

## Inner Harbor Precise Plan Draft Technical Memorandum

11.11.13, Rev. 02.10.14

The City of Redwood City's Vision, as outlined in the 2010 General Plan, is to balance new opportunities and development with conservation and environmental sustainability. The Plan includes growth projections for housing, population, and employment.

This document's interest is focused on an area known as The Inner Harbor. The Inner Harbor Area lies within the Inner Bayfront Area of Redwood City. The area is bounded by Redwood Creek on the west, the Bayshore Freeway (Highway 101) on the south, Graniterock Peninsula Road Materials to the east and Seaport Centre, a high tech business park, to the north. Steinberger Creek bisects a portion of the area separating the main land mass from an undeveloped area known as the Ferrari Property. Elevations range from sea level to elevation 10. The current General Plan designation for the area is a mix of Light Industrial, Public Facility, Mixed Use-Waterfront, and Open Space.

Adequate infrastructure is a key ingredient in facilitating a higher quality of life to both residents and business alike. The following narrative identifies the existing base infrastructure and assesses its potential to service the Inner Harbor Area as it grows. It also identifies opportunities for improvement. Specific systems include:

- Domestic Potable Water
- Recycled Water
- Storm Water and Storm Water Quality Management
- Sanitary Sewer
- Power and Gas

Two infrastructure-related construction projects have recently begun construction within the Inner Harbor area:

1. The San Mateo County Replacement Jail project (which includes the parcels surrounding Chemical Way), and
2. The reconstruction of an existing 48" sewer force main (part of the South Bay System Authority's 10-year capital improvement project).

Any new extensions or re-use of the existing infrastructure would be reviewed and approved through the redevelopment process. The City will require all new development to demonstrate adequate supply/capacity is available before project approval and to fund its fair-share costs associated with the service provided.

Two concerns that will impact all infrastructure are the projected sea level rise and the existence of Bay Mud.

1. ESA/PWA is preparing a Memorandum addressing the potential impacts and risk posed by the projected sea level rise (SLR). The Memorandum quotes the need for planning in the South San Francisco Bay for up to 11" of SLR by the year 2050 and 36" by 2100. With the rise in mean sea level there will be an increase in extreme water levels: the 1:100 year water level could raise to 11.5 ft. NAVD (North American Vertical Datum, 1988) by mid-century and 13.6 ft. NAVD by the end of the century. The result will be an increase in both frequency and depth of inundation as the number of flooding events increase.

This level of inundation could correspond to slow and regular degradation of infrastructure. The Inner Harbor Area is serviced by underground utility gravity mains, pump stations, and underground utility force mains. As the sea level rises the area will become more dependent on pumping of storm waters. Increased inundation of the area could flood the low-lying pump stations and backflow into gravity mains during storm events while overtopping manholes and other "open" structures. Underground utilities, pipes and structures may be affected by the rising groundwater as water levels within the Bay increase.

2. Review of geotechnical reports previously prepared for the area and nearby development shows the soils to consist of alluvial deposits overlain by a soft to very stiff marine clay deposit, locally known as "Bay Mud". The reports record the depths of these soils from approximately 5 to 11 feet with groundwater found from approximately 3 to 12 feet. Bay Mud is considered to be a highly compressible material resulting in differential settlements. This differential settlement impacts proposed structure and infrastructure design as well as construction practices.

Structural loads are generally too great for the Bay Mud to support with conventional foundations. Instead, support systems comprised of driven piles is commonly recommended. Settlement across this compressible material is dependent upon the thickness of Bay Mud in conjunction with the thickness of fill at any given location. To minimize settlement in areas receiving fill a surcharge program is often utilized. Surcharging consists of placing excess fill in areas where settlement is a concern and leaving it in place a sufficient amount of time to partially pre-consolidate the material. Gravity utilities constructed in areas of Bay Mud are designed to avoid grade reversal, joint separation, and leakage. Flexible connections are used when utilities enter a building or other structure. Construction activities in areas of Bay Mud usually require the use of light grading equipment.

