APPENDIX

D

INFRASTRUCTURE ANALYSIS

appendix D
infrastructure analysis

The preferred land use plan for North Fair Oaks outlined in Chapter 2: Land Use and Zoning Designations increases the development capacity within the community. The Preferred Plan designates opportunity areas for Commercial Mixed-Use, Neighborhood Mixed-Use, and Industrial Mixed-Use land uses. Change areas of increased development include:

- El Camino Real: Entire southern edge of North Fair Oaks, as well as along 5th Avenue between El Camino Real and the Dumbarton Rail Line.
- Existing Northern Industrial Area: Between 2nd Avenue and Willow Street, and between Fair Oaks Avenue and Bay Road.
- Middlefield Road: Entire length of Middlefield Road within North Fair Oaks.
- Edison Way Industrial Area: Between Oakside Avenue and 12th Avenue.

For analysis purposes, the large change areas listed above were divided into 16 specific areas to identify local impacts to the existing North Fair Oaks infrastructure based on proposed net increases in development capacity. The net increase for each specific area is determined by comparing the existing type of land use (including General Industrial, Neighborhood Commercial, and Industrial) and proposed type of land use (Neighborhood Mixed-Use, Commercial Mixed-Use, and Industrial Mixed-Use) for each parcel located in an Opportunity

Table 4.1: Preferred Plan Development Capacity

Scenario	Residential (dwelling/unit)		Commercial (sf)
	Single-Family	Multi-Family	Office
Existing	2,700	1,550	180,000
Proposed Development in Addition to Existing			
Neighborhood Mixed-Use	0	336	20,000
Commercial Mixed-Use	0	2,040	65,000
Industrial Mixed-Use	0	648	70,000

Area for increased development capacity. The existing development and proposed increase in development capacity is shown in Table 4.1.

The net increase of development is assumed to be spread evenly across each parcel within an Opportunity Area, with considerations given to parcel size and type of land use. For example, a new Neighborhood Mixed-Use area might consist of two parcels that are one acre and two acres in size, respectively. The new area might have 30,000 square feet of commercial retail space proposed for development. For planning analysis purposes, the one-acre site would be assumed to include 10,000 square feet of retail space, while the two-acre site would be assumed to include 20,000 square feet of retail space.

The size and shape of each specific area is based on existing utilities serving the area (smaller tributary areas), and proposed types of land use. The net increase in development capacity for each specific area is shown in Table 4.2 (see Figure 4.1: Existing Water System for the specific area locations).

The following sections identify the new demand for services such as water and sanitary sewer based on the proposed net increases outlined above.

A. POTABLE WATER

A healthy community provides a reliable source of clean water for its residents and businesses while safeguarding the remaining water resources for the environment and future generations. The following analysis of the North Fair Oaks potable water system identifies existing deficiencies and potential future improvements to the system based on increased development capacity. The proposed potable water recommendations and actions to be taken should guide implementation of proposed improvements related to the potable water system.

Existing Deficiencies and Required Upgrades

The water distribution system within most of North Fair Oaks is owned and operated by Cal Water and consists of a pipe network that lies predominantly beneath the traveled roadway in the public street rights-of-way. The northern portion of North Fair Oaks is served by the City of Redwood City. The water delivery system in the area consists of a

Table 4.2: Preferred Plan Development Capacity for Specific Areas

		Proposed Net Increase							
		Residential (dwelling/unit)		Commercial (sf)		Industrial (sf)		Institution (sf)	Public (sf)
Specific Area #	Area (acres)	Single-Family	Multi-Family	Office	Retail	Research & Development	General	(community/ school)	(parks/ recreation)
1	6.57	0	54	5,831	6,248	7,497	9,996	4,998	6,664
2	9.67	0	79	8,582	9,195	11,034	14,713	7,356	9,808
3	21.73	0	179	19,286	20,663	24,796	33,062	16,531	22,041
4	25.87	0	207	22,411	24,012	28,814	38,419	19,209	25,612
5	7.19	0	247	7,872	9,084	0	0	4,239	7,872
6	4.15	0	34	3,683	3,946	4,736	6,314	3,157	4,209
7	12.05	0	394	12,560	14,492	0	0	6,763	12,560
8	6.01	0	198	6,300	7,269	0	0	3,392	6,300
9	10.39	0	362	11,530	13,304	0	0	6,209	11,530
10	4.92	0	161	5,128	5,917	0	0	2,761	5,128
11	11.5	0	95	10,207	10,936	13,123	17,497	8,748	11,665
12	3.97	0	143	8,049	11,881	0	0	5,919	8,049
13	5.91	0	210	12,508	18,762	0	0	9,381	12,508
14	2.48	0	101	3,215	3,709	0	0	1,731	3,215
15	3.69	0	150	4,783	5,519	0	0	2,575	4,783
16	10.29	0	410	13,055	15,063	0	0	7,030	13,055
TOTAL		0	3,024	155,000	180,000	90,000	120,000	110,000	165,000

network of 2- through 10-inch mains. Distribution lines in the area are a combination of asbestos cement or transite, polyvinyl chloride (PVC) and cast iron pipe (see Figure 4.1: Existing Water System).

