013 Water Quality Improvement Fund. Without that new grant funding, this

3.0 AVOIDING UPSETS TO ACTIVATED SLUDGE MICROORGANISMS

WCWD staff and members of the WCWD Board of Directors have expressed concern over the risk of causing a treatment system upset as a result of the diversion. If chemical contaminants present in the diverted runoff are toxic to activated sludge microorganisms, the resulting loss of activated sludge treatment capacity could lead to discharge of partially treated wastewater, in violation of the WCA's NPDES permit. Sewage treatment plants that accept trucked in water from industrial facilities for disposal typically use oxygen uptake rate (OUR) measured for evaluation of potential toxicity to activated sludge microorganisms (American Public Health Association, 1998; Young, 1981).

To determine if the diverted runoff is toxic to activated sludge microorganisms, dry weather urban runoff and first flush water will be screened using specific oxygen uptake rate (SOUR) testing. This is based on a protocol established by the Contra Costa Central Sanitation District (CCCSD) for screening trucked in septic tank waste for acceptance (Attachment 1). The CCCSD approach is to dilute 7.5 ml of sample water into 300 ml of activated sludge, augmented with a carbon source to feed the activated sludge microorganisms, and then monitor the rate at which dissolved oxygen decreases – i.e., the SOUR. The sample SOUR is compared to the SOUR measured when activated sludge is inoculated with deionized water. If the SOUR is decreased by more than 20% in the sample compared to the deionized control, CCCSD does not accept the trucked-in waste.

The protocol described above would need to be amended to reflect the relative flows of the diversion as compared to WCWD's flows. The 7.5 ml into 300 ml protocol followed by CCCSD reflects a conservative approximation of diluting a truckload of waste into CCCSD's existing treatment system, which treats approximately 38 MGD. As noted above, the refined concept would batch divert at a flow rate of 0.6 MGD, or five percent of WCWD's ADWF (i.e., a twenty to one dilution of the diverted water into WCWD's treatment plant influent). To be conservative, a fifteen to one dilution (i.e., 20 ml sample water added to 300 ml activated sludge) would be used.

The preferred approach is for WCWD to perform the SOUR testing at their own wastewater laboratory. WCWD's involvement in the testing would make the logistics of obtaining and testing activated sludge samples simpler. Additionally, WCWD laboratory personnel have the most experience with their own activated sludge, and could likely provide additional measurement and observation that would help characterize the activated sludge health during the diversion. For example, settling times, presence / absence of foaming, and microscopic assessment of

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pilot project would be limited to only small-scale dry weather diversions to WCWD. The County expects to be notified whether or not a grant is awarded by November 2013.

activated sludge microbial community composition are all important clues that experienced operators would rely upon as indicators of a potential system upset. WCWD's close involvement with monitoring health of activated sludge during the diversion would be beneficial.

4.0 PROTECTING CONVEYANCE CAPACITY

The nearest conveyance system is a 36-inch vitrified clay pipe (VCP) that is estimated by WCWD to have approximately 0.6 to 1.4 MGD capacity during a five-year, 24-hour wet weather event (CCCWP, 2012a, citing to information provided by WCWD). Presumably, more capacity exists during dry weather. The refined diversion concept plan would divert up to 400 gpm (0.6 MGD). Because the proposed diversion flow is anticipated to be substantial compared to available conveyance capacity, there is a risk of causing a sanitary sewer overflow (SSO) as a result of the diversion.

To safeguard against potential SSOs caused as a result of the diversion, a float switch would be installed in the conveyance system, downstream of the diversion inflow. The float switch would be configured such that it is directly connected to an electrical shutoff that would turn off the diversion pump if a specific pre-determined level (e.g., 75 percent capacity) in the conveyance pipe is reached. The shutoff would be designed so that it would not turn back on once it has shut off until manually reset.

The shutoff would also be designed to turn off if no electrical signal is received from the float switch - if the switch were to fail, the system would shut off. The shutoff switch would be enabled with remote monitoring and operation capability so that WCWD staff and monitoring crews can determine the status of the pump at any time, and switch it off remotely, if necessary. The shutoff switch and associated remote operation and wiring would be incorporated into the final design of the diversion and installed during construction.

The other safeguard against SSOs is the decision to operate the diversion only when either a County employee or contractor is onsite at the NRSPS. By avoiding unattended operation, the County will be better able to rapidly determine if any capacity problems arise and respond by shutting off the diversion.

5.0 NO EVIDENCE FOR IMPACT ON EFFLUENT QUALITY

An initial assessment of the risk of causing effluent limit exceedances was made using monitoring data from The San Francisco Estuary Institute (Hunt et al., 2012) based upon a list of constituents provided by WCWD. Monitoring data were reviewed and compiled to assess maximum concentrations observed in stormwater and dry weather urban runoff. This maximum was used, assuming a sixty day, 250 gpm diversion into a 12.5 million gallon per day facility to estimate the maximum pollutant concentration change, initially assuming no removal by the WCWD treatment process (Equation 1). This was compared to effluent limits and known concentrations in effluent to estimate the removal efficiency needed to maintain effluent concentrations below effluent limits.

Equation 1:
Maximum pollutant concentration increase of effluent ($\Delta C_{effluent}$ from maximum pollutant concentration in effluent (C_{max}).

$$\Delta C_{effluent} = C_{\max}\left(\frac{\mu g}{L}\right) \times \frac{250 gal}{\min} \times \frac{60 \times 24 \min}{day} \times \frac{1 day}{12{,}500{,}000 gal}$$

Table 4-1 below presents potential constituent concentrations expected to be added to the WCWD effluent as a result of the runoff diversion. The overall impact on pollutant concentration in effluent was negligible for most pollutants, even with conservative assumptions that the maximum concentration reported by SFEI (Hunt et al., 2012) would be present and treatment would provide no pollutant removal. The single exception appears to be dioxin toxic equivalents (TEQ). For dioxin TEQ, if the highest concentration observed by Hunt et al were present in diverted water, 99 percent removal would be necessary to prevent the maximum concentration in stormwater from potentially causing an effluent limit exceedance.

Quantifiable data for effective dioxin removal are not presently available, either from WCWD or other POTWs. However, indirect inferences may be drawn, based on the reasonable assumption that dioxin and dioxin-like compounds are mostly associated with particles, rather than present in dissolved forms. Particle-associated pollutants like lead, mercury and silver are all removed at higher than a 90 percent efficiency rate. Therefore, it may be possible that dioxin TEQ would also show better than 90 percent removal; however, the dioxin TEQ appears to be the pollutant with the greatest risk for exceedance of effluent limits as a result of the diversion.