Corrosivity tests show the Bay Mud to be moderately corrosive to concrete and metals. Corrosivity will impact the types of underground materials and connections specified for infrastructure systems (this concern is addressed by the City's Building Code).

## Domestic Water

### Overview

Redwood City receives 100 percent of its potable water supply from the Hetch Hetchy, a part of the San Francisco's Regional Water System (RWS). The San Francisco Public Utilities Commission (SFPUC) manages this system. Hetch Hetchy is fed mostly from Sierra Nevada snowmelt but also includes rainfall and runoff collected in a number of reservoirs: Calaveras, San Antonio, Crystal Springs, San Andreas, and Pilarcitos. In addition to capturing runoff, these reservoirs provide storage for emergency water supplies. The remaining water supply into Hetch Hetchy comes from flows diverted from the Tuolumne River (which flows from the central Sierra Nevada to the Central Valley). The Redwood City water system provides water to both Redwood City and portions of San Mateo County. This system covers approximately 17 square miles and includes +/- 262 distribution pipelines, 10 pump stations, 26 pressure reducing stations, and 12 water storage facilities. The system is operated by the Redwood City Public Works Services Division. The service area's elevation varies from sea level to over 900 feet. The City recently connected its 17 pressure zones to storage tanks. This allows water to be pumped from one zone to another if any regional water supply is disrupted.

In accordance with the State of California Urban Water Management Planning Act the City of Redwood City developed and adopted its 2010 Final Urban Water Management Plan (UWMP) in June 2011. The purpose of the plan is to facilitate local and regional water planning activities and support the City's long-term water resource planning goals. The population projections outlined in the 2010 General Plan match the growth assumptions contained in the 2010 UWMP.

The City has actively reviewed alternate water sources and methods to reduce its water demand and reliance on the RWS. In 2003, the City investigated the possibility of developing groundwater to supplement the City's water supply. The resulting report concluded that the existing aquifers were minimal and could not be considered for more than a marginal supply source. The City has incorporated extensive, active water conservation and recycling programs. The active measures include incentives and rebates for low-flow toilets and water efficient faucets, washing machines, shower heads, and irrigation methods. The recycling program includes a water treatment facility and series of distribution pipelines. With these plans in place the City of Redwood City currently meets the 2020 water demand reduction targets as required by the California Water Conservation Act of 2009. On a regional level the SFPUC, Santa Clara Valley Water District, East Bay Municipal Utility District, Contra Costa Water District, and Zone 7 Water Agency are jointly exploring the development and creation of a regional desalination and water transfer facility. Although not a near-term solution, the City will continue to monitor the progress of this project.

The City of Redwood City 2010 General Plan indicates that the City's Water System Capital Improvement Plan (CIP) is focused on replacement of aging and obsolete pipe types,

rehabilitating existing pump and pressure reducing stations, as well as initiating emergency planning and action measures.

## Inner Harbor

The Inner Harbor Area is currently served by two water mains. One main is a 12" Asbestos Cement Pipe (ACP) that extends from the Walnut Street cul-de-sac, under Highway 101 through the west side of the Maple Street loop and then extends east through Blomquist Street where it ties into a 16" Welded Steel Pipe (WSP) in Seaport Boulevard. Both the ACP and WSP have an installation date of 1978. The second main is an 8" ACP that will service the Replacement Jail (currently under construction) at Chemical Way and Maple Street. It then extends through Blomquist Street and ties into an existing 8" ACP in Seaport Boulevard. This 8" ACP has installation dates that range from 1957 to 1966. Several services are provided to parcels located Blomquist Street, but outside the limits of the Inner Harbor Area. There are no apparent water lines/mains shown in the upper looped portion of Maple Street, to the Docktown Marina, nor to the Ferrari Property. It is anticipated that any new development along Maple Street or the Docktown Marina would require a water line extension around the Maple Street loop while the Ferrari property could possibly receive service from Penobscot Drive in Seaport Centre. The Seaport Centre lines were constructed mid-1980. Penobscot Drive contains an existing 10" PVC (polyvinyl chloride) stub in the nearby cul-de-sac. A connection to the 10" PVC line would require a coordination and approval from PG&E for a crossing under their main overhead transmission lines. A new water line connection at Seaport Boulevard would be another option for the Ferrari property. Either option would require an easement. Although the Water Master Plan does not indicate any existing hydraulic deficiencies the aging ACP and WSP pipelines throughout these areas is a concern. See Exhibit A – Domestic Water System Map.