North Fair Oaks contains approximately 4,000 homes with approximately 15,000 residents. The area is also home to commercial businesses and industrial facilities. Although no feedback was received at community workshops about existing water system deficiencies in meeting existing water demands, localized improvements to the aging existing water system will likely be required. Based on utility block maps of the existing water system, several sections of water mains consist of asbestos cement or transite pipe, including areas identified in Chapter 2: Land Use and Zoning Designations for increased development capacity. Although these pipes do contain asbestos they are not considered hazardous unless broken, sawed or cut. The age of these specific existing water mains should be confirmed by Cal Water and/or the City of Redwood City to determine pipe conditions. Based on the age of the water mains and the presence of asbestos-containing pipe, it is likely that more frequent repairs and/or replacement are anticipated in the future. The County should engage in discussions with both Cal Water and the City of Redwood City to develop a suitable, proactive replacement plan for the distribution system to ensure that the existing water demand for both domestic and fire flow needs are met.

A key finding from the Existing Conditions Analysis was that the portion of North Fair Oaks within the City of Redwood City's water system jurisdiction has insufficient emergency water storage facilities. An emergency water supply would help reduce negative effects from any future regional water system failures. The size and location of future emergency storage facilities should be reviewed by the County as needed and agreements between the County and the two water service providers in North Fair Oaks (Cal Water and the City of Redwood City) should be pursued. This will ensure that North Fair Oaks has access to a safe and reliable potable water storage and distribution system to meet current needs.

New Demand and Required Upgrades

The Preferred Plan increases the development capacity of specific areas within North Fair Oaks, which will require an increase in potable water demand. Since portions of North Fair Oaks are located within the Redwood City Water Department service area, increased potable water demand was calculated using water demand rates from the Redwood City Engineering Standards. The following water demand rates were used for this analysis:

- Multi-Family Residential Unit Water Demand – 150 gal/day/unit
- Commercial (Office and Retail) Water Demand – 0.13 gal/day/sf
- Industrial (Research and Development, and General) Water Demand – 0.21 gal/day/sf
- Institution (Community/Schools) Water Demand – 0.13 gal/day/sf
- Public (Parks/Recreation) Water Demand – 0.08 gal/day/sf landscaped areas

The net increase in water demand for each area of North Fair Oaks, which is based on the water demand rates listed above and the net increase in development capacity, appears in the Existing Conditions Analysis in Appendix A. As required by Senate Bill 610, new developments that result in an increase of water usage equivalent to the water usage of 500 dwelling units will be required to complete a Water Supply Assessment (WSA) to determine if adequate water supply is available. Using the above listed water demand rates, this threshold is approximately 75,000 gpd (500 dwelling units x 150 gpd/unit). Although it is unlikely that a specific parcel or development in North Fair Oaks will exceed this 75,000 gpd threshold, large developments that do meet any of the WSA thresholds (residential units, office square footage, etc.) would be required to complete this assessment.

To mitigate increased water demand for increased development capacity, new developments should incorporate water conservation measures such as low-flow water fixtures, infrared detectors, drought-tolerant landscaping, and other water efficient measures. The County should engage

in discussions with Cal Water and the City of Redwood City to determine future available water capacity. Based on these discussions, the extent of proposed development and the type and method of water conservation measures required for new developments will be determined.

Water systems are sized primarily to meet fire flow capacity. Therefore, some replacement of local lines may be required to serve large new developments within North Fair Oaks. The North Fair Oaks area is served by turnouts that receive flow from a San Francisco Public Utilities Commission water transmission line, and there is adequate flow and pressure available to the area. Local improvements may be needed if high density construction were to occur in an area currently served by undersized lines. Based on existing utility block maps from Cal Water and Redwood City, some areas identified for increased development capacity are currently served by water lines as small as two to four inches in size. Individual developments will need to request that fire flow tests be performed to determine if these small lines will provide adequate water capacity. Based on the test results, it is likely that portions of these small lines will need to be replaced and upsized to larger water lines. These lines are identified on Figure 4.2: Proposed Potable Water System Improvements.

As stated previously, the lack of emergency water storage would present a significant challenge to the proposed increase in development. However, based on the recently published Redwood City General Plan, the City anticipates that future water storage tanks will be located in Friendly Acres and the Bayfront area. North Fair Oaks could derive benefits from these future water tanks as their locations would be relatively close by. The County should coordinate with Redwood City with respect to the timing and funding for these tanks.

Recommended Actions

- Discuss and pursue any agreements with Redwood City regarding the timing and funding of future emergency water storage tanks to be located in Friendly Acres and Bayfront area. Pursue similar discussions with Cal Water.
- Set up an annual maintenance program to identify older and/or undersized lines that need to be repaired and/or replaced. Since North Fair Oaks is served by Redwood City and Cal Water, the County should coordinate with these water purveyors to ensure that deficient lines within North Fair Oaks are on the priority list.
- Update fire flow test data for North Fair Oaks. Similarly, the County needs to obtain from Redwood City and Cal Water the most current fire flow data for North Fair Oaks and work with these water providers to identify areas with inadequate fire flow requirement based on the Preferred Plan.
- Require dual-plumbing criteria for all major new developments. This will help reduce the demand on potable water.
- Provide incentives for new developments to use the latest water technologies (e.g., low-flow fixtures, infrared detectors, waterless urinals, etc). Examples of incentives may include increased development density or reduced in-lieu fees.
- Replace and upsize the small (two-to-four-inch) water mains located next to change areas. The pipe material selected should be suitable for the site specific soil conditions to minimize corrosion, and should consist of non-asbestos containing materials.

