Town of Scotia

Community Services District

Municipal Service Review

October 2010

Prepared for Formation of the

Scotia Community Services District

Town of Scotia

Community Services District

Municipal Service Review

October 2010

LAFCO Membership 2010

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Executive Summary

Town of Scotia, LLC (TOS) has submitted a tentative map with Humboldt County to subdivide the existing, privately-owned town of Scotia and filed an application for the formation of a Community Services District (CSD). The Humboldt County Local Agency Formation Commission (LAFCo) reviews proposals for the formation of new local governmental agencies and changes of organization for all local agencies within Humboldt County. The Municipal Service Review (MSR) was prepared to document service capabilities for the proposed CSD.

Very little development is feasible within the proposed boundaries due to limited available vacant land, substandard lot sizes that cannot support additions, and physical constraints. Current industrial uses are expected to remain the same. TOS currently provides the majority of public services and utilities for the town of Scotia. There are no new proposed facilities or services. The only change is the service provider, from TOS to the proposed Scotia CSD. As part of the transfer of services and utilities to a new CSD, a detailed utility description of ownership has been prepared and repairs to existing infrastructure have been identified and are summarized in Table ES-1.

Table ES-1

Summary of Infrastructure Analysis

Scotia CSD Formation Municipal Service Review

Utilities and Services	Changes
Wastewater collection, treatment, and disposal	Responsibility for wastewater collection, treatment, and disposal services will be transferred to the Scotia CSD. The wastewater collection system will be improved through relocation of the residential/commercial lines to the new Scotia CSD public right-of-way, using 6-inch minimum diameter pipe; replacement of all service laterals using 4-inch minimum diameter pipe and the installation of service cleanouts; and installation of new manholes and cleanouts in residential and commercial areas. The wastewater treatment facility will be improved through relocation of the electrical controls outside flood elevation; installation of new drives on the primary clarifier, deep well pumps, shallow well pumps, and secondary clarifier; leveling the primary weir; replacing the shallow well pumps; addition of a solids contact basin or small activated sludge basin, and an additional secondary clarifier; and installation of return activated sludge pumps and blowers.
Water supply, storage, treatment, and distribution	Responsibility for water supply, storage, and treatment services will be transferred to the Scotia CSD. TOS will transfer the water right license to the Scotia CSD. The water distribution service will be improved through relocation of distribution lines to the public right-of-way, installation of all new services from the new distribution lines to residences with meters, and verification of serviceability or installation of new services and meters to commercial and industrial users. Raw and treated water storage tank foundations will be modified to meet current seismic

Table ES-1

Summary of Infrastructure Analysis

Scotia CSD Formation Municipal Service Review

Utilities and Services	Changes
	codes and standards. The water treatment facility will be improved through installation of two turbidity meters, upgrades to the chlorination system, and new system electronic controls. As part of a separate maintenance project, the fire suppression water tanks will be replaced.
Drainage and flood control	Responsibility for drainage and flood control services will be transferred to the Scotia CSD. The stormwater drainage system will be improved through replacement of immediately needed portions, and installation of new and replacement drain inlets and manholes in the residential and commercial areas, as deemed appropriate from a proposed drainage facilities plan and field-identified inspections. Flood protection will be improved through relocation of the Wastewater Treatment Facility (WWTF) electrical controls outside flood elevation.
Circulation	The road and street network will be improved through repairs that will include a 0.2-foot overlay of asphalt concrete pavement throughout streets affected by the utility infrastructure modification program; patching, leveling with appropriate base course thickness; some curb replacement in kind; repair to the retaining wall at south end of B Street; and safety improvements to address basic signage and stop bars. The County will continue to be responsible for maintaining B Street, Church Street, Eddy Street, Main Street, Mill Street, 1st Street, 2nd Street, 3rd Street, 4th Street, 5th Street, and 6th Street. The CSD will take over Bridge Street, North Court, and Williams Street, and will be responsible for all other streets and alleys.
Fire protection	The Scotia Volunteer Fire Department will be organized as part of the CSD. As part of a separate maintenance project, the fire suppression water tanks will be replaced. The fire apparatus and the personal gear will be upgraded.
Power	PG&E will incorporate existing power supply and distribution systems into its regional operation. TOS will continue to operate the cogeneration plant and sell the power to PG&E.
Parks and recreation	Responsibility for parks and recreation services will be transferred to the Scotia CSD. The Scotia Union School District will continue to operate the recreation center.
Law enforcement	No change. Law enforcement services will continue to be provided by the Humboldt County Sheriff.
Telecommunications	No change. Telecommunications will continue to be available from private providers AT&T and Suddenlink.

Table ES-1

Summary of Infrastructure Analysis

Scotia CSD Formation Municipal Service Review

Utilities and Services	Changes
Natural gas	No change. Natural gas will continue to be available from private provider PG&E.
Cable	No change. Cable services will continue to be available from private providers AT&T and Suddenlink.
Solid waste collection and disposal	No change. Solid waste services will continue to be available from private provider Eel River Disposal & Resource Recovery.

The range of services to be provided by the CSD includes water, wastewater, road maintenance and street lighting, stormwater drainage, parks and recreation, and fire protection. A financial analysis of expected revenues and expenditures was prepared in order to evaluate the CSD's ability to be self-sufficient.

The financial analysis lays out a plan analyzing the CSD's forecasted revenues and expenses. Operation of the CSD would be funded through a mix of property tax allocation (negotiated with Humboldt County) and user fees. Expenses would include personnel services, material and services, capital expenditures, and debt service. The capital improvement plan described above would be funded through a combination of short-term bonds and low-interest long-term loans or bonds. The expected tax revenue, user fees, and expenses were compared to those of other similar districts and cities providing comparable services:

- Tax revenues were estimated at various possible percentage rates (0%, 8.7122%, 15%) of the property taxes collected by the County in Scotia, representative of a CSD with the wide range of services that would be provided by the Scotia CSD. The final tax allocation factor (TAF) percentage will depend on negotiations with the County.

- User fees for all services and reserves were estimated in a range of $165.34 to $184.00/month by Year Five of the CSD's operation, which will vary relative in part to the tax allocation factors. Although it is difficult to find a suitable point of comparison for the entire user fees, due to the wider range of services than is typically provided by CSDs, the portion represented by water and wastewater services, estimated at up to $121.00 for the combined rates, is comparable to that found in similar districts and cities reviewed (range of $108 to $137, with an average of $118), and falls within the range considered affordable in U.S. Environmental Protection Agency (EPA) guidance for these services (range of $113 to $150).

- An initial budget primarily related to Operations and Maintenance (O&M) was prepared for each service area and a combined budget for overall operation of the CSD was projected over a five-year period to include the expected schedule of capital improvement projects. The CSD's projected operating budget will consist of

approximately $536,500 in annual costs for personnel services and $349,000 for materials and services.

- The short-term loan or bonds will be financed entirely by the current owner, TOS. Debt service for the long-term bonds would represent approximately $30.22/month by Year Five of the CSD's operation. This is comparable to the bond levies assessed under the Mello-Roos Community Facilities Act of 1978, which enables cities, counties, special districts, and school districts to establish community facilities districts and to levy special taxes to fund a wide variety of facilities and services.