Practically, this may not pose a significant compliance risk, as monitoring for dioxin TEQ is only required twice per year, once in the wet season and once during the dry season. More importantly, the highest concentration of dioxin TEQ observed by Hunt et al (2012) was present during storm flows. A cautious diversion for storm event lasting less than eight hours duration would minimize the risk of causing an exceedance of a dioxin TEQ effluent limit.

Based on these considerations, no further monitoring is recommended for potential impacts to effluent quality.

Table 4-1.
Projected Diversion Impacts on Pollutant Concentrations in WCWD Effluent

Constituent	Unit	WCWD Influent Local Limits Daily Maximum	WCA Effluent Limit Monthly Average*	WCA Effluent Limit Daily Maximum*	Maximum Concentration Reported in Runoff**	Maximum Concentration Expected to be Added (Bold indicates potential exceedance)	Maximum 2012 WCWD Effluent***
Dioxin-TEQ****	pg/L	NA	0.014	0.028	4.26	**1.67**	Unknown
Mercury	ng/L	20000	66	72	200	5.760	10.9
Selenium	µg/L	1000	3.8	8.9	9.00	0.259	0.7
Total Ammonia	mg/L	NA	32	59	1.70	0.049	5
Phenolic compounds	mg/L	8	NA	NA	ND	Unknown	ND
Methylene Chloride	mg/L	0.18	NA	NA	ND	Unknown	ND
4,4'-DDD	ng/L	NA	0.84	1.7	0.35	0.01	ND
Heptachlor	ng/L	NA	2.0	4.1	ND	Unknown	ND
Sum of PCBs	ng/L	NA	12	17	82.4	2.373	2.27
Cyanide	µg/L	400	7.8	15	4.60	0.132	5.9
Copper	µg/L	3000	71	100	20	0.576	23
Nickel	µg/L	800	34	59	7.00	0.202	5.1
Bis(2-ethylhexyl)phthalate	µg/L	NA	55	150	1.50	0.043	2.9
Arsenic	µg/L	370	NA	NA	2.40	0.069	5.8
Cadmium	µg/L	500	NA	NA	0.50	0.014	0.07
Chromium	µg/L	2000	NA	NA	4.00	0.115	0.6
Lead	µg/L	2000	NA	NA	8.00	0.230	0.75
Silver	µg/L	300	NA	NA	0.04	0.001	0.16

Preliminary Data, Subject to Revision.

Table 4-1.
Projected Diversion Impacts on Pollutant Concentrations in WCWD Effluent (Cont.)

Constituent	Unit	WCWD Influent Local Limits Daily Maximum	WCA Effluent Limit Monthly Average*	WCA Effluent Limit Daily Maximum*	Maximum Concentration Reported in Runoff**	Maximum Concentration Expected to be Added (Bold indicates potential exceedance)	Maximum 2012 WCWD Effluent**
Zinc	µg/L	5000	NA	NA	118.00	3.398	68
Chloroform	µg/L	3340	NA	NA	ND	Unknown	80
Tetrachloroethylene	µg/L	14260	NA	NA	9.00	0.259	ND
Benzene/Toluene/E/X	mg/L	NA	NA	NA	NM	NA	0.6
MTBE	mg/L	NA	NA	NA	NM	NA	ND

Notes:
* Effluent limits from The West County Agency NPDES Permit, Order No. R2-2013-xxxx reissued by the SFRWQCB on May 8. 2013, and the NPDES Watershed Permit for Mercury and PCBs, Order No. R2-2012-0096, reissued by the SFRWQCB on December 12, 2012.
** Concentration in runoff data as reported by Hunt et al. (2012)
*** 2012 WCWD Effluent data as provided by Steve Linsley, Personal Communication on behalf of WCWD. Original data sources have not been verified. Data are considered provisional and subject to change.
***EPA, 2010
ND - Not detected
NA - Not applicable
NM - Not Measured

Preliminary Data, Subject to Revision.

6.0 NO EVIDENCE FOR IMPACT ON BIO-SOLIDS QUALITY

The potential impact on bio-solids quality can be calculated from load considerations, and then applied to a theoretical mass of bio-solids that may be impacted. SFEI calculated mercury and PCB loads for dry and wet season pump-outs of the NRSPS over the monitoring period September 2010 through January 2012, as presented in Table 5-1 (Hunt et al., 2012).

Table 5-1.
Mercury and PCB Loads Conveyed by the NRSPS Between September 2010 and January 2012

Season	Mercury loads (grams[g])	PCB loads (g)
Wet	37	11
First Flush (4% of Wet)	1.5	0.44
Dry	35	0.80
Dry + First Flush	36.5	1.24

Making the simplifying (and conservative) assumption that all dry season flows are diverted to WCWD, this corresponds to 35 g of mercury and 0.80 g of PCBs conveyed during dry season. SFEI estimated that about 4% of the wet season load for mercury and PCBs was conveyed by first flush (Hunt et al., 2012). If all of the 4% of first flush loads are diverted, 1.5 g of mercury and 0.44 g of PCBs would be diverted during wet season. If all dry season loads were diverted, 35 g of mercury and 0.80 g of PCBs would be diverted during dry season. If all dry season and first flush flows are diverted to WCWD[2], and assuming 100% removal to bio-solids, the annual mass transfer to bio-solids would be 36.5 g mercury and 1.24 g PCBs.

For context, the PCBs TMDL for San Francisco Bay (California Regional Water Quality Control Board, San Francisco Region (SFBRWQCB) Resolution No. R2-2008-0012) sets the expectation that, over time, all Bay Area stormwater programs would reduce PCB loads from Municipal Separate Storm Sewer System (MS4) discharges by 18,000 g per year. The amount of PCB loads that may be potentially reduced by diversion of dry season flows and first flush at the NRSPS, 1.24 g per year, is a tiny fraction (about 0.006 percent) of the long term expectations set by the TMDL. This finding is consistent with the previous findings of the Bay Area Stormwater Management Agencies Association (BASMAA) Regional Feasibility Evaluation Report, submitted in compliance with Provisions C.11.f and C.12.f of the MRP (BASMAA 2010).