The potable water supply is managed by the Redwood City Water Department. In October 2011, West Yost Associates completed the City of Redwood City Water Master Plan. The Master Plan evaluated the City's existing water distribution system and its ability to meet the recommended operation and design criteria. The Inner Harbor Area is located within the "Main City" water zone. This water zone is supplied by the SFPUC via gravity. The Master Plan evaluated the storage capacity of the various zones. The purpose of storage is to equalize demands on the water supply source, production facilities, and transmission mains; provide emergency storage; and to provide water to fight fires. Ten storage facilities are located in the higher elevations of Redwood City and two are located in the lower elevation within Redwood Shores. The current combined storage capacity is 21.24 MG. The Main City zone was identified as having a water storage capacity deficit of 6.3 MG. The City is looking to construct two new storage tanks: one with 3.3 MG capacity and one with 3.0 MG capacity. Blomquist Street, west of Seaport Boulevard is one of the proposed locations for the 3.0 MG tank. The tank is to be constructed at grade and include a booster pump. The Master Plan estimates the booster station to be sized at 10 MGD (three duty pumps, each with a flow rate of 2,300 gpm). West Yost Associates established 7 levels of concern for rating the City's pipelines for their Rehabilitation/Replacement Program. The existing WSP in Seaport

Boulevard was listed in tier 4 under their “Watch Program” for pipeline replacement with the ACP in within the Inner Harbor noted as tier 5 (mid to lower levels of concern). As more information is gained on the ACP’s performance under aging conditions – this ranking could rise to a level of “high concern”.

## Opportunities and Recommendations

1. Opportunities exist for the Inner Harbor Specific Plan to facilitate the reduction of water consumption by requiring the use of recycled water lines, using water conserving appliances and fixtures as well as encouraging the use of drought-tolerant, low-water consuming landscaping. Reference the Recycled Water section that follows. Construction of the proposed 3.0MG water tank and booster station will alleviate current concerns regarding storage capacity.
2. Given the combination of aging pipelines, Bay Mud and it’s corrosive environment, it is recommend that the existing pipes should be monitored as described in the 2010 Master Plan in order to minimize any pipe failures or leakage. Future pipeline construction should consider installation of high-density polyethylene pipe (HDPE) with water-tight/restrained joints (to minimize water intrusion and joint deflection). All pipe installation should comply with current geotechnical recommendations for the area and the City of Redwood City Building Code.
3. The City of Redwood City has an existing hydraulic model. This model should be used to analyze the existing capacity/pressure of the nearby water mains should they be extended into the Inner Harbor area with new development.

## Recycled Water

### Overview

The City of Redwood City has adopted a recycled water program to ensure prudent water use and ongoing water conservation. The program’s implementation allows the shift away from using high-quality water for non-potable uses. In 2008, the City adopted a Recycled Water Use Ordinance. The Ordinance is broken into both “Required” and “Encouraged” use categories.