The overall operating budget relative to services provided, including revenues and expenditures, is consistent with local area agencies and experienced operating costs of the community.

The financial analysis was intended to represent a "worst case" scenario. Although the CSD, as a public entity, would have access to sources of funding (such as, grants and low-interest loans from federal and state agencies), it would be speculative to assign a dollar value at this stage. Similarly, "pooled" bonds (Pooled Transaction Certificates of Participation) funding multi-agency projects offer more advantageous rates. This funding may be obtained through entities like the California Special Districts Association (CSDA) Finance Corporation as outlined in the financial analysis and obtaining them is not considered speculative, as it can be issued with certainty. While in practical application bonds as opposed to grants/loans are considered a fallback position, they were used as the primary option in the analysis to account for the maximum anticipated user fees.

Cost-avoidance, shared facilities, and management efficiencies opportunities are identified in this MSR, most prominently those realized by integrating the Scotia Volunteer Fire District (SVFD) into the CSD structure, followed by opportunities for joint planning and purchases with other local agencies. Local governance and accountability review indicates that the CSD will have the ability to make information available to the public and comply with the Brown Act. The CSD's proposed government will be simple and closely resemble that of other similar agencies in the County. A "status quo" sphere of influence is sustainable and appropriate for the Scotia CSD.

(Note: This MSR was updated in October 2010, based on material submitted to LAFCo staff in August and September, 2010, for final consideration by the LAFCo commission prior to adoption of resolutions for approval of the CSD.)

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List of Illustrations

Abbreviations and Acronyms

CCF	100 Cubic Feet
cfs	cubic feet per second
gpd	gallons per day
gpm	gallons per minute
kV	kiloVolt
MGD	Million Gallons per Day
NTU	Nephelometric Turbidity Units
AAF	Average Annual Flow
AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
AMHI	Annual Median Household Income
APN	Assessor's Parcel Number
AWWF	Average Wet Weather Flow
CalARP	California Accidental Release Prevention Program
CDF	California Department of Forestry and Fire Protection
CEQA	California Environmental Quality Act
CIP	Capital Improvement Program
CPUC	California Public Utility Commission
CSD	Community Services District
CSDA	California Special Districts Association
DHS	California Department of Health Services
EDU	Equivalent Dwelling Unit
EMS	Emergency Medical Services
EPA	U.S. Environmental Protection Agency
ESU	Equivalent Service Unit

Abbreviations and Acronyms, Continued

FEMA	Federal Emergency Management Agency
GC	California Government Code
HOA	Home Owners Association
HRC	Humboldt Redwood Company
I/I	Infiltration and Inflow
ISO	Insurance Services Office, Ltd.
LAFCo	Humboldt County Local Agency Formation Commission
LOS	Level of Service
Marathon	Marathon Structured Finance Fund
MMWWF-5	Maximum Month Wet Weather Flow
MRC	Mendocino Redwood Company
MS4	Municipal Separate Storm Sewer System
MSR	Municipal Service Review
NCEMSA	North Coast Emergency Medical Service Authority
NCRA	North Coast Railroad Authority
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
PALCO	Pacific Lumber Company
PEIR	Program Environmental Impact Report
PPC	Public Protection Classification
RAS	Return Activated Sludge
RWQCB	California Regional Water Quality Control Board, North Coast Region
SHN	SHN Consulting Engineers & Geologists, Inc.
SVFD	Scotia Volunteer Fire Department

Abbreviations and Acronyms, Continued

SWRCB	State Water Resource Control Board
TAB	Tax Assessment Board
TOS	Town of Scotia Company, LLC
USDA	U. S. Department of Agriculture
USGS	United States Geological Survey
VCP	Vitrified Clay Pipe
VFD	Variable Frequency Drive
WDR	Waste Discharge Requirement
WTF	Water Treatment Facility
WWTF	Wastewater Treatment Facility

Zoning Designations:

C-2/Q	Community Commercial, Qualified
IG	Industrial General
MH/Q	Heavy Industrial, Qualified
U	Unclassified

Combining Zone Classifications:

D	Design Control
N	Noise
P	Planned Development
Q	Garage Lots

Chapter 1. Introduction

1.1 Purpose of Municipal Service Review

1.1.1 Overview

The Humboldt County Local Agency Formation Commission (LAFCo) reviews proposals for the formation of new local governmental agencies and changes of organization for all local agencies within Humboldt County. In order for LAFCo to approve the formation of a new agency, information must first be collected that documents the service capabilities of that agency.

This Municipal Service Review (MSR) has been prepared pursuant to LAFCo Guidelines and Procedures, updated April 28, 2001 per AB 2838 and July 15, 2003 per AB 2227 to determine how urban services will be provided to the area upon formation of a Community Services District (CSD) for the existing, privately owned town of Scotia. (Note: This MSR was updated by LAFCo staff in October 2010 for final consideration by LAFCo prior to adoption of resolutions for approval.) This MSR identifies the current service providers, level of service, and transfer of service issues related to the provision of water, wastewater treatment, storm drainage, circulation, fire protection, electrical, parks and recreation, law enforcement, telecommunication, natural gas, cable, and solid waste for the town of Scotia.

1.1.2 Regulatory Context

The applicant has submitted a tentative map with Humboldt County to subdivide the Town of Scotia. An additional application has been filed with the LAFCo to form a CSD. A Notice of Preparation (NOP) was prepared and circulated by Humboldt County in compliance with the California Environmental Quality Act (CEQA) (State Clearinghouse # 2007052042). A Draft Program Environmental Impact Report (PEIR) was prepared by SHN Consulting Engineers & Geologists, Inc. (SHN) for the County on behalf of Town of Scotia, LLC (TOS), and circulated by the County for the required 45-day public review and comment period ending in January 2008. The Final PEIR was circulated and is scheduled for a Humboldt County Planning Commission hearing (SHN, 2009).

On November 10, 2009, the Humboldt County Board of Supervisors Certified the PEIR with Resolution No. 09-77 and approved Vesting Tentative Subdivision Map FMS 05-01, allowing for the subdivision of the Town of Scotia into 340 parcels. The County also approved General Plan Amendment GPA 05-01, Rezoning ZR 05-01, and Planned Development Permit PDP 05-01, corresponding to the proposed subdivision.

1.2 Scotia Setting

Scotia, which was originally known as Forestville, was founded in 1882 as part of the purchase of 6,000 acres of forested lands along the Eel River in Humboldt County, California (see Figure 1). The Pacific Lumber Company (PALCO) began its logging operations and building of the town shortly thereafter. Scotia was built around the logging industry, and residential units were constructed to house company employees.