B. RECYCLED WATER

The use of recycled water provides a sustainable option for meeting a community's increasing water needs. This is achieved by reducing potable water use and diversifying the sources of water supply. The following analysis of recycled water use within North Fair Oaks identifies an existing lack of recycled water infrastructure and potential future improvements to bring recycled water to North Fair Oaks. The proposed recycled water recommendations and actions to be taken shall guide implementation of proposed improvements related to a future recycled water system.

Lack of Existing Infrastructure

There is currently no recycled water system that serves North Fair Oaks. The closest existing point of connection from North Fair Oaks to the City of Redwood City recycled water system is east of the Highway 101/Woodside junction. The City of Redwood City has discussed expansion of their system from this point westerly, along Highway 84 toward El Camino Real and ultimately to the foothills. However, all of Redwood City's future pipe alignments are located north of North Fair Oaks with only one line extending through part of North Fair Oaks (see attached Redwood City General Plan, 2010, Figure BE-31).

Although there is no existing recycled water infrastructure or identified demand within North Fair Oaks, several existing potable water users with large demands would benefit from the availability of a recycled water system. Potential potable water savings could then be achieved through the use of recycled water for landscaping and select indoor uses.

New Demand and Infrastructure

To reduce the area's reliance on potable water supplies, a recycled water system should be installed and/or extended to North Fair Oaks. Since there are no immediate plans to extend the Redwood City recycled water distribution system to the community, the County should work with the City of Redwood City and SBSA regarding the timing and proposed pipe routing for bringing recycled water to North Fair Oaks. Based on the outcome of this collaborative effort, new developments can be required to plan for future connections to the recycled water system by providing dual plumbing.

Several alternatives are available for conveying recycled water from the existing connection points to North Fair Oaks. Per the Redwood City General Plan, 2010, Figure BE-31, proposed Phase 2 extensions of the existing recycled water system are located on Broadway and Charter Street. Based on these proposed Redwood City extensions, one potential alignment for a future recycled water line to North Fair Oaks may be located along 2nd Avenue. See Figure 4.3: Proposed Recycle Water System Improvements for a summary of the existing and proposed recycled water system. A final alignment should be determined by the County and factor in several issues such as the location of new developments with large potentials for recycled water use, cost, and existing utility conflicts Street replacement projects may be required to provide a distribution system for recycled water.

Once a recycled water distribution system is installed in select areas of North Fair Oaks, this system could then be used by new developments for all irrigation needs, which would result in significant potable water savings. Recycled water can also be used to achieve indoor water demand reductions by means of dual plumbing. Possible uses of recycled water indoors include toilet flushing, cooling water, and possible other industrial and mechanical water uses . As an alternative to recycled water, incentive programs could be developed to encourage the use of gray water for irrigation purposes.

Recommended Actions

- Adopt a Dual-Plumbing Ordinance for new multi-family and commercial projects in anticipation of available recycled water.
- Coordinate with Redwood City on possible alignments from the City's current recycled water system to provide recycled water access to North Fair Oaks.
- Work with Redwood City on the timing of the recycled water line extensions to North Fair

Oaks. If appropriate, the line extensions to North Fair Oaks should be part of the City's Phase 2 program.

- Seek funding from state and federal sources to bring recycled water to North Fair Oaks. The County may need to partner with Redwood City since the City is the primary recycled water purveyor.
- Identify and maintain an inventory of both existing users and future projects that would benefit from the use of recycled water.
- Develop incentive programs for new developments to use gray water or harvested rainwater for irrigation purposes.

C. SANITARY SEWER

A healthy community provides sufficient sanitary sewer conveyance and treatment capacity, but also protects the environment by not overburdening the downstream treatment facility or discharging excess treated effluent into the San Francisco Bay. The following analysis of the sanitary sewer system identifies existing deficiencies and potential future improvements to the system based on increased development capacity. The proposed specific recommendations and actions to be taken shall guide implementation of the proposed improvements related to the sanitary sewer system.

Existing Deficiencies and Required Upgrades

Sanitary sewer service is provided by Fair Oaks Sewer Maintenance District (FOSMD) and Redwood City facilities for transporting sewage flows, and South Bayside System Authority (SBSA) facilities for treating the sewage. FOSMD is not a member agency of SBSA, but contracts for sewer capacity through Redwood City. Therefore, Redwood City has jurisdictional responsibility with SBSA regarding available treatment capacity and associated costs of connection for FOSMD. Redwood City has on occasion exceeded its peak wet weather flow allocation to the treatment plant .

The County of San Mateo Fair Oaks Sewer Maintenance District Sewer Master Plan (September 2000) identifies significant lengths of the Fair Oaks system as under capacity. There are four sections of sanitary sewer mains in North Fair Oaks that were identified in the Sewer Master Plan as deficient but have yet to be repaired or replaced (see Figure 4.4: Existing Sanitary Sewer System and Figure 4.5: Proposed Sanitary Sewer System Improvements). These sections of pipe were identified by the Sewer Master Plan as "Priority 3 – Sewer lines with minor to major structural deficiencies" and should be replaced to meet current County standards. The County should continue to identify existing deficient lines and repair/replace these lines.

New Demands and Required Upgrades

The Preferred Plan increases the development capacity of specific areas within North Fair Oaks, which will result in an increase in sanitary sewer demand. As stated earlier, Redwood City has jurisdictional responsibility with SBSA regarding available treatment capacity and associated costs of connection for FOSMD, and Redwood City has on occasion exceeded its peak wet weather flow allocation to the treatment plant. The County should negotiate with Redwood City and SBSA for additional sewer allocations at the earliest possible opportunity to ensure that new development can move forward. Detailed calculations of how much new capacity will be needed in each area of North Fair Oaks is presented in the Existing Conditions Analysis in Appendix A.