#### Required Uses:

*Existing and remodeled commercial and industrial buildings:*

- External Landscaping

*New Commercial, Industrial, Institutional, Government Project, New Apartments and New Condominiums:*

- Internal Separate Plumbing of water closets, urinals, trap primers
- Internal Cooling Towers and Evaporative Coolers
- External Landscaping

*Dust Control for Construction.*

Encouraged Uses:

*Existing and Remodeled Commercial and Industrial Buildings:*

- Internal Separate Plumbing of water closets, urinals, trap primers
- Internal Cooling Towers and Evaporative Coolers

*Existing and Remodeled Apartments and Condominiums:*

- Landscape Irrigation
- Internal Separate Plumbing of water closets, urinals, trap primer
- Internal Cooling Towers and Evaporative Coolers

*Single Family Home Owners:*

- External Landscaping

*New and Industrial Users must consider use for industrial processes.*

The recycled water system is owned and operated by the City. The recycled water is produced by South Bayside System Authority (SBSA); of which the City is a member. Construction of the Phase I Recycled Water Project started in 2005 is now complete. It consisted of tertiary-treatment facilities, two 2.2 million gallon storage tanks, a distribution pump station, and pipelines spread throughout the Redwood Shores, Seaport, and Bayfront Areas. See Exhibit B –Recycled Water System Map.

Since its implementation the Recycled Water program has seen a steady increase in the amount of water recycled and the number of customers joining the project. During fiscal year 2009-2010 the City of Redwood City saw a 7% reduction from their water usage in 2008-2009 (about 482 million gallons saved). As outlined in the City General Plan the City is dedicated to expanding its recycled water treatment piping with future pipelines proposed to reach much of the rest of Redwood City.

## **Inner Harbor**

Based upon the City’s GIS and Utility Block Maps a 24” PVC recycled water line travels along the north side of the Highway 101 and enters the Inner Harbor Area at the easterly loop of Maple Street and into Blomquist Street. The majority of the Inner Harbor would access the recycled water system by extending these existing transmission pipelines. The Ferrari property could access the recycled water line with a connection to the existing 8” PVC recycled water line at the intersection of Penobscot and Galveston Drives (requires the crossing of the existing PGE easement) or the 14” PVC recycled water line in Seaport Boulevard. Either connection would require a new easement.

## **Opportunities and Recommendations**

1. Being a part of the initial recycled water customer area presents the Inner Harbor area with a unique opportunity to tap into the nearby lines and provided high quality

recycled water to future development. Including the use and extension of these pipelines for landscaping, fire service, dust control, cooling towers, toilet flushing, and other industrial uses will ensure future cost saving in potable water demand and meet conservation goals.

2. Due to the high water table, Bay Mud, and its corrosive environment it is recommended that any new pipelines should be designed using a high-density polyethylene pipe (HDPE) with water-tight/restrained joints to minimize water intrusion and joint deflection. All pipe installation should comply with current geotechnical recommendations for the area and the City of Redwood City Building Code.

## Storm Water and Storm Water Quality Management

### Overview

The City is divided into several major storm water drainage areas: Redwood Creek, Cordilleras Creek, Southeastern Area – Bayfront Canal, and Redwood Shores. The overall system includes pumps stations, standard storm drain catch basins, siphon storm drain catch basins, miles of storm drain pipe, miles of creeks, and retention basins (in Redwood Shores). The City is currently guided by the combined Sewer, Storm Drain, and Water Master Plan prepared by Kennedy Jenks in 1986. Reference Exhibit C.1- Storm Drain System.

### Inner Harbor

Redwood and Steinberger Creeks physically define the Inner Harbor Area. Redwood Creek flows from the north side of the City, under Highway 101, combines with Steinberger Creek, and then flows into the San Francisco Bay. Both creeks, within the extents of the Inner Harbor Area, exist in a natural condition. Per the Assessor's Parcel Maps, Redwood Creek is owned by the City of Redwood City while Steinberger Creek is split with Graniterock owning the upper end/easterly portion and the City the remainder. Both creeks are within the jurisdiction of the California Department of Fish and Game, San Francisco Bay Regional Water Quality Control Board, and the U.S. Army Corps of Engineers. Any work associated with these creeks would require permits from these approving agencies. The San Francisco Bay Conservation and Development Commission (BCDC) indicated that the water bodies within the boundaries of the Inner Harbor Area are not within its jurisdiction.