Approximately 420 acres of land comprises the subdivision area of Scotia on Assessor's Parcels Number (APN) 205-351-016 and 205-351-018. From the 1880s to 2008, Scotia has operated as a company town, and it was one of the last company-owned and company-operated towns in the nation. The entire town of Scotia, including the buildings, houses, accessory structures, roadways, and community infrastructure, was developed and constructed by PALCO and continues to be maintained by TOS. The residences were constructed and maintained by PALCO for their employees. Under PALCO management, the town of Scotia retained a consistency in layout, streetscapes, and historic design, and presents a well-maintained appearance.

The town of Scotia is located in the Eel River Valley in southern Humboldt County, and is bordered to the east by Highway 101, and to the north, south, and west by the Eel River. Scotia's topography ranges from flat areas in the western and central portions of the town, to sloped terrain in the eastern portion toward Highway 101. Steep, forested hillsides and mountains surround the town and river. The City of Rio Dell is located just north, across the Eel River from Scotia.

1.2.1 Project Applicant and Property Ownership

On January 18, 2007, PALCO filed for protection under Chapter 11 of the U.S. Bankruptcy Code.

On July 8, 2008, the court issued its judgment and order confirming the Plan of Reorganization submitted by secured creditor Marathon Structured Finance Fund (Marathon), joined by Mendocino Redwood Company (MRC). Pursuant to that plan, most of the Town of Scotia's real and personal assets transferred to a reorganized entity wholly owned by Marathon, Town of Scotia Company, LLC, now the applicant and project proponent. Under the plan, the active Scotia sawmill facilities and other ancillary office buildings have transferred to a second reorganized entity, Humboldt Redwood Company (HRC) in which Marathon and MRC both have interests (United States Bankruptcy Court for the Southern District of Texas, Corpus Christi Division as "Case No. 07-20027-C-11" under the consolidated title, *In Re Scotia Development LLC, et al, Debtors*.)

As a matter of law and a consequence of the Judgment and Order confirming the Plan of Reorganization, on and after the effective date, July 30, 2008, Town of Scotia Company, LLC has full legal authority to operate the PALCO Scotia businesses; to use, acquire, and dispose of property; retain, compensate, and pay professionals or advisors; settle causes or claims; etc. without any additional approval or supervision by the bankruptcy court or any other agency or entity except as may be expressly provided in the Plan of Reorganization.

1.2.2 Existing Uses

Existing uses in Scotia include a mix of commercial, residential, industrial/timber production, public facilities (after the transfer of ownership to the CSD), and recreational, all of which are summarized below (See Figure 2).

Commercial. The approximately 13-acre commercial area is located in the northern portion of Scotia, bordering Main Street. Scotia's commercial center is currently zoned Community Commercial Qualified (C-2/Q). Commercial land uses include the U.S. Post Office, a shopping center, beauty/barber shop, movie theater, bank, hardware store, HRC and TOS offices, the Scotia Museum, Scotia Inn, and a number of park-

like landscaped setback areas. The former hospital, located just off Main Street, is used for medical offices and storage space (SHN, September 2007).

Residential. There are three residential areas in Scotia with 272 residential units that are currently zoned Unclassified (U). The smallest residential area, known as the North Court Neighborhood is approximately 6 acres, located in the northern corner, adjacent to the Highway 101 Scotia off-ramp. The mid-sized residential area, known as the Williams's Street Neighborhood is approximately 13 acres, located west of the log pond and adjacent to the river. The largest residential area, known as the "Primary Neighborhood" is approximately 40 acres, located south of the commercial center, east of the main industrial area, and is bordered by Highway 101 to the east (SHN, September 2007).

The Primary Neighborhood also contains non-residential land uses that are commonly located in residential areas, including an elementary school (although not within the purview of the LAFCo), two churches, commercial offices (in the former hospital building), and the recreation center. Also within this residential area—although considered part of the public facilities zone—is the fire station (SHN, September 2007).

Industrial. Approximately two-thirds of the town of Scotia is devoted to industrial uses. The industrial area, designated Industrial General (IG) in the Humboldt County General Plan and zoned Heavy Industrial/ Qualified (MH/Q), includes: Mill complexes "A" and B, a large remanufacturing plant, a cogeneration plant, fuel and machinery buildings, a planer facility, small and large log sawmills, the log pond, log storage areas, a hardwood chip plant, a sediment pond, and a transfer station (SHN, September 2007).

There is a second, smaller industrial area located west of the large remanufacturing plant complex's lumber storage area and adjacent to the Eel River. It includes a hardwood chip plant, log storage areas, a sediment pond, and transfer station (SHN, September 2007).

Public Facilities and Recreation. These areas are currently owned and operated by TOS; however, after the transfer of ownership to the CSD and rezoning, they will be public facilities. Public facilities located adjacent to the industrial area and river, include Fireman's Park, Carpenter's baseball field, the soccer field, and the Wastewater Treatment Facility (WWTF). The water treatment plant is located on the east side of Highway 101. The North Coast Railroad Authority (NCRA) right-of-way, which extends the entire length of Scotia, is also considered a public use (SHN, September 2007).

1.3 Framework of Analysis

In preparing the MSR, three requirements were key:

1) The need to provide **levels of service** that are sufficient to meet the forecasted needs of the population and are comparable to those that are currently provided and found in similar communities in the area.

2) The **affordability** of the resulting solutions in terms of fee structure, debt service, etc.

3) The necessity to meet all applicable **regulations.**

The existing services and utilities were analyzed in light of these factors, trying to use fairness and caution. None of the upgrades that are currently proposed preclude future options for the CSD to upgrade its facilities or respond to changing conditions or unforeseen changes in regulations. The CSD will remain able to opt for new or different upgrades, new facilities, joint services with other public entities, etc.

Level of Service: The appropriate level of service is that of an existing community with facilities showing normal wear and tear but a healthy life expectancy of at least 20 years. The level of service should be maintained throughout the service life, accounting for forecasted growth, and should be comparable to that of other similar communities in Humboldt County.

The CSD and taxpayers must not be burdened with under-par infrastructure or excessive maintenance requirements; on the other hand, the community of Scotia is an existing one and it would not be reasonable to require that Scotia's infrastructure be rebuilt to match the profile of a newly-built development.

Affordability: The future CSD and the taxpayers must not be saddled with excessive fees or debt service. As a private entity, TOS presently has no access to the funding sources available to a public entity, and a conservative approach was used in the financial analysis underpinning the MSR.

Once established, the CSD will able to pursue such funding, but prudence was used in the financial planning to avoid presenting an excessively optimistic analysis. As a public entity, the future CSD will retain the ability to make more sweeping decisions if deemed appropriate.

Regulatory Requirements: SHN and TOS looked ahead in terms of capacity to meet current regulations as well as reasonably foreseeable changes in regulations for the short- to medium-term. This MSR and the Detailed Engineering Analysis (Appendix A) that supports it plan for upgrades that will allow the infrastructure to accommodate Scotia's growth needs for the next two decades under current and reasonably foreseeable regulations.

However, regulatory requirements can change with every re-issue of a permit (for example, the National Pollutant Discharge Elimination System [NPDES] and Waste Discharge Requirement [WDR] permits). It would not be reasonable to require that the facility upgrades be planned for every possible change in regulations.