North Fair Oaks should also continue to implement

and refine standards for routine and preventative maintenance of the existing sanitary sewer distribution system. This will aid the County in maintaining and/or improving the collection systems to provide reliable service in the future. Capital improvement projects should continue to be developed to identify cost-effective ways to minimize infiltration/inflow and provide adequate sewer capacity for wet weather flows. Closed circuit television inspection should continue to be scheduled as needed.

Connection fees for any future projects potentially generated from an updated Community Plan would be based on the additional capacity needed. FOSMD should consider implementing a monitoring program to track actual usage rates versus calculated demand rates for any such potential projects. In the case of potential multi-phase projects, FOSMD will also consider adjusting estimated sewer generation rates for later project phases based on measured generation rates from the initial project phases.

To mitigate increased sanitary sewer demand for increased development capacity, new developments should incorporate water conservation measures such as low flow water fixtures, infrared detectors, and other water efficient measures and more stringent sewer generation standards. The type and extent of water conservation measures and more stringent sewer generation standards required for new developments will be determined based on the negotiations with Redwood City and SBSA for additional sewer allocations. New developments should be required to offset increased net sewage generation by replacing existing sanitary sewer laterals and mains in order to minimize infiltration and inflow to the sanitary sewer system.

Recommended Actions

- Negotiate with the City of Redwood City and SBSA wastewater treatment plant for additional sewer allocations at the earliest opportunity possible.
- Revise County standards to reflect more current/more stringent sewer generation standards.
- Condition or provide incentives for new developments to use more stringent water demand and sewer generation standards.
- Identify priority lines and structures within the system that need to be repaired and/or replaced. These tasks should be done on an annual basis.
- Reassess the sanitary sewer system maintenance cost periodically and update connection and usage fees accordingly.
- Identify and prioritize areas of high infiltration and inflow and conduct immediate repairs and/or replacement to avoid sending unnecessary flows downstream.
- Require new developments to contribute to the reduction of infiltration and inflow. Developer contributions may be monetary based on a fair share basis, or actual developer-install projects.
- Continue with routine maintenance and repairs of the collection system.
- Continue to perform closed circuit television inspection of the existing sewer lines.
- Share and gather conveyance data from Redwood City and treatment data from SBSA regularly (i.e., on an annual basis) so that the information can be used for planning and determining the basis for cost-sharing, fee adjustment, etc.
- Promote water reduction measures/technologies, which will reduce the amount of sewage generated.

D. STORM DRAINAGE

A healthy community provides a safe and accessible environment for its residents, free of localized or regional flooding, while protecting the local waterways from development-based erosion and pollution. The following analysis of the storm drain system identifies existing deficiencies, lack of infrastructure, and potential future improvements to the system based on increased development capacity. The proposed specific recommendations and actions to be taken should guide implementation of the proposed improvements related to the storm drainage system.

Existing Deficiencies and Required Upgrades

The storm drainage system is currently provided primarily by flow through streets and gutters. There is potential for flooding to occur in North Fair Oaks because of deficiencies in the local drainage systems. Flooding occurs most often near the railroad tracks, where the tracks act as a barrier to overland flow, and within the drainage area where garages are located below the street grade, causing street flows to be conveyed through private property.

In addition, there are regional flooding issues associated with flow capacity limitations at the Bayfront Canal tide gates, which the City of Redwood City is currently working to resolve. The County should engage in discussions with Redwood City and the Town of Atherton regarding joint upgrades of the regional storm drainage facilities. Deficiencies along the Bayfront Canal will need to be corrected by the City before upgrades within the North Fair Oaks systems could be constructed that would reduce local flooding. The County should work closely with adjacent jurisdictions to find workable solutions to mitigate regional flooding, since the systems are hydraulically connected. Potential solutions by other jurisdictions also include additional pump station capacity.

The southern portion of North Fair Oaks drains to a storm drain system that conveys flows to the County's Athlone Pump Station. Once the regional flooding issues associated with flow capacity limitations at the Bayfront Canal tide gates are resolved, the existing Athlone storm drain pump/lift stations should be upsized to increase conveyance capability, which would provide for future storm drain distribution systems within North Fair Oaks (see Figure 4.6: Existing Storm Drain System and 4.7: Proposed Stormwater System Improvements).

New Demands and Required Upgrades

Stormwater runoff is calculated based on site-specific amounts of pervious areas (landscaping) and impervious areas (roof, pavement, etc.), with large amounts of impervious areas resulting in higher stormwater runoff. The Preferred Plan outlined in increases the development capacity of specific areas within North Fair Oaks, which will result in an increase in building square footage and will also likely result in increased building footprint size. The existing areas identified for increased development capacity already consist of large amounts of impervious areas. Therefore, new developments have the potential to reduce the amount of impervious areas, resulting in reduced stormwater runoff. New developments that result in an increase in stormwater runoff should be required to provide on-site detention facilities to mitigate increased flows. This is in line with the County's current standard that requires stormwater detention be implemented to assure that there is no increase in runoff during a ten-year storm event.