In June 2012, BKF Engineers prepared a Draft Redwood Creek Deficiency Review. The Report identifies locations where Creek failures have started to occur and documented hydraulically undersized portions of the Creek. None of the suggested repairs are within the Inner Harbor area of study. The work includes a geotechnical review as well as a biological resource analysis. The Report identifies the lower reaches of the Creek as saline emergent wetlands noting the presence of area specific plants and special status wildlife species occurring in

these reaches of the Creek. In order to evaluate the potential for these plants and wildlife species to occur, a localized, site specific study should be undertaken. The Report's analysis shows the Creek to have capacity for a 30-year storm event. Although most of the Creek does not have capacity for the 100-year event, this improvement was deemed impractical and no creek repair to increase capacity was recommended within the report.

The Inner Harbor Area is currently serviced by a combination of gravity mains, force mains, and pump stations. Pumping is required due to the combination of tidal action and the low elevation. Per the City's GIS and Block Maps, there are three storm collection systems within the Inner Harbor Area. Each system discharges into Steinberger Creek. Two of the systems include runoff from both the south side of Highway 101 and the Inner Harbor Area. One of these two system directs gravity flow into the Oddstad Pump Station located adjacent to the north side of Highway 101. Per the City Storm Drain System Map, the Oddstad Pump Station includes three pumps (1- 3,600 GPM, and 2 each - 18,200 GPM). The storm waters are pumped through a 39" pipe within the Inner Harbor Area where they discharge into Steinberger Creek. The second drainage area is directed through gravity lines into an existing wetland area along the east loop of Maple Street, which then connects to the K-Mart Pump Station at the edge of Steinberger Creek. Per the City Plan, this pump station consists of two pumps, each with a 6,300 GPM capacity. The third system collects flows on the west loop of Maple Street and discharges via gravity into Steinberger Creek. Using the City Storm Drain System Map and GIS/Block Maps, Exhibit C.2 was assembled. It approximates the Drainage Areas feeding into these storm collection systems. The Kennedy Jenks Master Plan identifies several existing, undeveloped areas as having a potential for redevelopment – the Inner Harbor was one of these areas. Although the Report identifies that land plans supplied by the City were used for analyzing major elements with regard to water and sewer, the report does not identify any existing or proposed land uses which were used in their analysis. Reference was made to the K-Mart pump station requiring 2 hours, 38 minutes to eliminate ponding during their maximum designed event. No other deficiencies are noted in this area and no improvements were suggested. Given this lack of data, it is difficult to determine the anticipated service levels the report analyzed and; therefore, predict impacts or requirements for the existing or proposed conditions within the Inner Harbor Area. Discussions with the City Community Development Department indicate that to date, no improvements are planned for the Inner Harbor Area. Any new storm facilities would be driven by the Precise Plan and the resulting proposed development scheme.

Again the possibility to service the Ferrari property may lie within the Seaport Centre development. This area drains via a series of gravity storm lines to the Seaport Pump Station. The nearest point of connection would be an 18" RCP located at the Penobscot Drive cul-de-sac. The pump station discharges via a 42" RCP into Redwood Creek. Per the City Storm Drain System Map, the pump station consists of three pumps, each with a 27,000 GPM capacity. The City Community Development Department indicates that although there is no sizing report/analysis for this pump station, it has not had any maintenance difficulties. Any new storm connection would need to cross under the existing PGE transmission lines and would require an easement.

As previously referenced, localized flooding in the Inner Harbor Area can occur when a rainfall greater than the 30-year storm event occurs and overwhelms the capacity of the storm drains and pumps. Increased flooding is experienced during the combination of high tides and major rainstorms. The high tides raise the controlling water surface elevation within the creeks; backwater occurs and inundates adjacent, low-lying lands. The Inner Harbor Area is within the 100-year flood plain as defined by the Federal Emergency Management Agency's Flood Insurance Rate Map (FEMA). The City's Municipal Code requires areas under tidal influence to be raised to six inches above the 100-year elevation and that finished floors of structures must reside a minimum of 12-inches above this defined elevation.