1.4 Elements of the Municipal Service Review

As part of its review of municipal services, the LAFCo is required to prepare a written statement of its determination with respect to each of the following (Governor's Office of Planning and Research, 2003):

1) infrastructure needs or deficiencies,

2) growth and population projections for the affected area,

3) financing constraints and opportunities,

4) cost avoidance opportunities,

5) opportunities for rate restructuring,

6) opportunities for shared facilities,

7) government structure options, including advantages and disadvantages of consolidation or reorganization of service providers,

8) evaluation of management efficiencies, and

9) local accountability and governance.

In addition, California Government Code (GC) Section 56425 requires that the LAFCo evaluate the sphere of influence of each local governmental agency within the county.

In order to present the project-specific information in a logically unfolding sequence, the information in this MSR was arranged as follows:

Chapter 1: Introduction

Chapter 2: Growth and Population (Element No. 2)

Chapter 3: Infrastructure Analysis (Element No. 1)

Chapter 4: Finances and Rate Structure (Elements Nos. 3 and 5)

Chapter 5: Cost Avoidance Opportunities and Shared Facilities (Elements Nos. 4 and 6)

Chapter 6: Evaluation of Management Efficiencies (Element No. 8)

Chapter 7: Local Governance and Accountability (Element No. 9)

Chapter 8: Government Structure (Element No. 7)

Chapter 9: Sphere of Influence

Chapter 10: References

Chapter 2. Growth and Population

2.1 Current Population

As of January 2009, the TOS housing office estimates that there are 272 residential dwelling units in Scotia, with an estimated residential population of approximately 860 persons; TOS employs 67 people, including those who work at the Scotia Inn; with an estimated 88 additional employees working for other businesses in Scotia (Frank Bacik, personal communication). Based on the U.S. Census, and using census blocks that are approximately coterminous with the town, the year 2000 population was 849 (Tract 06023- 011100 and blocks 4 through 7, 10 through 25, 27 through 33, and 38) (SHN, September 2007).

2.2 Future Population Growth

Scotia is an unincorporated community and is located within the jurisdiction of Humboldt County with regard to land use regulations. The town's existing uses are not identified in the current General Plan land use designations and zones. However, the proposed Humboldt County General Plan Amendment and Rezone will reflect current land uses in Scotia that have been occurring for the last 100 years (see the PEIR for more detailed information). After the subdivision and sale of lots, there will be five vacant parcels. These parcels comprise the only non-developed areas in Scotia.

Scotia does not have a current community plan. As part of the ongoing Humboldt County General Plan update process, it is anticipated that the County and CSD will collaborate on the preparation of a community plan for Scotia when the CSD is formed. For more detailed information, see the PEIR.

There is limited land available for development within the proposed CSD boundaries. The vast majority of parcels are "substandard" when compared to County Zoning requirements for Residential One-Family zone, especially regarding lot sizes, yard, and maximum ground coverage requirements, thus the necessity of the Planned Development (P) combining zone. The P combining zone allows these non-conforming lots to be created because the town was developed prior to the zoning code being adopted. In essence, with the P overlay, existing non-conforming standards become the standards for each individual lot. However, County code does not allow a lot that does not comply with the code to change in a way that further exacerbates non-compliance. Simply, there is not adequate space for most residential zone lots to accommodate secondary dwelling units. Of the existing residential lots, only 11 conform to current zoning requirements. Of those 11, only 5 have adequate size or yard dimensions or maximum lot coverage to accommodate secondary dwelling units. At this time, it is speculative to say that the vacant residential lots would support second dwellings, because it would depend on the extent of site development.

The industrial areas of the town zoned MH/Q will be used by HRC as it continues to harvest timber and produce lumber at the Scotia mill. Essentially, areas used for outdoor lumber storage and the sedimentation pond will continue to be used as part of the lumber mill operations, are not considered vacant, and so will not be available for development. No plans exist to change from lumber production to some other industrial use in the foreseeable future. The subdivision and formation of a CSD will not result in changes to this existing condition.

There are physical restraints to development outside of the proposed boundaries. The town of Scotia is located adjacent to the City of Rio Dell. The Eagle Prairie Bridge (State Route 283) links Rio Dell and Scotia. Scotia is bound to the east by Highway 101 and to the north, south, and west by the Eel River. Scotia's topography ranges from flat areas in the west and central parts of the town, to sloped terrain in the eastern portion toward Highway 101. Steep, forested hillsides and mountains surround the town and river. There is no useable land available in the immediate vicinity of Scotia for development.

2.3 Determination

There is limited population growth in Scotia due to available vacant land, substandard lot sizes that cannot support additions, and physical constraints. Current industrial uses are expected to remain the same, and log storage areas and the sedimentation pond will continue to be used. Engineering studies have concluded that the existing WWTF historically handled wastewater flows and loads substantially greater than those that will exist after completion of the collection system upgrades proposed as part of the project. The WWTF is expected to have sufficient capacity to serve the newly created residential and commercial lots (SHN, November 2007).

The subdivision and formation of a CSD will not result in a need to increase capacity of the WWTF and there is an adequate water supply to sustain ongoing and future industrial operations.

Chapter 3. Infrastructure Analysis

TOS currently provides the majority of public services and utilities for the town of Scotia. There are no new proposed facilities or services. The only change is the service provider, from TOS to the proposed Scotia CSD. As part of the transfer of services and utilities to a new CSD, a detailed utility description has been prepared and repairs to existing infrastructure have been identified (see Detailed Engineering Analysis in Appendix A); and a schedule for these repairs has been developed (see Appendix B).

The proposed infrastructure improvements are in line with comparable system needs for a town similar in size and character to Scotia. Table 3-1 presents a quick overview, and the rest of this section provides analyses of each service to be provided to the CSD area. A more comprehensive analysis of the infrastructure upgrades is provided in the Detailed Engineering Analysis (Appendix A).

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Utilities and Services	Changes
Wastewater collection, treatment, and disposal	Responsibility for wastewater collection, treatment, and disposal services will be transferred to the Scotia CSD[1]. The wastewater collection system will be improved through relocation of the residential/commercial lines to the new Scotia CSD public right-of-way, using 6-inch minimum diameter pipe; replacement of all service laterals using 4-inch minimum diameter pipe and the installation of service cleanouts; and installation of new manholes and cleanouts in residential and commercial areas. The wastewater treatment facility will be improved through relocation of the electrical controls outside flood elevation; installation of new drives on the primary clarifier, deep well pumps, shallow well pumps, and secondary clarifier; leveling the primary weir; replacing the shallow well pumps; addition of a solids contact basin or small activated sludge basin, and an additional secondary clarifier; and installation of return activated sludge pumps and blowers.
Water supply, storage, treatment, and distribution	Responsibility for water supply, storage, and treatment services will be transferred to the Scotia CSD. TOS[2] will transfer the water right license to the Scotia CSD. The water distribution service will be improved through relocation of distribution lines to the public right-of-way, installation of all new services from the new distribution lines to residences with meters, and verification of serviceability or installation of new services and meters to commercial and industrial users. Raw and treated water storage tank foundations will be modified to meet current seismic codes and standards. The water treatment facility will be improved through installation of two turbidity meters, upgrades to the chlorination system, and new system electronic controls.