[2] The Project proposes only to evaluate diversion of dry season flow and a first flush event captured during a monitoring period lasting for no more than 10 days during wet season; the assumption diverting all dry season flows and all first flush events is made conservatively, to evaluate impacts were the Project to indicate potential for more long term diversion.

The potential increase in those contaminant concentrations in bio-solids is estimated by dividing the annual mass transferred to bio-solids by the annual bio-solids production. Biosolids production best estimates are based on WCWD's ADWF. Data from a recent summary of Bay Area bio-solids management developed by the Bay Area Clean Water Agencies (BACWA) suggests that for every 1 MGD ADWF, the median (over all Bay Area counties) bio-solids production rate is 255 dry tons per year (dtpy); the minimum bio-solids production rate (per MGD ADWF) is 192 dtpy and the maximum is 413 dtpy. WCWDs ADWF is 12.5 MGD according to its most recent adopted NPDES permit. This would correspond to a potential range of 2,400 to 5,200 dtpy bio-solids production, with a best estimate of 3,200 dtpy based on a median Bay Area production rate of 255 dtpy per MGD ADWF. Equation 2 below shows the calculation of change in pollutant concentration of bio-solids based on the pollutant mass diverted and the annual bio-solids production.

Equation 2:

Calculation of change in pollutant concentration of bio-solids (ΔC) from annual pollutant load diverted (M) and annual bio-solids production (B).

$$\Delta C\left(\frac{\mu g}{kg}\right)=\frac{M\left(\frac{\cancel{g}}{\cancel{yr}}\times\frac{1{,}000{,}000\ \mu g}{\cancel{g}}\right)}{B\ \left(\frac{\cancel{tons}}{\cancel{yr}}\times\frac{2000\ \cancel{lbs}}{\cancel{ton}}\times\frac{kg}{2.2\ \cancel{lbs}}\right)}$$

Table 5-2 below summarizes the theoretical changes in PCB concentrations resulting from diversions. The best estimate for a change in mercury concentrations in bio-solids is 12.55 µg/kg; the best estimate for a change in PCB concentrations is 0.43 µg/kg. The actual concentration of PCBs in WCWD bio-solids for comparison is unknown. For context, United States Environmental Protection Agency (USEPA) Section 503 Regulations for the Land Application of Bio-solids limit mercury concentrations in bio-solids to 57,000 µg/kg, and PCB concentrations to 50,000 µg/kg. Contemporary bio-solids in developed nations rarely have PCB concentrations exceeding 1,000 µg/kg (Clarke et al., 2010). The theoretical increase of mercury and PCB concentrations in bio-solids appears to be negligible in terms of potential constraints on bio-solids reuse and disposal options for WCWD.

Table 5-2.
Estimated Change of Mercury and PCB Concentrations in Bio-solids as a Result of Diversions

Pollutant	Assumed Annual Loading to Bio-solids (g/year)	Assumed Annual Bio-solids Production (dtpy)		
		Minimum	Maximum	Best Estimate
		2,400	5,200	3,200
Mercury	36.5	16.73 µg/kg	7.72 µg/kg	12.55 µg/kg
PCBs	1.24	0.57 µg/kg	0.26 µg/kg	0.43 µg/kg

An alternate approach to evaluating impact on bio-solids is to consider maximum pollutant concentration in effluent, applied to a diversion[3] duration period to generate a pollutant mass. The pollutant mass is divided by the mass of bio-solids expected to be produced over the same duration period. A sixty day duration period is used for the calculated estimate below to be conservative – the actual duration planned for the pilot is two weeks maximum.

The calculation for this approach is presented in Equation 3 below. Consistent with the results of the approach above, bio-solids appear to have negligible potential changes in concentrations of all measured pollutants with respect to bio-solids limits or known concentrations in WCWD bio-solids, as presented in Table 5-3 below.

Equation 3:
Calculation of change in pollutant concentration of bio-solids (ΔC) based on an assumed maximum pollutant concentration in diverted water (C_{max})

$$\Delta C = C_{\max}\left(\frac{\mu g}{L}\right)\times\frac{250gal}{\min}\times\frac{60\times 24\min}{day}\times\frac{60day}{1}\times\frac{3.785L}{gal}\times\frac{1mg}{1000\mu g}\times\frac{yr}{2400tons\_biolsolids}\times\frac{365days}{yr}\times\frac{1}{60days}\times\frac{1ton}{2{,}000lbs\_biosolids}\times\frac{1lb}{0.4536kg\_biosolids}$$

The results presented in Table 5-3 are conservative estimates for this diversion pilot, as they represent the potential impact on biosolids quality from a sixty day diversion. The planned diversion pilot is for a duration of four days. Based on these considerations, no additional monitoring is recommended to characterize potential impacts on biosolids quality.

[3] Note that equation 3 applies regardless of the discharge duration – 60 days appears in both the numerator and denominator. Conceptually, the longer the duration, the greater the mass of diverted pollutants (numerator), but also the greater the mass of the affected biosolids (denominator),

Table 5-3.
Estimated Change of All Measured Pollutant Concentrations in Bio-solids as a Result of Diversions

Constituent	Water Unit	Max Concentration reported in runoff	Pump Stn. Sediments (mg/kg)	Bio-solids Limits (mg/kg)	Maximum 2012 WCWD Bio-solids (mg/kg)	Maximum Added to Bio-solids (mg/kg)
Dioxin-TEQ	pg/L	4.26	NM	0.01	--	0.0000010
Mercury	ng/L	200	0.18	20.00	1.1	0.046
Selenium	µg/L	9.00	ND	100.00	3	2.056
Total Ammonia	mg/L	1.70	NM	NA	--	Unknown
Phenolic compounds	mg/L	ND	ND	NA	ND	Unknown
Methylene Chloride	mg/L	ND	ND	NA	ND	Unknown
4,4'-DDD	ng/L	0.35	NM	1.00	--	0.000
Heptachlor	ng/L	0.00	NM	4.70	--	0.000
Sum of PCBs	ng/L	82.40	NM	1.00	--	0.019
Cyanide	µg/L	4.60	ND	NA	3.1	1.051
Copper	µg/L	20	46	2500.00	112	4.569
Nickel	µg/L	7.00	33	2000.00	56	1.599
Bis(2-ethylhexyl)phthalate	µg/L	1.50	ND	NA	ND	0.343
Arsenic	µg/L	2.40	8.4	500.00	12	0.548
Cadmium	µg/L	0.50	1.4	100.00	1.1	0.114
Chromium	µg/L	4.00	30	2500.00	46	0.914
Lead	µg/L	8.00	65 (3.6 mg/L WET)	1000.00	43	1.827
Silver	µg/L	0.04	ND	500.00	3.2	0.009
Zinc	µg/L	118.00	260	5000.00	261	26.954
Chloroform	µg/L	ND	ND	6 mg/L TCLP	ND	Unknown

Table 5-3.
Estimated Change of All Measured Pollutant Concentrations in Bio-solids as a Result of Diversions (Cont.)