There are very limited amounts of existing storm drainage infrastructure within North Fair Oaks, including in the areas identified for increased development capacity (see Figure 4.6: Existing Storm Drain System and 4.7: Proposed Stormwater System Improvements). Therefore, new developments should be conditioned to contribute to the extension of storm drain lines to areas with piped facilities. Although there are downstream deficiencies at the Bayfront Canal, new storm drain line extensions would help mitigate local flooding when the downstream deficiencies are corrected.

Recommended Actions

- Engage in discussions with the City of Redwood City and the Town of Atherton regarding joint upgrades to the regional storm drainage

Policy 5C

facilities and Bayfront Canal. These regional upgrades are required before upgrades within the North Fair Oaks systems that would reduce local flooding could be constructed.

- Work closely with adjacent jurisdictions to find workable solutions to mitigate regional flooding, such as additional pump station capacity located outside North Fair Oaks.
- Once the regional flooding issue at the Bayfront Canal is resolved, the existing Athlone storm drain pump/lift stations should be upsized to increase conveyance capability. Future storm drain distribution systems within North Fair Oaks could then connect to the upgraded pump station.
- New developments that result in an increase in stormwater runoff should be required to provide on-site detention facilities to mitigate increased flows.
- New developments should be conditioned to contribute to the extension of storm drain lines to areas with piped facilities.

E. STORMWATER TREATMENT

Stormwater runoff from North Fair Oaks can impact local water quality and biological diversity. A sustainable community must provide a safe manner to protect local waterways from development-based pollution by treating stormwater runoff. The following analysis of the existing stormwater treatment deficiencies and potential future stormwater treatment improvements provides a basis for recommendations and actions to be taken that shall guide implementation of the stormwater treatment policies.

Existing Stormwater Treatment Deficiencies

Based on field observations reported in the Existing Conditions Analysis, there are very limited to no existing stormwater treatment measures located in North Fair Oaks. There are also limited opportunities to require existing developments to install stormwater treatment measures. One possibility is to redesign public streets with integrated stormwater best management practices, such as stormwater planters and bioswales, to provide stormwater treatment. This would also result in benefits for the storm drain system by reducing the peak storm flows from the public streets.

New Stormwater Treatment

In addition to providing traditional storm drainage capacity to accommodate a particular size storm, current regulatory requirements mandate that stormwater must be treated prior to being discharged into receiving waters. The purpose of the treatment is to remove or substantially reduce the amount of hydrocarbons and heavy metals from the stormwater that enters the local creeks, regional canals, and ultimately the San Francisco Bay. Local municipalities, including San Mateo County, must require post-construction stormwater controls as part of their obligations under Provision C.3 of the Municipal Regional Stormwater Permit (MRP).

To meet the MRP requirements, the County should continue to require that all new developments implement stormwater treatment (C.3) measures to reduce peak flows in the storm drain system, maximize on-site retention and potentially reuse the stormwater for irrigation purposes. New developments will also be required to implement all local and State mandated stormwater controls (C.3 requirements) and shall follow current County standards for stormwater treatment thresholds. Included in this requirement is that new developments provide a Maintenance Agreement that will be recorded with the property deed. To ensure compliance, the County shall perform regular inspections of stormwater treatment facilities at all new developments.

The County has also prepared a Sustainable Green Streets and Parking Lots Design Guidebook. This guidebook, along with other post-construction stormwater control requirements, encompasses

Low-Impact Development (LID). LID is designed to minimize negative water quality impacts by minimizing imperviousness, using stormwater as a resource (rain water harvesting), and preserving/re-creating natural landscape features. There is potential within North Fair Oaks to adopt LID measures that promote treatment and storage of stormwater, green roofs, rainwater catchment/cisterns, etc., including water reclamation features and bioretention areas. New developments should be encouraged to implement LID strategies to reduce stormwater runoff. The following description highlights LID measures to be implemented in North Fair Oaks.

- Rain Gardens / Bioretention Areas: Bioretention areas, or rain gardens, treat stormwater runoff by removing pollutants through physical, biological, and chemical treatment processes as soil and plant-based filtration occurs. Bioretention areas can be very flexible when it comes to shape, which allows for their use at most sites. They may also be shaped as linear bioretention swales and can then be placed along public streets to treat runoff from paved surfaces.
- Green Roofs: Green roofs have several advantages when it comes to stormwater treatment. They reduce stormwater runoff when compared to a conventional roof and are considered self treating. Additional environmental benefits include reduced "heat island" effect, sound absorption, bird habitat, etc. Although green roofs are non-traditional designs, their use contributes to sustainable developments by meeting several stormwater treatment requirements.
- Cisterns: The use of cisterns and/or rain barrels may be used to store rainwater from local storm events in North Fair Oaks onsite. Cisterns must be sized appropriately based on local average precipitation. Stored rainwater may then be used for irrigation or other select indoor uses, which will reduce potable water consumption. Storing rainwater on-site also reduces stormwater runoff and helps alleviate demands on downstream storm drain systems.
- Permeable Pavement: Permeable pavement (pervious paving) consist of a load-bearing durable surface and an underlying layered section that stores, infiltrates and drains water through the pavement. Since the surface is porous, water can infiltrate across the entire surface. This results in a reduction in stormwater runoff and promotes groundwater recharge. Permeable pavement also has the additional benefit of functioning as a self-treating area, similar to landscaped areas.
- Preserve Sensitive Areas and Open Space: Site design measures such as preserving open space, aid in pollution prevention and reduce stormwater runoff rates. Due to the infill development areas in North Fair Oaks, the limited amounts of open space should be preserved to the maximum extent practical.