Table 3-1

Summary of Infrastructure Analysis

Scotia CSD Formation Municipal Service Review

Utilities and Services	Changes
	As part of a separate maintenance project, the fire suppression water tanks will be replaced.
Drainage and flood control	Responsibility for drainage and flood control services will be transferred to the Scotia CSD. The stormwater drainage system will be improved through replacement of immediately needed portions, and installation of new and replacement drain inlets and manholes in the residential and commercial areas, as deemed appropriate from a proposed drainage facilities plan and field-identified inspections. Flood protection will be improved through relocation of the WWTF[3] electrical controls outside flood elevation.
Circulation	The road and street network will be improved through repairs which will include 0.2-foot overlay of asphalt concrete pavement throughout streets affected by the utility infrastructure modification program; patching, leveling with appropriate base course thickness; some curb replacement in kind; repair to the retaining wall at south end of B Street; and safety improvements to address basic signage and stop bars. The County will continue to be responsible for maintaining B Street, Church Street, Eddy Street, Main Street, Mill Street, 1st Street, 2nd Street, 3rd Street, 4th Street, 5th Street, and 6th Street. The CSD will take over Bridge Street, North Court, and Williams Street, and will be responsible for all other streets and alleys.
Fire protection	The Scotia Volunteer Fire Department will be organized as part of the CSD. As part of a separate maintenance project, the fire suppression water tanks will be replaced. The fire apparatus and the personal gear will be upgraded.
Power	PG&E will incorporate existing power supply and distribution systems into its regional operation. TOS will continue to operate the cogeneration plant and sell the power to PG&E.
Parks and recreation	Responsibility for parks and recreation services will be transferred to the Scotia CSD. The Scotia Union School District will continue to operate the recreation center.
Law enforcement	No change. Law enforcement services will continue to be provided by the Humboldt County Sheriff.
Telecommunications	No change. Telecommunications will continue to be available from private providers AT&T and Suddenlink.
Natural gas	No change. Natural gas will continue to be available from private provider PG&E.

Table 3-1

Summary of Infrastructure Analysis

Scotia CSD Formation Municipal Service Review

Utilities and Services	Changes
Cable	No change. Cable services will continue to be available from private providers AT&T and Suddenlink.
Solid waste collection and disposal	No change. Solid waste services will continue to be available from private provider Eel River Disposal & Resource Recovery.

1. CSD: Community Services District
2. TOS: Town of Scotia, LLC
3. WWTF: Wastewater Treatment Facility

3.1 Wastewater Collection, Treatment and Disposal

3.1.1 Existing Level of Service and Improvements

TOS maintains and operates Scotia's wastewater collection, treatment, and disposal system, which are proposed to be acquired and operated by the CSD.

1) Collection System

The wastewater collection system, including portions of system pipelines, service laterals, manholes, and cleanouts, was constructed approximately 50 to 70 years ago (or more) to service a company-owned town. To that end, many collection lines, service laterals, and manholes are located under buildings, in residential yards, and are experiencing high Inflow and Infiltration (I/I) during storm events. Additionally, the pipe materials are primarily Vitrified Clay Pipe (VCP), in various states of serviceable hydraulic capacity.

Given the condition of the existing collection system as determined through inspection processes and the fact that much of the system is located outside of typical right-of-way areas (in backyards, under buildings, etc.—places that will become private property), a majority of the system needs to be replaced. A preliminary layout of a replacement system has been devised. Pending final design, some lines may need to be realigned from the proposed alignments shown on Figure 1-2 of the Detailed Engineering Analysis (Appendix A) in order to maintain gravity flow within the wastewater collection system.

The repairs to the wastewater collection system would include the following tasks:

- The residential/commercial collection system will be relocated and constructed using 6-inch minimum diameter pipe.
- All service laterals will be replaced using a 4-inch minimum diameter pipe to each building and will include a service cleanout.

- New manholes and cleanouts will be installed in the residential and commercial areas. HRC will be responsible for the repair of existing manholes on the industrial property.

These upgrades to the system are intended to significantly reduce I/I, thus reducing non-wastewater flows (stormwater primarily during the winter months) to the WWTF.

A detailed breakdown of proposed repairs is provided in Chapter 1 of the Detailed Engineering Analysis (Appendix A).

2) Wastewater Treatment

The Scotia WWTF is located on Williams Street, west of the main industrial area, north of the soccer field, and within the 100-year floodplain of the Eel River. The WWTF was constructed in 1954 and consists of the treatment headworks, a primary clarifier, a redwood slat trickling filter, a secondary clarifier, a sludge digester, a chlorine contact basin, a series of three treatment ponds, and a final summer percolation discharge pond (summer) or permitted Eel River discharge (fall, winter, spring).

The treatment plant process has an estimated existing hydraulic capacity of approximately 1.0 Million Gallons per Day (MGD). The Average Annual Flow (AAF) of wastewater treated is estimated at 0.240 MGD, with an Average Wet Weather Flow (AWWF) of 0.288 MGD and a Maximum Month Wet Weather Flow (MMWWF-5) of 0.420 MGD (Detailed Engineering Analysis Table 2-6, Appendix A).

The wastewater treatment system is operated by licensed operators. The WWTF has a State-regulated quantity of chlorine gas (4,400 pounds), which must also be managed according to the California Accidental Release Prevention Program (CalARP) Risk Management Plan. The proposed repairs to the existing WWTF incorporate upgrades to minimize the risk of the facility's location within the 100-year floodplain, provide redundancy for major treatment processes, and increase the secondary treatment capacity. A layout of the existing WWTF is shown in Figure 2-1 of the Detailed Engineering Analysis (Appendix A).

The existing WWTF is now operating under a new NPDES permit, and to date has met its permit conditions. In addition, an existing Cease and Desist Order for the WWTF sets forth a compliance schedule to develop and implement a pollution prevention plan (California Regional Water Quality Control Board North Coast Region [RWQCB], September 20, 2006).

The wastewater treatment system must provide reliable secondary treatment for at least the next 20 years. To achieve satisfactory performance within this timeframe, it will be necessary to upgrade or replace major components of the existing treatment system. These upgrades are summarized below:

A) Electrical Controls

The electrical controls will be relocated to a new elevated control room, above the 100-year flood elevation. The control room will contain the Variable Frequency Drive units (VFDs) for pump motors and a new electrical control panel.

B) Primary Treatment

Primary treatment consists of a primary clarifier and associated deep well pumps. Deep well pumps were replaced in 2007. Recommended upgrades to the primary treatment system include:

- replacing the primary clarifier drive,
- installing VFDs on deep well pumps, and
- leveling the top of the primary weir.

C) Secondary Treatment

With the installation of VFD motors on the shallow well pumps, the recirculation rate can be increased and the filter can be loaded at higher rates. Using the VFDs, it is estimated that the existing trickling filter will have the capacity to treat projected loadings.