Constituent	Water Unit	Max Concentration reported in runoff	Pump Stn. Sediments (mg/kg)	Bio-solids Limits (mg/kg)	Max. 2012 WCWD Bio-solids (mg/kg)	Max Added to Bio-solids (mg/kg)
Tetrachloroethylene	µg/L	9.00	ND	0.7 mg/L TCLP	ND	Unknown
Benzene/Toluene/E/X	ppm	0.00	0.4	0.5 mg/L TCLP	ND	Unknown
MTBE	ppm	0.00	ND	NA	ND	Unknown
Total Petroleum (EPA8021)		NM	7	NA		Unknown
Total Petroleum (SM5520)		NM	1300	NA		Unknown
Total Extractable (EPA8015)		NM	520	NA	7450	Unknown
Pyrethroid pesticides	ppm	NM	ND	NA		Unknown
DDT/DDD/DDE	µg/L	3.5	NA	1.00		0.799
Other OC pesticides	µg/L	0.36	NA	1.4-100		0.082
Trichloroethylene	µg/L	18	NA	0.5 mg/L TCLP	ND	4.112
Other volatile organics	µg/L	ND	ND	0.2-200 mg/L	ND	Unknown
Butyl benzyl phthalate	µg/L	0.95	NA	NA	ND	0.217
Di-n-butyl phthalate	µg/L	1.2	NA	NA	ND	0.274
Pentachlorophenol	µg/L	0.77	NA	17	ND	0.176
Carcinogenic PAHs	µg/L	0.10	NA	NA	ND	0.023
Other semi-volatile organics	µg/L	ND	NA	0.13-400 mg/L	ND	Unknown
Antimony	µg/L	NM	0.97	500	ND	Unknown
Barium	ppm	NM	59	10000	175	Unknown
Beryllium	µg/L	ND	ND	75	ND	Unknown
Cobalt	ppm	NM	6.8	8000	10	Unknown

Constituent	Water Unit	Max Concentration reported in runoff	Pump Stn. Sediments (mg/kg)	Bio-solids Limits (mg/kg)	Max. 2012 WCWD Bio-solids (mg/kg)	Max Added to Bio-solids (mg/kg)
Molybdenum	µg/L	2.2	9.3	3500	3.5	0.809
Thallium	µg/L	ND	ND	700	ND	Unknown
Vanadium	ppm	NM	27	2400	36	Unknown

Notes:
ND - Not detected
NA - Not applicable
NM - Not Measured

Preliminary Data, Subject to Revision

7.0 GUARDING AGAINST MAJOR SPILLS TO THE MS4

The concern over spills and illicit discharges to the MS4 is that contaminants may be introduced that cause a sewage treatment system upset. Large scale spills could result from tanker truck or rail tanker accidents in the pump station catchment. Both modes of transport are significant activities within the watershed. There is a major north-south rail corridor and a sizable parkway that both connect to industrial areas of Richmond where significant refining, manufacturing, and shipping industries operate. Smaller illicit discharges can also occur, including but not limited to: overturned portable toilets, improper disposal of solvents, and radiator flushing.

The precaution against major spills is to coordinate with local emergency response services ahead of time, so that a point of contact for the diversion project can be notified in the unlikely event of a major spill. The point of contact would be County staff or contractors assigned to be onsite at the NRSPS during the diversion.

The precaution against smaller illicit discharges is to implement the cautious approach outlined earlier in this report. By operating in batch mode and sampling the stored water to test for toxicity to activated sludge microorganisms, WCWD will have some comfort prior to initiating each batch discharge that potential toxicity to activated sludge bacteria has been addressed.

Another precaution, if its deemed necessary, would be to include continuous monitoring of temperature, pH, turbidity, dissolved oxygen (DO) and conductivity along with the continuous flow monitoring. Set points would be established (e.g., pH 6 to 9) that would alert onsite staff if pH, conductivity, or turbidity were measured outside of the pre-established set points. This would provide additional precaution against spills and illicit discharges that occur after testing of the batch discharge has been completed.

8.0 MONITORING APPROACH AND COST ESTIMATE

In summary, the most significant risks to be addressed through monitoring are sewage system overflows within the WCWD conveyance system and upsets to the WCWD activated sludge treatment process. The overflow risk would be mitigated by a float switch providing for automated shutoff if conveyance pipe capacity is nearly full. The risk of upsets would be addressed through a program of baseline monitoring to characterize toxicity to activated sludge, along with increased monitoring and surveillance of activated sludge health during the diversion. The risks of exceeding effluent limits or altering biosolids quality such that reuse options are limited appear to be minimal. Therefore, additional monitoring for effluent and biosolids risks is not warranted.

One of the most important tools to mitigate risks would be staffing and vigilance during the diversion. The planned approach is to have two personnel onsite at the NRSPS at all times when water is being diverted to the WCWD collection system. This will enable rapid response if there is evidence for a risk of spill or upset. In addition to ensuring that the float switch shutoff and continuous monitoring systems for pH, turbidity, and conductivity are functioning, onsite staff would be responsible for collecting samples to be screened for activated sludge toxicity using SOUR evaluations.

The mercury, PCB, and suspended sediment concentrations of storm water and dry weather flows at the NRSPS have been characterized through a baseline study (Hunt et al., 2012). Follow-up monitoring has continued since that baseline study was completed, fulfilling tributary loads monitoring requirements established by Provision c.8.e of the MRP. The PCB to suspended sediments ratio in stormwater at the NRSPS has been estimated to be 325 µg/kg; the mercury / suspended sediments ratio has been estimated to be 1.4 mg/kg (Hunt et al., 2012). This baseline characterization will be relied upon to estimate mercury and PCB loads diverted based on turbidity, with some calibration of suspended sediment concentration (SSC) and limited confirmatory grab samples for mercury and PCBs.