Proposed developments shall be required, as a part of the San Francisco Bay Region Municipal Regional Stormwater Permit, to implement many of the LIDs described above. The LID measures can be on-site, regional or a combination of the two. Regional treatment within a green streets program can be incorporated into a project's LID requirements and should be considered by the County.

New developments shall also comply with the Countywide Water Pollution Prevention Program, and when land disturbance (grading, etc.) is greater than one acre, a Stormwater Pollution Prevention Plan shall be prepared by the developer for approval by the County and a Notice of Intent (NOI) shall be filed with the Regional Water Quality Control Board. The County should also require all new developments to provide erosion and sediment control plans and Best Management Practices (BMPs) for all construction activities.

Recommended Actions

- Redesign public streets with integrated stormwater treatment BMPs (bioswales, bioretention areas, etc.). These stormwater treatment measures will also reduce the peak storm flows from the public streets.
- Per MRP requirements, require all new developments implement stormwater treatment (C.3) measures and follow current County standards for stormwater treatment thresholds.
- Require new developments to provide a Maintenance Agreement.
- Perform regular inspections of stormwater treatment facilities at all new developments.
- Adopt LID measures that promote treatment and storage of stormwater. New developments

should be conditioned to implement LID strategies to reduce stormwater runoff.

- Consider incorporating regional treatment within a green street program into a project's LID requirement.
- Require new developments that result in land disturbance (grading, etc.) that is greater than one acre to prepare a Stormwater Pollution Prevention Plan (SWPPP) and file a Notice of Intent (NOI) with the Regional Water Quality Control Board.
- Promote continuing education for the County Planning and Engineering staff in the area of stormwater treatment measures—as the technology and treatment techniques are constantly changing.

F. DRY UTILITIES

Several types of dry utilities such as electrical, natural gas, and communications contribute to the health and safety of a community. Service for dry utilities in North Fair Oaks is provided by private companies and the distribution systems consist of both overhead and underground utility lines. These distribution systems consist of a support network that the community relies on for daily activities and economic well-being. The following observations of the existing and potential future dry utility systems provide a basis for recommendations and actions to be taken that shall guide implementation of proposed improvements related to the dry utility system.

Existing Deficiencies

Electric

The electrical power distribution system within North Fair Oaks is owned and operated by Pacific Gas & Electric Company (PG&E). This electrical power grid consists of both overhead and underground electrical lines located predominantly in the public street rights-of-way and easements. There are no confirmed existing system deficiencies; however, the County should engage in discussions with the service provider to ascertain existing system deficiencies. Each year PG&E places approximately 30 miles of overhead electric facilities underground within its service area, under provisions of PG&E's Rule 20A. The County should engage in discussions with PG&E to identify priority overhead electric facilities adjacent to change areas that should be undergrounded.

Gas

The natural gas distribution system within North Fair Oaks is also owned and operated by PG&E and consists of a pipe network that lies predominantly beneath the traveled roadway in the public street rights-of-way. There are no confirmed existing system deficiencies. However, the County should engage in discussions with the service provider to ascertain existing system deficiencies.

Telecommunication

The telecommunication distribution system within North Fair Oaks provides various services such as telephone service, cable television, and internet service. The service providers include Comcast and AT&T. There are no confirmed existing system deficiencies; however, the County should engage in discussions with the service providers to ascertain existing system deficiencies. Currently, there is an existing program in place called Wireless Silicon Valley that intends to develop a large-scale wireless network along the peninsula, including the North Fair Oaks area. The County should engage in discussions with the program sponsor, Joint Venture, to ensure that North Fair Oaks is included in any future wireless network area that provides free or low-cost internet access.