Recommended improvements to the secondary treatment system include:

- Replacement of shallow well pumps with submersible pumps not impacted by flooding
- Installation of VFDs on the shallow well pumps
- Construction of a solids contact or small activated sludge basin following the trickling filter to operate as a combined suspended growth/trickling filter process
- Installation of Return Activated Sludge (RAS) pumps to transfer solids from secondary clarifiers to the solids contact basin
- Installation of blowers for the solids contact process with controls installed in the proposed control room
- New drive for existing secondary clarifier and horizontal baffling to increase settling
- Construction of an additional secondary clarifier to provide redundancy and improve treatment performance during peak flow events

D) Biosolids

The digester has the capacity to handle projected loadings; however, structural improvements will be necessary. Although the extent of these improvements will be assessed during design, an estimate of probable cost has been included in the upgrade costs.

The tertiary ponds are full of biosolids. The cost of initial and periodic removal biosolids from the tertiary ponds was included in the financial analysis as part of Operations and Maintenance (O&M).

Discussions with TOS have indicated that land application of dewatered biosolids is the preferred alternative for biosolids disposal. During dry weather, biosolids would be applied from the proposed drying beds onto forested land. In addition, upgrade costs include new covered drying beds with a drainage system that discharges into the influent sanitary sewer and a truck to dispose of biosolids.

3) Wastewater Disposal

During high winter flows, treated effluent is discharged directly into the Eel River. During the summer months, when discharges to the Eel River are prohibited, the percolation pond is used for disposal of treated effluent. The pond is a temporary construction and used only in the summer (May-October), to percolate treated wastewater from the WWTF. The Clean Water Act Section 404 permit from the U.S. Army Corps of Engineers, the Clean Water Act Section 401 Water Quality Certification from the RWQCB, and the California Department of Fish and Game Code Section 1603 agreement allow for the construction of the temporary percolation pond, which is annually removed by TOS.

Wastewater discharges from the Scotia Mill and Town of Scotia are currently covered under Waste Discharge Requirements Order No. 2006-0020, NPDES Permit No. CA0006017. These waste discharge requirements are associated with wastewater discharges from the industrial operations at the Scotia Mill and the existing WWTF, and do not cover stormwater discharges from the HRC Scotia Mill operations or the town of Scotia, which are discussed in more detail under section 3.3 of this MSR. The NPDES permit authorizes the WWTF to discharge treated wastewater from Scotia municipal waste treatment facility and 1.0 MGD from the Scotia steam electric power plant (including approximately 0.86 MGD of once-through cooling water).

Wastewater disposal alternatives are being investigated under a separate NPDES program with the RWQCB. TOS is planning for summer wastewater disposal by means of storage and evaporation from the existing log pond.

3.1.2 Scotia Level of Service with Improvements

Wastewater systems are currently operated by CSDs in several unincorporated communities in Humboldt County, including McKinleyville, Redway, and Shelter Cove.

According to the PEIR, the formation of a CSD for Scotia would provide an organizational structure to operate and maintain the wastewater facilities while the subdivision would create individual lots for existing dwellings or structures and other related facilities. The CSD and subdivision would not result in a substantial increase in population or demand on wastewater systems. Wastewater system capacities are sufficient to serve the existing community and the foreseeable growth. The former Mill “A” facility is currently being converted into light industrial uses. The Eel River Brewing Company brewery is required to provide pre-treatment to minimize the impact of its discharge on the WWTF.

Wastewater collection systems are being upgraded to meet current standards of practice to serve residential and commercial areas. New collection lines, service laterals, manholes, and cleanouts will be constructed to upgrade the existing collection system and to remove collection system facilities from under buildings and into easements accessible to O&M personnel.

The planned upgrades to the collection system are expected to reduce I/I significantly and therefore flows entering the WWTF will also decrease. For planning purposes, I/I reductions have been estimated at 70%. This is believed to be a conservative estimate because the upgrades target the worst sources of I/I identified, and can therefore be reasonably expected to curb I/I by an even greater proportion.

As a result, flows reaching the WWTF will decrease substantially. Even factoring in all available residential and commercial site development, the wastewater inflows after rehabilitation of the collection system would be well below current operating conditions (see Table 2-6 of the Detailed Engineering Analysis, Appendix A). The current permitted capacity of the WWTF is 1.0 MGD. The proposed upgrades to the WWTF will provide the WWTF with the ability to meet flows and loadings forecasted for the next 20 years.

Currently, the two regulated point source dischargers in Scotia are the cogeneration plant and the WWTF, which are regulated by the same permit. TOS would continue to operate and maintain the cogeneration plant. The CSD will assume responsibility for ownership and maintenance of the WWTF. Given the changes proposed in this MSR, the CSD would require a change of name on the existing waste discharge permit. If substantial changes not planned in this MSR were to occur in the future, a new waste discharge permit would need to be pursued by the CSD.

3.1.3 Implementation Schedule

A detailed breakdown of costs and system improvements for the wastewater treatment and disposal is listed in Chapters 2 and 3 of the Detailed Engineering Analysis (Appendix A). Proposed wastewater system infrastructure modifications will occur concurrently with proposed domestic water distribution system and stormwater collection system improvements. A preliminary capital improvement program being proposed by TOS indicates construction of the wastewater collection, treatment, and disposal system starting in 2011 and continuing into 2017.

3.1.4 Determination

Ongoing upgrades to the existing infrastructure to meet level of service standards will bring the services into compliance with regulations and standards of practice that will become applicable as a public entity. With completion of these upgrades, the Scotia CSD will be able to continue providing wastewater collection, treatment, and disposal services to the town of Scotia for an additional 20 to 30 years without creating negative impacts on the level of service or the environment. Completion of wastewater facilities upgrades is part of the ongoing maintenance. Upon formation of the Scotia CSD, these facilities will have the capacity to meet levels of service standards and standards of practice normally associated with such services as well as comply with applicable regulatory requirements.

With completion of the collection and treatment infrastructure upgrades, the Scotia CSD is an appropriate wastewater service provider for the town of Scotia.

3.2 Water Supply, Storage, Treatment, and Distribution

3.2.1 Existing Level of Service and Improvements

TOS operates and maintains Scotia's water systems. The domestic Water Treatment Facility (WTF) is located on the hillside across Highway 101, east of Scotia. Currently, TOS's WTF and distribution system provides potable water to the town of Scotia and to TOS and HRC facilities. The California Department of Health Services (DHS) regulates the potable water system.

1) Water Supply

The Eel River Watershed, covering a drainage area of 3,684 square miles, is the third largest in the State of California. Based on data obtained from the California Department of Water Resources for January 1992 to the present at the Scotia gaging station, annual median flow was 1,900 cubic feet per second (cfs); median flow from May through November was 380 cfs, and median flow from December through April was 12,200 cfs. The 10^{th} percentile flow was 103 cfs and the 90^{th} percentile flow was 21,000 cfs (California Department of Water Resources, 2009). Peak discharge happened in 1964 and is estimated at approximately 752,000 cfs (Costa and Jarrett, 2008).