The cost estimate summarized in Table 7-1 below relies on the approach described above, including the following assumptions:

- A baseline characterization of dry weather flows for toxicity to activated sludge will take place in the 2013 – 2014 water year.

- The baseline toxicity characterization will require assistance by WCWD laboratory staff at a level of effort not to exceed 80 person hours for SOUR methods development and baseline testing.

- During the development of SOUR testing methods, WCWD laboratory staff and supervisors would specify additional metrics for activated sludge health (i.e., settling times, microscopic assays) that would be assessed during the diversion.

- WCWD laboratory staff time would be billed at $100 per hour.

- County contractors will collect water samples for baseline toxicity characterization. The level of effort would involve two field staff and no more than five working days of sample collection effort.

- Float switch installation is assumed to be part of the construction cost and is therefore not included in this cost estimate.

- The diversion duration will be no more than ten working days for dry weather flows and two days for first-flush flows.

- WCWD laboratory staff effort during the diversion to assess activated sludge health would total no more than 40 person hours for the diversion pilot.

- Two County monitoring contractors will be present onsite at the NRSPS at all times when the diversion is operating; this corresponds to a total of twelve working days field effort, plus five working days for preparation, demobilization, data management and reporting.

- County monitoring contractors will provide a summary data report with no interpretation. Data to be reported include diversion run times and volumes diverted, continuous turbidity, pH, and conductivity data, and results from the WCWD assessments of activated sludge health.

- Costs of coordination by County staff and facilitation by CCCWP staff and consultants are also not included in the estimate below.

Table 8-1.
Monitoring Cost Estimate

	Total	**Baseline assessment of toxicity to activated sludge**	**Continuous monitoring during diversion**	**Assumptions**
WCWD Staff	$16,000	$8,000	$8,000	80 WCWD hours @ $100 / hr during baseline testing for laboratory support. $2,000 supplies and materials for initial SOUR methods development. 40 WCWD hours @ $100/hr for laboratory support and 40 WCWD hours @100/hr for field support during diversion.
County Monitoring Contractors	$40,000	$10,000	$30,000	Field crew of two costs $2,000 per day, including travel and ODCs; 5 working days for baseline, 10 working days for diversion, including mobilization, demobilization, and data management
Equipment	$10,500	500	$10,000	Cost of probes and data logger, plus programming and testing; provides acquisition of some basic lab equipment for SOUR test
Totals	$66,500	$18,500	$48,000	

9.0 TEMPORARY DIVERSION OPTION FOR PUMP STATION MAINTENANCE

This section evaluates temporary diversion options in conjunction with maintenance. It is included in this memorandum as a guide to diversion approaches and alternatives that could be considered if there are maintenance activities that need to be completed before the pump station rehabilitation is completed.

From time to time, it is necessary to remove accumulated solids from the wet well of the NSPS. This operation was last performed in 2010. Since 2010, low dissolved oxygen (DO) conditions have become gradually more persistent during summer months, indicating that solids accumulation in the wet well and conveyance system may be causing stagnant waters.

This memorandum explores a scenario in which dry weather flows are diverted to a sanitary sewer and / or onsite treatment in conjunction with regular maintenance. One of the first steps in maintenance is to dewater the NRSPS wet well and the upstream conveyances. Currently, with no low flow pumps functional, the only way to dewater the NRSPS and upstream conveyances is using the storm pumps. The analysis below compares the pros and cons of using the storm pumps vs. using small, temporary low-flow pumps, as well as options for managing the resulting dewatering discharges.

Several options for emptying the collection system and wet wells are considered. Minimizing negative effluent impacts on the Bay is a particular concern given potentially low dissolved oxygen concentrations in the system. Five options are considered (Fig. 1).

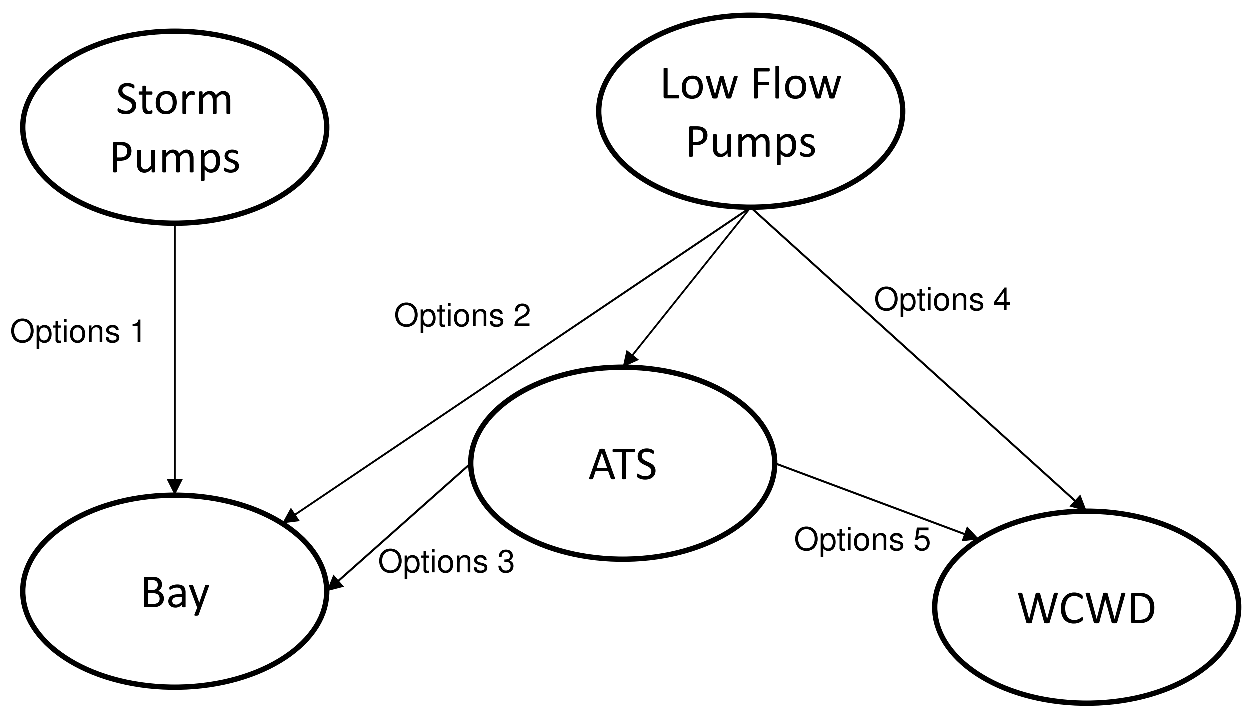

Figure 1: Five options for dewatering the NRSPS collection system

Option 1: Use existing large pumps and discharge directly into the Bay.