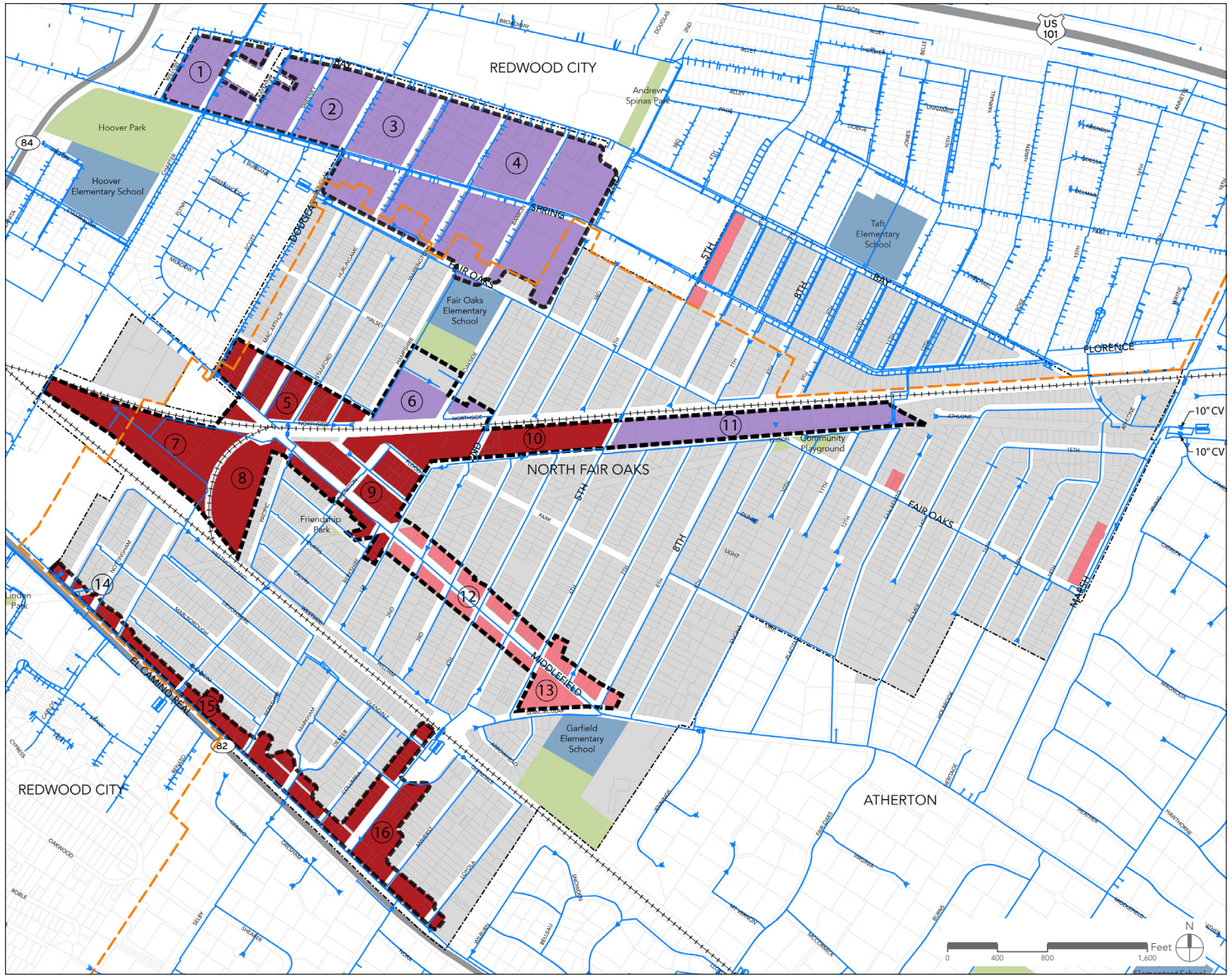
New Demands and Required Upgrades

These local service providers are generally able to expand service to North Fair Oaks to meet reasonable increases in demand. The service providers have not been willing to comment on whether there are specific constraints that would limit expansion until specific projects are identified. The County should engage in discussions with the service providers to provide for the increased development capacity within North Fair Oaks.

Recommended Actions

- Encourage new developments to underground overhead utilities along the project frontage in accordance with PG&E's Rule 20A.
- Require PG&E to inspect its gas line on a regular interval and provide transparent records of the inspection and maintenance of the PG&E gas lines.
- Partner with wireless providers and Joint Venture (sponsor of Wireless Silicon Valley) to bring wireless technology to North Fair Oaks.
- Provide incentives for new existing and new developments to use local renewable energy within North Fair Oaks (e.g., solar power).