TOS owns Eel River diversion entitlements of up to 4,588,500 gallons per day (gpd) for drinking water, mill processes, and fire supply (7.1 cfs, or 4.6 MGD) and can provide adequate supply for the town of Scotia and HRC mill operations (Water Right License 6373). Historical records reviewed for the Detailed Engineering Analysis (Appendix A) indicate that under current conditions, the maximum daily usage was 601,000 gpd, and the average was 484,400 gpd. There is substantial reserve capacity for any reasonably foreseeable industrial development with the current water treatment system. New or expanded drinking water facilities are not necessary.

In the future there may be more light industrial operations, using the partially vacant Mill "A" building for which there is an adequate supply of water. TOS also owns the water intake structure, raw water pumping station, and raw water transmission system.

TOS will transfer the water right license to the Scotia CSD, setting aside a contractual right that guarantees HRC a specific quantity of water. The Scotia CSD will operate the diversion facility itself for purposes of conveying its own water. Regarding delivery of the water, this arrangement is structured to require the Scotia CSD to deliver the water or else give HRC the right to use the diversion facility—and any replacement facility—to divert and convey its own water supply. HRC will maintain the distribution of the water for industrial uses and fire suppression. In short, TOS would convey the water right and the diversion works to the CSD.

2) Water Storage and Distribution

The water intake is located in an infiltration gallery in the bed of the Eel River. A pumping station and piping system transfers raw water to a 1,000,000-gallon steel tank located on a concrete pad east of the WTF. The water flows to the WTF by gravity. Following treatment, finished water is

stored in a 488,000-gallon steel tank located below the WTF, directly to the west. According to the Detailed Engineering Analysis (Appendix A), the finished water storage tank foundation will require a seismic upgrade.

The domestic water distribution system needs complete replacement for lines 3 inches in diameter and smaller because lines are leaking, damaged, or unable to meet current standards (4 inch minimum diameter). As shown in the Detailed Engineering Analysis (Appendix A), over 40% of the current water usage is unaccounted for (192,000 gpd out of an average treated water production of 405,350 gpd). Unaccounted-for water may include unmetered industrial service connections, public facilities, parks and schools; loss due to leakage; and WTF losses (from filter backwashes). System loss due to leakage is believed to be a significant source of unaccounted-for water; the water supply system was installed in the 1930s and 1940s and much of it is brittle cast-iron pipe.

Proposed upgrades to the system include replacement of over 9,500 feet of main water lines, and installation of meters at every residential and commercial service connection in the domestic water system. Monitoring water use will also facilitate identification of leaks.

Additional proposed upgrades include the rerouting of certain existing distribution lines to avoid proposed property and easement/access issues for system maintenance and operation. The existing water distribution layout for Scotia is presented in Figure 4-1 of the Detailed Engineering Analysis (Appendix A). Distribution system replacement components will include:

- all new services from the new distribution lines (relocated to avoid property, structure, and easement conflicts) to residences with meters, and
- verified serviceable or installation of new services and meters to commercial and industrial users.

Because the town of Scotia is not yet a public entity and therefore does not have its own standards, outside references were used to establish baseline standards in order to determine what improvements would be proposed for Scotia's systems during initial CSD formation, and subsequent capital improvements planning (for upgrading system components to area municipal standards). These include the nearby cities of Rio Dell and Fortuna's standard improvement specifications, referred to in the Detailed Engineering Analysis (Appendix A) as the "City Standards."

Replacement of the 3-inch and smaller diameter distribution lines will meet current "City Standards," which require a minimum line size of 4 inches. Modifications to the distribution system will also include construction of facilities to provide a combination potable domestic and fire suppression water system. Figure 4-4 of the Detailed Engineering Analysis (Appendix A) shows the proposed Scotia combined water system layout.

3) Fire Suppression Water

The current fire supply tank farm is accessible by means of an existing road. The two, 500,000-gallon tanks share a level pad on the north side of the access road, independent from the drinking water supply tanks located on the south side of the access road. The water tank farm and surrounding land are zoned for

timber production and share the setting with second-growth timber. The tanks are surrounded by a clear zone to keep debris and falling limbs and trees away from the tanks.

In October 2008, engineers recommended that the two existing 500,000 gallon water tanks used for fire protection, and located at the tank farm east of Highway 101 be replaced by one new 750,000-gallon concrete water tank (SHN, October 2008). The new tank will best serve the fire protection needs of the town and industrial facilities well into the future, as well as limiting the liability of the CSD.

The existing industrial fire suppression water distribution system (excluding the new tank) will be owned and operated by HRC. Portions of the existing fire suppression water distribution system (Figure 4-3 of the Detailed Engineering Analysis, in Appendix A) will be incorporated into the new domestic water system. The Scotia CSD will take over the existing domestic (residential and commercial areas) Scotia fire distribution system. Modifications and an upgraded service to segregate the industrial system from residential and commercial will be paid for by TOS. The new Scotia CSD domestic system construction, incorporating modifications to accommodate becoming a combined potable/fire water system, will allow the Scotia CSD and HRC fire systems to work independently of each other, yet have supply redundancy in emergency situations.

A detailed breakdown of costs and system improvements is listed in Chapter 4 of the Detailed Engineering Analysis (Appendix A).

4) Water Treatment

The WTF is functioning, is in good condition, and has been well maintained. A layout of the existing WTF is shown as Figure 5-1 of the Detailed Engineering Analysis (Appendix A).

The water treatment system is operated by licensed operators. The WTF has a State-regulated quantity of chlorine gas (600 pounds), which must also be managed according to the CalARP Risk Management Plan (SHN, September 2007).

The water treatment system consistently produces high quality water. Filter effluent turbidity (which is recorded daily) indicates that average finished water turbidities under current conditions were less than 0.06 Nephelometric Turbidity Units (NTU). During this period, the maximum daily turbidity recorded was 0.50 NTU and consistently low finished water turbidities were maintained even when raw water turbidity exceeded 100 NTU (see Detailed Engineering Analysis, Appendix A).

The disinfection system feed rates and dosages are monitored on a daily basis to ensure that the chlorine residual is maintained throughout the system and to comply with California DHS requirements. A chlorine residual measurement is obtained from a service in the distribution system on a daily basis. Based on the water system filtration report, the residuals average 0.3 milligrams per Liter (Detailed Engineering Analysis, Appendix A).

Historical records cited in Section 5.4 of the Detailed Engineering Analysis (Appendix A) indicate a potable water treatment capacity of 622,000 gpd under the current loading conditions. The maximum daily usage in that period was 601,000 gpd, and the average was 405,350 gpd. The limiting portions of the treatment

system as currently operated can produce 1,244,000 gpd. The treatment could be increased, without significant changes in operation, to produce 1,450,000 gpd.

Two turbidity meters will be installed at the plant, upgrades will be made to the chlorination system, and new system electronic controls will be constructed for more efficient water treatment and operations.