The City of Redwood City is a partner in the San Mateo Countywide Storm water Pollution Prevention Program – a storm water quality program that addresses potential construction-phase and post-construction pollutant impacts. The program is designed in accordance with the San Francisco Bay State Water Resources Control Board NPDES permit. City of Redwood City Ordinance No. 1130-336 defines Redwood Creek and its tributaries upstream of Highway 101 to Bradford Street and upstream of El Camino Real as a "Protected Watercourse". The Storm water Treatment Section 32.12 F requires protection and maintenance of areas within 30 feet of a creek centerline or 25 feet from the top of bank, of a protected watercourse. Development of structures or additions of new impervious surfaces are restricted to improvements that will not disturb riparian vegetation, that will maintain the stability of the slope and creek bank, and will not discharge pollutants directly to the watercourse and any runoff is to be properly filtered. Section 2.88 defines a "Sensitive Area". A Sensitive Area is any area located less than two hundred feet away from a water resource including but not limited to a wetland, pond, river, the San Francisco Bay or other bodies of water. The land areas within the Inner Harbor that are adjacent to Redwood and Steinberger Creeks would be subject to these provisions.

The 2010 City of Redwood City General Plan identifies multiple policies in order to provide for adequate storm drainage flood control facilities to meet both current and future needs. These policies consider potential development areas and their relation to flood hazard zones, maintenance of existing facilities while prioritizing those areas already prone to flooding, as well as minimizing impervious surfaces to reduce runoff and peak flows.

## Opportunities and Recommendations

1. Redwood Creek has a 30-year storm event capacity. The capacity of the storm drains and pumps within the Inner Harbor Area is unknown. The City plans to initiate a storm drainage study in early 2014. The storm drain study should reflect the projected changes in the Inner Bayfront Area and identify any expected overall system deficiencies/improvements for both the infrastructure (piping, pumps, etc.) and Redwood and Steinberger Creek, such as dredging. Dredging could provide additional benefits not only for flood control but also to generally benefit the water quality and even provide for recreational use.

2. In accordance with the BKF Draft Report, it is recommended that a biological assessment of the area be prepared to identify and make recommendations regarding the potential for saline emergent wetlands and the plants and wildlife that accompany them.
3. Continue to inspect, maintain, and replace aging or poor performing piping and structures and creeks.
4. Development of the Inner Harbor Area provides an opportunity to assess the existing wetland areas (currently located adjacent to the Redwood City Police Station) and create a plan that could allow for relocating all or portions of them with a 3:1 replacement ratio. This would result in improved quality and connectivity of wetland habitat. The overall objective would be to preserve and enhance the unique resources associated with the existing creeks and wetlands (wildlife habitat, tidal marsh lands, riparian vegetation) while incorporating them as an environmentally sustainable feature of the neighborhoods.
5. In order to reduce the discharge of pollutants and detain increased storm flows any proposed development should incorporate a combination of low impact development (LID) features and hydromodification such as:  
Rain Gardens, Flow-Through Planter Boxes, Green Roofs, and Permeable Pavements. These elements can be incorporated both on individual sites as well as within the public streets and right-of-ways (green streets with storm water planters and curb extensions). More traditional features such as detention ponds and oversized piping can also be employed. The location and natural resources of the Inner Harbor presents an opportunity for incorporating “area-wide” solutions for storm water treatment and control. Locating a combined treatment wetland zone near the low discharge zones can provide dual use – as both a habitat buffer and green amenity. See Exhibit C.3 for possible locations.
6. Coordination with the geotechnical specialists is critical due to Bay Mud conditions and the high water tables.
7. A perimeter levee system or sea-wall could be designed to augment the protection of the Inner Harbor Area from storm water flooding, high tides, and anticipated sea-level rise. This type of protection could be designed to accommodate a sea-level rise higher than currently predicted.
8. To meet current flood control requirements, all developed finished floor elevations would need to be raised 12” above the FEMA Flood Zone elevation (note that this would not protect against the projected increases in sea level).
9. Consider connecting the existing gravity outfall at Steinberger Creek into the nearby K-Mart Pump Station, upsizing as required. This would allow for continued storm water discharge, even during times of high-tide.