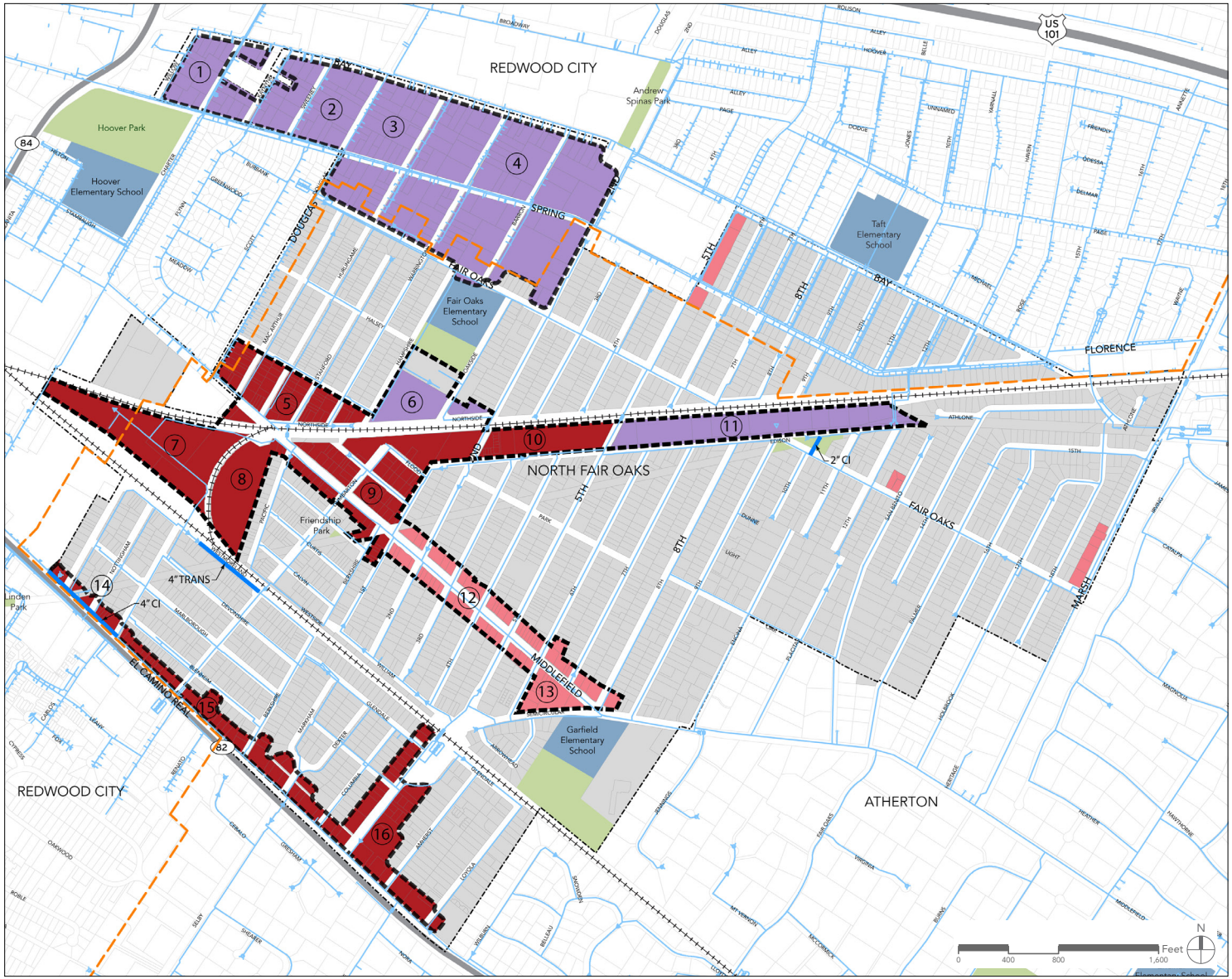
FIGURE 4.1: Existing Water System



- North Fair Oaks
- Parcel
- Highway
- Rail Line
- Park
- School
- Commercial Mixed-Use
- Industrial Mixed-Use
- Neighborhood Mixed-Use
- (16) Specific Area #
- Existing Water Line
- Water Service Area Boundary

NOTES:
1. EXISTING UTILITY INFORMATION BASED ON CALWATER AND REDWOOD CITY UTILITY SYSTEM MAPS.

FIGURE 4.2: Proposed Potable Water System



- North Fair Oaks
- Parcel
- Highway
- Rail Line
- Park
- School
- Commercial Mixed-Use
- Industrial Mixed-Use
- Neighborhood Mixed-Use
- (16) Specific Area #
- Existing Water Line
- Small Lines to be Upsized
- Water Service Area Boundary

NOTES:
1. EXISTING UTILITY INFORMATION BASED ON CALWATER AND REDWOOD CITY UTILITY SYSTEM MAPS.

FIGURE 4.3: Proposed Recycled Water System Improvements

- North Fair Oaks
- Parcel
- Highway
- Rail Line
- Park
- School
- Commercial Mixed-Use
- Industrial Mixed-Use
- Neighborhood Mixed-Use
- (16) Specific Area #
- RWC Proposed Line
- North Fair Oaks Proposed Line
- Water Service Area Boundary

NOTES:
1. EXISTING UTILITY INFORMATION BASED ON CALWATER AND REDWOOD CITY UTILITY SYSTEM MAPS.

FIGURE 4.4: Existing Sanitary Sewer System

- North Fair Oaks
- Parcel
- Highway
- Rail Line
- Park
- School
- Commercial Mixed-Use
- Industrial Mixed-Use
- Neighborhood Mixed-Use
- (16) Specific Area #
- Existing Sanitary Sewer Trunk Line
- Existing Sanitary Sewer Line

NOTES:
1. EXISTING UTILITY INFORMATION BASED ON SAN MATEO COUNTY AND REDWOOD CITY UTILITY SYSTEM MAPS.

FIGURE 4.5: Proposed Sanitary Sewer System Improvements

- North Fair Oaks
- Parcel
- Highway
- Rail Line
- Park
- School
- Commercial Mixed-Use
- Industrial Mixed-Use
- Neighborhood Mixed-Use
- (16) Specific Area #
- Existing Sanitary Sewer Trunk Line
- Existing Sanitary Sewer Line
- Priority Lines

NOTES:
1. EXISTING UTILITY INFORMATION BASED ON SAN MATEO COUNTY AND REDWOOD CITY UTILITY SYSTEM MAPS.

FIGURE 4.6: Existing Storm Drain System

- North Fair Oaks
- Parcel
- Highway
- Rail Line
- Park
- School
- Commercial Mixed-Use
- Industrial Mixed-Use
- Neighborhood Mixed-Use
- (16) Specific Area #
- Existing Storm Drain Line

NOTES:
1. EXISTING UTILITY INFORMATION BASED ON SAN MATEO COUNTY AND REDWOOD CITY UTILITY SYSTEM MAPS.

FIGURE 4.7: Proposed Storm Drain System Improvements

- North Fair Oaks
- Parcel
- Highway
- Rail Line
- Park
- School
- Commercial Mixed-Use
- Industrial Mixed-Use
- Neighborhood Mixed-Use
- ⑯ Specific Area #
- Existing Storm Drain Line
- Storm Drain Improvements

NOTES:

1. Existing utility information based on San Mateo County and Redwood City utility system maps.

2. Four sections of sanitary sewer mains in NFO are identified as deficient by the County of San Mateo, Fair Oaks Sewer Maintenance District, Sewer Master Plan (September, 2000) and have yet to be repaired and/or replaced. These sections are labeled as Bay Road #3, 6th Avenue, Middlefield Road, and El Camino Real #1 by the Sewer Master Plan. These lines should be replaced to meet current County standards.

3. Priority #3 locations are defined as "Sewer lines with minor to major structural deficiencies" by the County of San Mateo, Fair Oaks Sewer Maintenance District, Sewer Master Plan (September, 2000).

THIS PAGE LEFT BLANK INTENTIONALLY