The pumps in the station can be run to the low alarm level (el. -10.42 ft), at which point the collection system will be empty, with water remaining at a depth of 5.55 ft in the wet well. Depending on how full the collection system is, the dewatering can be completed in approximately 1 hour.

Pro: This is a low cost option, using infrastructure that is already in place. Direct discharge into the Bay is already happening now at a much smaller volume, since the pump is currently set to run for about five minutes approximately every 36 hours in the dry season.

Con: A large volume of potentially poor quality water released in a short pulse may cause serious harm to the Bay.

Option 2: Use temporary low–flow pumps and discharge directly into the Bay.

Temporary low flow pumps can be placed at the entrance to the well (EL. -10.45) where it is more easily accessible. Additionally, since water is generally in motion at that location, in contrast to the bottom of the well (EL. -16.00), there are less solids to hamper pump operations. Assuming a net dry weather flow of 150 gpm and with a combined pump capacity of 500 gpm, the collection system can be emptied in approximately 22 hours.

Pro: This option allows the effluent to flow into the Bay at a slower rate, thereby prolonging the discharge pulse and give the Bay more time to equilibrate. The pumps can be connected to an existing 2-inch line that discharges directly into the pump station cistern (Fig. 2).

Con: The volume of the effluent into the Bay remains large and the quality retains its state. Additional cost has to be allocated for the pumps.

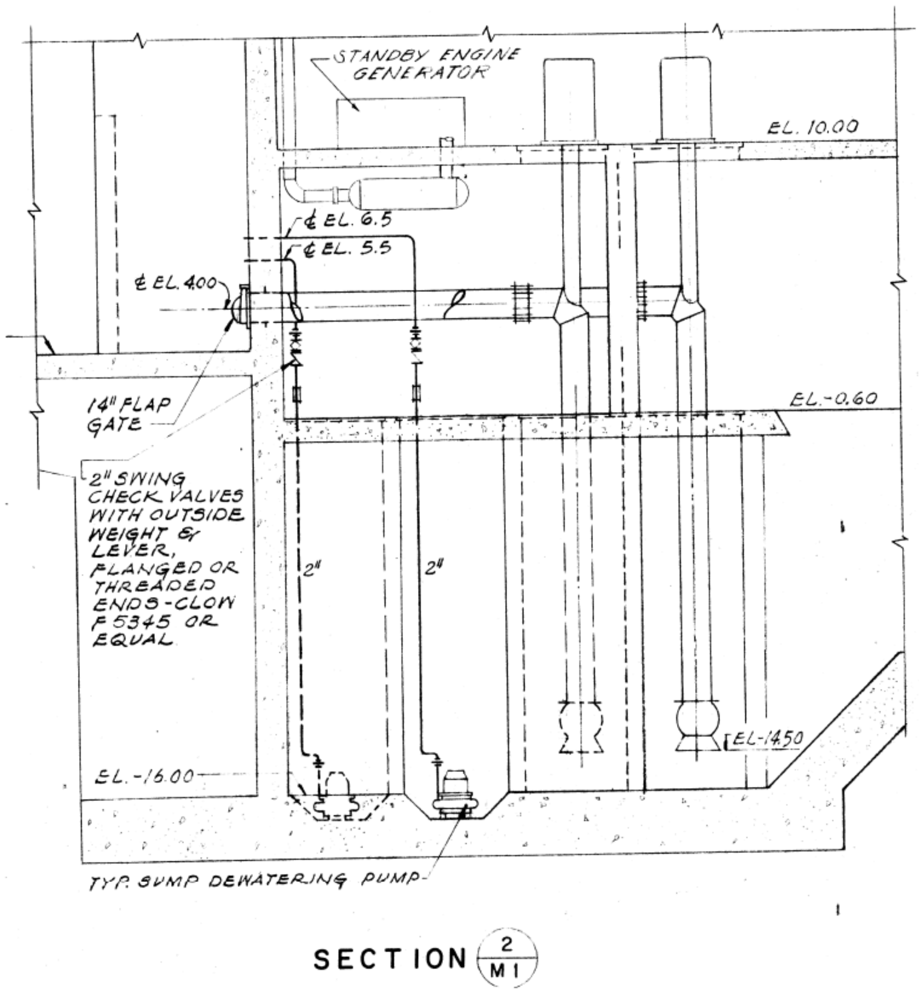

Figure 2: Cross section of pump station from pump station plans.
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Option 3: Use temporary low-flow pumps and contract an active treatment system (ATS) vendor.

Water from the station can be pumped into an onsite storage tank and treated with an ATS using a coagulant and sand filter. The treated water would be aerated then discharge into the Bay.

Pro: The effluent is treated.

Con: The RWQCB may impose stringent monitoring requirements and effluent limits for ATS. There is a lengthy process to develop an ATS plan for RWQCB approval in construction projects, which may be applicable here. Additional cost has to be allocated for the pumps and ATS.

Option 4: Use temporary low-flow pumps to divert flow to WCWD.

The temporary low-flow pumps can be connected to a pipe that discharges into a nearby manhole.

Pro: Discharge to the Bay is avoided and the effluent will be treated by WCWD.

Con: WCWD may be concerned about potential impacts. Those concerns are addressed in Scetions 1 – 8 above. If station maintenance is scheduled during the dry season, WCWD would likely have adequate capacity to accommodate the diverted water, although effluent quality may still be of concern given the large volume.

Option 5: Use temporary low-flow pumps and contract an active treatment system (ATS) vendor prior to diverting to WCWD.
As a precautionary approach, the water can be treated prior to discharge.
Pro: Discharge into the Bay is avoided, and the effluent is pre-treated to minimize risk to WCWD.
Cost: This is the most complex option, with potentially the highest cost.

Once the collection system has been emptied, upstream conveyances (Fig. 3) can be inspected using CCTV. If debris is present during inspection, the entire drainage can be flushed out, with the temporary diversion in place, thus avoiding debris discharging into the Bay. The wet wells can then be dewatered and cleaned out, which would entail draining the well down to EL. -16.00 with a dewatering sump.