10. Research the capacity of the existing Seaport Pump Station and nearby storm lines - consider increasing capacity, if necessary, to service the Ferrari property.
11. Without data outlining the base design data associated with the existing storm piping/pumping systems the impact of any redevelopment of the Inner Harbor area cannot be evaluated.

## Sanitary Sewer

### Overview

The City's sewer collection system consists of approximate 192 miles of gravity and force mains. Most of the gravity piping system is comprised of 6"-8" diameter pipe sizes. The system includes 31 pump stations located in the Bayfront Area (26 of which are located in Redwood Shores and the remaining 5 located in Seaport/Pacific Shores). Most of the City's sewer flows are directed via gravity to the Maple Street Pump Station; although wastewater from Seaport/Pacific Shores is directed via a 10-inch force main. The Maple Street Pump Station is under the jurisdiction of the South Bayside System Authority (SBSA). The SBSA is a regional wastewater treatment plant jointly owned by the cities of San Carlos, Belmont, Redwood City, and the West Bay Sanitary District. The SBSA pumps from the Maple Street Pump Station to its transmission force main (48-inch to 54-inch diameter pipes) to their Wastewater Treatment Plant located in Redwood Shores. Once treated, the effluent is discharged through a 66" diameter pipeline to an outfall diffuser (about a mile offshore) into a deep-water channel of the San Francisco Bay. Under SBSA's 10-year capital improvement plan to replace and upgrade aging infrastructure, the SBSA has begun construction on their 48-inch Force Main Reliability Improvement Project. Construction is anticipated to take 16 months. This pipe will replace the existing line(s) that have had a history of leakage and damage due to the unstable Bay Mud ground conditions. In addition, SBSA is planning on replacing all four of its pump stations with three new stations (consolidating two of the stations into one). SBSA's proposed Pump Station No. 2 (the Maple Street Pump Station) will include a screening facility to handle material from the jail located in the Inner Harbor Area. Final design is expected in 2014 with construction starting in 2015. The new pump stations combined with the new force main will be designed to convey the wastewater through the year 2040.

The City's current General Plan indicates plans for implementing current CIP which range from rehabilitation of existing pump stations to replacement of aging sewer infrastructure. With the adoption of the 2010 General Plan the City employed West Yost Associates to update the 2008 Sanitary Sewer Master Plan in January 2013. The 2013 Updated Sanitary Sewer Plan confirmed that the City's collection system has adequate capacity for the future Peak Dry Weather Flow. Eighteen (18) capacity improvements/projects were identified and prioritized as required to eliminate the sewer system surcharge which occurs during selected

design storms – Peak Wet Weather Flow (PWWF) conditions. Of those proposed improvements the City has completed the highest priority capacity project and conducts annual flow monitoring to assess pipeline conditions and troubleshoot for potential inflow and infiltration problems. See Exhibit D.1 Sanitary System.

## Inner Harbor

The 2013 Update modeled the City sewer system with a PWWF scenario under build-out conditions that include the future capacity planned by the SBSA’s Maple Street Pump Station improvements. Their model showed a surcharging in the collection system that violated their planning criteria (5 feet of freeboard between rim and HGL) but did not predict any sanitary sewer overflows – flows that left the system. Without the capacity improvements sewer overflows were predicted in three areas, all located on the south side of Highway 101 and outside the Inner Harbor development area. The 2013 Update Plan indicated that under PWWF conditions the gravity mains and force mains studied in the Seaport area showed sufficient operational capacities for the 10-year storm event.