Potential ATS vendors:

- Rain for Rent (http://www.rainforrent.com/)
  5301 Live Oak Avenue, Oakley, CA 94561
  925-679-2803

- Clear Creek Systens (http://www.clearcreeksystems.com/)
  Scott Holbein
  sholbein@clearcreeksystems.com
  530-554-8848

- NRC Environmental Services (http://nrcc.com/Pages/default.aspx)
  1605 Ferry Point, Alameda, CA 94501
  510-749-1390

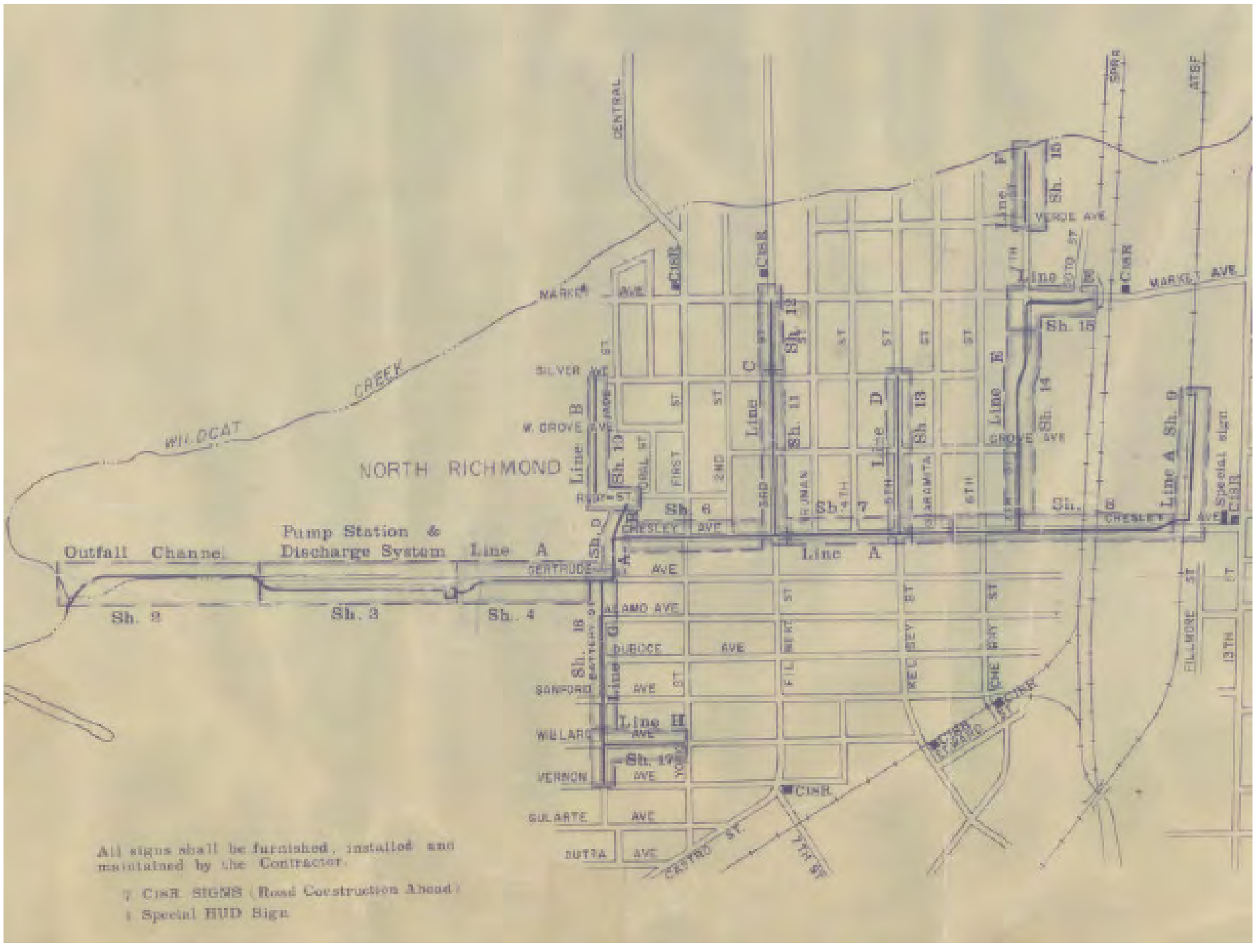

Figure 3: Storm Drain System of North Richmond Storm Drain Project (1972).

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ATTACHMENT 1

CCCSD SOP FOR SOUR TESTING OF TRUCKED IN WASTE

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Other Implementation Activities

This appendix fulfills MRP reporting requirements associated with POC fate and transport studies (C.11.h/C.12.h), risk reduction program implementation (C.11.i/C.12.i), and the allocation sharing scheme with Caltrans (C.11.j). The text in this section was provided by the Alameda Countywide Clean Water Program.

C.4.1 POC Fate and Transport Studies

MRP provisions C.11.j and C.12.j require Permittees to “conduct or cause to be conducted studies aimed at better understanding the fate, transport, and biological uptake of mercury and PCBs discharged in urban runoff to San Francisco Bay and tidal areas.” Working through BASMAA, the Permittees used previous annual reports to describe the specific manner for meeting these information needs through their participation in the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP) and provide updates on the status of these studies.

The RMP Multi-Year Plan[1]describes activities in the two main program elements, Status and Trends Monitoring and /Special Studies. Special Studies are developed through the RMP’s structure of Work Groups and pollutant-specific Strategies which have coordinated information needs for mercury, PCBs and other Pollutants of Concern. As described in IMR Part A, staff from ACCWP and other BASMAA programs actively represented all MRP Permittees on the RMP Steering Committee, Technical Review Committee and several Work Groups and Strategy Teams to oversee the implementation of studies, review results and comment on draft reports.

Major findings from RMP mercury studies were reported in Davis et al. (2012) which synthesized results from recent RMP studies on food web uptake and methods to identify high leverage pathways that introduce mercury to Bay food webs. A more extended Mercury Synthesis report for RMP stakeholders will incorporate additional data from a study of mercury food web uptake in small fish (e.g. Grenier et al., 2013), and more detailed recommendations on filling information needs for San Francisco Bay in the following areas:

- Data on mercury content for additional popular sport fish species;
- Improved spatial understanding of biotic exposure to mercury uptake, particularly in tidal marshes, managed ponds, reservoirs, and streams;

[1] The January 2014 update to the RMP Multi-Year Plan is available at http://www.sfei.org/sites/default/files/Item8_RMP%20Multi-Year%20Plan%2001-23-14%20clean.pdf

- Information to promote understanding of the potential benefits of management actions at local and regional scales;
- Evaluation of the effectiveness of management actions at local and regional scales; and
- The overall potential for reduction of net methylmercury production at a regional scale.