SBSA’s new 48-inch force main will connect the San Carlos and Maple Street pump stations. A portion of this force main will impact the Inner Harbor area as it runs from the Maple Street Pump Station toward Inner Bair Island. The force main will exit the pump station in Maple Street, continue north in Maple Street to the Docktown Marina, then run underneath Redwood Creek to Inner Bair Island (owned by the U.S. Fish & Wildlife Service). Inner Bair Island is a part of the San Francisco Bay National Wildlife Refuge. See Exhibit D.2 for the SBSA 48” Sanitary Sewer Force Main System.

The City’s GIS and Utility Block Maps show the Inner Harbor area to include an 8” vitrified clay pipe (VCP) gravity main in a portion of the west side of the Maple Street Loop. This line appears to drain directly into the force main and the Maple Street Pump Station. Another 8” VCP travels from the north and east sides of the Maple Street Loop and joins into a main on Blomquist Street. Where shown, the slopes appear to be fairly flat, 0.33% - 0.4%. These gravity lines leave Blomquist and continue south through an easement and under Highway 101. The maps indicate an existing 10” ACP force main that runs in Seaport Boulevard to Blomquist Street and into the Maple Street Pump Station. As part of the SBSA and County Jail projects, this 10” force main will be replaced with a 20” sewer main. There are no official sewer laterals to the waterfront residences at the Docktown Marina, although the City has reported that there appear to be several illegal connections. The sewage from the Docktown residences is removed by a pump boat.

## Opportunities and Recommendations

1. It is suggested that the City implement the recommendations outlined in the 2013 Sewer Master Plan Update. The City could expand and include the Inner Bayfront areas in their monitoring program and address sewer pipe inflow and infiltration with closed-circuit television inspection and sewer mains and laterals rehabilitation.

2. The continued implementation of the City's water conservation programs including grey water dual plumbing and low flow plumbing fixtures will reduce effluent discharge to the sewer system.
3. As noted previously, due to the high water table and Bay Mud – any new pipelines should be designed with water-tight joints to minimize water intrusion and joint deflection.
4. While the existing system could be extended to provide service for services at Maple and Blomquist Street, the Ferrari Property may gain access to the sewer system through Seaport Boulevard. The existing capacity of these lines should be analyzed.

## Dry Utilities

### Power and Gas

As a society, we depend on a robust and reliable power system. Power to the City of Redwood City is provided by Pacific Gas & Electric Company (PG&E), a natural gas and electric company. Electricity is generated from hydroelectric, fossil fuels, nuclear, wind, and geothermal facilities. Electrical transmission lines are generally located in the public right of way. Per the City's 2010 General Plan, as of 2008, no new major transmission lines are planned in Redwood City. The City's natural gas is supplied by three main pipelines. One runs parallel to Highway 101 and two lines run adjacent to Highway 280. Broadband service is provided by CableCom of California, a national provider of construction, technical, and engineering services in the tele-communications field. Reference Exhibits E.1 –E.3 – Electric System, Gas System, and Broadband System, respectively.

### Inner Harbor

The north and west portions of the Maple Street looped road are serviced by overhead power poles/lines while the remainder of the area appears to be serviced by underground facilities. The gas lines appear more limited and do not extend into the looped portion of Maple Street. Based upon discussions with CableCom, there does not appear to be any fiber optic/cable lines within the area.

Any further development of the Inner Harbor Area would include close collaboration with PGE and CableCom to assure that the required levels of service are provided. While the majority of the Inner Harbor Area would receive service through the extension and/or upgrades in the existing system, the Ferrari Property may be able to access these facilities through the Seaport Centre development.

## Opportunities and Recommendations

1. Per the City's General plan, the City's goal is to work towards a sustainable-based energy economy. Given the generally sunny climate solar energy could be a viable addition to their energy system.
2. The City could require all new buildings and building additions to meet the 2010 California Green Building Standards and provide incentives for using Energy Star Appliances and state-of-the-art lighting.
3. In order to provide adequate service, it is anticipated that both gas and cable service lines will be extended throughout the Inner Harbor Area.
4. Although costly, undergrounding of electrical transmission lines within the Inner Harbor Area would improve the attractiveness of the area.