The RMP's PCB Strategy activities during the MRP permit term included:

- Monitoring of mercury, PCBs and other pollutants in biota, both ongoing (Status & Trends) and in a special 3-year study of Small Fish living along the Bay margins that are an important link in the Bay food web (Greenfield and Allen, 2012).
- Preparation of a draft report outlining a conceptual model of transport and food web uptake for mercury and PCBs in Bay Margin areas, to help inform future data collection in these areas (Jones et al. 2012). The RMP originally intended to incorporate these recommendations plans for more detailed fate and transport modeling of the Bay and its margin areas; however in 2013 the RMP Steering Committee approved shifting the Multi-Year Plan forecasting/modeling priorities toward other modeling objectives and away from a focus on PCBs and other sediment-associated bioaccumulative pollutants.
- A review of current knowledge and information needs to support modeling of food web bioaccumulation for multiple Pollutants of Concern (Melwani et al. 2012).

A draft PCB Synthesis document was reviewed by RMP stakeholders in 2013 (Davis et al. 2013). It incorporates significant new information generated by the RMP and others since the preparation of the 200x PCB TMDL Staff Report, including Bay sediment data using more accurate analytical methods (high resolution mass spectrometry) and the randomized sampling design; additional trend data from sport fish, bivalves, and bird eggs; data on the magnitude and spatial distribution of PCBs in small fish that are important for understanding food web pathways; and information on the entire suite of 209 congeners for sediment, water and biota. draft recommendations regarding priorities for future information needs have not been integrated among different sections of the synthesis or finalized to incorporate review comments but may include:

- Continuing RMP monitoring of sport fish and small fish, with consideration of additional sampling locations or time series to support multiple objectives.
- Assessment of sediment trends data and the potential value of continuing to track dry season trends.
- Assessment of PCBs in the Bay margins using indicator species and sediment.
- Identification of high-leverage watersheds or groups of watersheds contributing high PCBs in marginal areas

- Identification of source areas for cleanup, with more emphasis on source control,
- The importance of determining the role of loading from in-Bay contaminated sites in segment-scale recovery of the Bay.

BASMAA representatives will continue participation in RMP Work Groups, Strategy Teams and Committees to promote future implementation of studies to address priority information needs for mercury and PCBs outlined in the recent synthesis documents.

C.4.2 Regional Risk Reduction Activities

Provisions C.11i and C.12.i require that Permittees "develop and implement or participate in effective programs to reduce mercury-related risks to humans and quantify the resulting risk reductions from these activities." Working through BASMAA, ACCWP Permittees addressed this requirement through participation in the San Francisco Bay Fish Project (SFBFP) coordinated by the California Department of Public Health (CDPH) to raise public awareness of fish contamination issues in San Francisco Bay and to encourage fish-consuming populations to reduce their exposure to pollutants in contaminated fish. Representatives from BASMAA and the Alameda County Environmental Health Department joined representatives of wastewater dischargers and regulatory agencies in the SFBFP Stakeholder Advisory Group (SAG) to implement four main tasks:

- Conduct needs assessments;
- Create and convene the SAG to solicit feedback on project activities;
- Conduct risk communication and exposure reduction activities; and
- Program evaluation and coordination.

BASMAA's Clean Watersheds for a Clean Bay project also contributed funding for these tasks, which were contracted to CDPH via the Aquatic Science Center. CDPH's final project report[2] for the SFBFP described successful outcomes for all tasks including:

- Development of educational materials including a "Safe Eating Guidelines" advisory brochure for use by anglers and in community workshops and clinics[3]. The brochures were translated from English into 10 additional languages and

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[2]http://www.sfei.org/sites/default/files/users/antonytran/SFB%20Fish%20Project%20Final%20Report-CDPH%2010-29-12.pdf

[3] Brochures and other materials are available as pdf files along with order forms for print versions at http://www.sfei.org/content/educational-materials

printed copies were made available to funded groups. Advisory information was provided as a kiosk flyer and also adapted into a coloring book for children.

- Development of a new “Fish Smart” warning sign and posting of signs at fishing sites around the Bay. In addition to the OEHHA phone number, signs contain a “QR code” which, when scanned by a smart phone, links to a CDPH website where the Safe Eating brochures are available in all languages[4]. As of December 2012 CDPH reported signs had been posted at a total of 60 sites around the Bay, including 13 in Alameda County, which was roughly about 40% of all sites identified. In July and August 2012 CDPH interviewed 37 anglers at 10 fishing sites where signs had been posted for at least one week. CDPH found that, in general, most anglers noticed the signs and understood the main messages. However, only one in three anglers reported that the signs were likely to influence their future decisions.

- Implementation of a grant program in which four community groups were awarded a total of $100,000 to conduct risk reduction activities in vulnerable communities. CDPH provided support and worked with each of the groups to conduct evaluations of their projects in two areas: a) process evaluation documenting implementation of the core activities; and b) outcome evaluation to measure changes in awareness, knowledge or intent to change behavior among participants in the funded projects. All groups successfully implemented their projects and met or exceeded their goals for the numbers of participants, totaling over 8,000 of which 5,726 were consumers of Bay fish and 4,741 were considered to be at risk. The participants also identified over 17,000 other members of their households who ate Bay fish; the actual number of potential indirect contacts is likely to be larger because some of the funded groups did not obtain this information from all of their participants.

- Evaluation: the outcome evaluation results for the funded groups demonstrated positive changes in terms of increases in knowledge and access to information after participation in the funded group activities. However despite providing standard evaluation tools CDPH could not aggregate outcome evaluation data across the funded groups because all made some modifications to the tools or the way they collected, aggregated, and presented their outcome evaluation data. Participants generally demonstrated a willingness to share the information with others and an intention to change behavior in ways that reduce exposure to chemicals from Bay fish. The groups planned to continue incorporating the educational materials in future work with their target communities.

[4] www.sfbayfish.org

CDPH staff identified several challenges to completing the effective posting of fishing sites and Alameda County Environmental Health has continued working with them to post signs and track posting activities. The final project report lists other recommended improvements to the SFBFP components if continued.

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