A detailed breakdown of costs and system improvements is listed in Chapter 5 of the Detailed Engineering Analysis (Appendix A). A detailed breakdown of annual O&M costs is included in the Financial Analysis (Appendix C).

3.2.2 Scotia Level of Service with Improvements

Water distribution systems are being upgraded to meet current standards of practice to serve residential and commercial areas. In response to formation of the CSD, the old domestic distribution water lines need to be replaced, and water meters, installed. New services will be completed to meet current standards of practice for several local municipalities, (such as, Fortuna). Modifications to the transmission and distribution system will also include construction of facilities to provide a combination potable domestic and fire suppression water system, thus separating Scotia water infrastructure from HRC mill facilities infrastructure.

The existing industrial fire suppression water distribution system (excluding the new tank) will continue to be owned and operated by HRC, with appropriate easement access negotiated with the Scotia CSD for raw water to be acquired and independently pumped (by CSD-operated pumps) to the existing one million gallon raw water storage tank (and then diverted to the existing raw water fire tanks and the treatment plant where water is subsequently treated and stored in the existing 488,000-gallon tank). Portions of the existing non-industrial fire suppression water distribution system will be incorporated into the new domestic water system.

Service to residents will not be significantly interrupted by the infrastructure improvements, as this type of work is typically performed in municipalities to upgrade or modify existing infrastructure.

Historical records cited in Section 5.4 of the Detailed Engineering Analysis (Appendix A) indicate a potable water treatment capacity of 622,000 gpd under the current loading conditions. The maximum daily usage in that period was 601,000 gpd, and the average was 484,400 gpd. The limiting portions of the treatment system as currently operated can produce 1,244,000 gpd. The treatment could be increased, without significant changes in operation, to produce 1,450,000 gpd. The current water right allows a diversion of up to 4,588,500 gpd.

There is substantial reserve capacity for any reasonably foreseeable industrial development with the current water treatment system. As discussed earlier in Section 2.3, the possibility of growth is extremely limited by physical conditions in Scotia. No new or expanded water resource entitlements would be needed. Water system capacities are sufficient to serve the existing community. No new water treatment facilities or expansion of existing facilities would result from the CSD and subdivision; however, improvements are being prompted by the proposed transfer of operations.

In addition, the planned upgrades to the water supply system, and particularly the replacement of a significant portion of the water main lines, will result in decreased losses and therefore in added capacity. The current water supply system is adequate to fulfill the demand on the system and the proposed CSD and subdivision would not cause or create a substantial increase in the existing water demand for the town of Scotia.

Water systems are currently provided by a CSD in several unincorporated communities in Humboldt County, including McKinleyville, Redway, and Shelter Cove.

3.2.3 Implementation Schedule

TOS will be carrying out upgrades to the existing infrastructure to meet level of service standards prior to the CSD formation.

Water system infrastructure modifications will occur concurrently with proposed wastewater collection and stormwater collection system improvements. A preliminary capital improvement program proposed by TOS indicates construction of the water supply, storage, treatment, and distribution system starting in 2011 and continuing into 2014.

3.2.4 Determination

There is substantial reserve capacity for any reasonably foreseeable industrial development with the current water treatment system. The Scotia CSD will be able to provide water supply storage, treatment, and delivery services to the town of Scotia and its residents without creating negative impacts on the existing level of service or the environment.

With completion of the storage, distribution and treatment infrastructure upgrades, the Scotia CSD is an appropriate water service provider for the town of Scotia.

Completion of water facilities upgrades is part of the ongoing maintenance. Upon formation of the Scotia CSD, these facilities will have the capacity to meet levels of service standards and standards of practice normally associated with such services as well as comply with applicable regulatory requirements.

3.3 Drainage and Flood Control

3.3.1 Existing Level of Service and Improvements

1) Stormwater Drainage

HRC mill facilities and Scotia storm drain systems have outfalls to the Eel River and the log pond. The log pond is being used as a stormwater treatment facility as well as for treated wastewater discharge. Humboldt County and State of California highway drainage facilities also tie into the existing storm drain system at various locations. TOS currently provides maintenance for the storm drain system. Culverts associated with County-maintained roads in Scotia are maintained by Humboldt County. TOS manages the drainage systems that are not associated with County-maintained roads (SHN, September 2007).

In the past, the town's sewer system functioned as a combined sanitary sewer and stormwater collection system. However, as part of a concerted, all known stormwater connections have been separated from the sanitary sewer system. Smoke test studies have been conducted to help identify and disconnect stormwater inflow piping. Additional smoke testing is also anticipated to be performed in the future, as a part of TOS's effort to comply with NPDES permit requirements (Detailed Engineering Analysis, Appendix A).

Similar to the water and wastewater collection systems, the stormwater collection system has major piping located under existing buildings. Taking into consideration the location of the main lines, along with information gathered from 2006 visual and Closed Circuit Television inspections, a preliminary estimate of repairs has been prepared. The proposed repairs are based upon:

- replacement of immediately needed portions of the existing system, and
- installation of new and replacement drain inlets and manholes in the residential and commercial areas (HRC will repair existing drain inlets and manholes on their industrial property).

2) Floodplains and Flood Protection

Based on review of the July 1982 Flood Insurance Rate Map for Scotia (FEMA, 1982), there are several locations in Scotia that are located within the 100-year flood hazard area. Areas within Flood Zone A30 (areas with a 1% annual chance of flooding and a 26% chance of flooding over a 30-year period) include the existing WWTF and the associated treatment ponds and percolation pond, areas west of Railroad Avenue, the soccer field, Fireman's Park, Carpenter's Field, the chip plant, and portions of the new sawmill and planer building. Some portions of the new sawmill are in Flood Zone B (areas less than 1% annual chance of flooding), which also extends parallel to a number of homes along Railroad Avenue (SHN, September 2007).

Numerous large floods have occurred in Scotia as a result of intense winter storms and historical upslope land disturbances. The highest recorded Eel River discharge at the Scotia gage is 752,000 cubic feet per second (Costa and Jarrett, 2008), which occurred on December 23, 1964, and had an estimated recurrence interval of 290 years. A berm (designed by LACO Associates) is now located at the HRC hardwood deck area to detain future floodwaters. The berm was designed using large riprap on the face and in a keyway that was grouted with concrete into the substrate. The berm is located in the lumber and log deck areas of the HRC mill operations.

3.3.2 Scotia Level of Service with Improvements

Storm drainage systems are currently provided by CSDs in several unincorporated communities in Humboldt County including McKinleyville, Redway, and Shelter Cove.

According to the PEIR, the proposed subdivision of Scotia would not result in an increase in population or development that could cause an increase in demand for stormwater infrastructure. Improvements to the storm drainage system are proposed to meet current standards of practice including replacement of existing, pipe, installation of new and replacement drop inlets, and manholes. Drainage and wastewater infrastructure will be separated after reconstruction. As Scotia is currently "built out," existing storm drain lines will not require size upgrades. However, stormwater modeling and facilities planning will be conducted

to confirm system component capacities. The proposed CSD and subdivision would not involve any proposed land use changes from existing conditions and would not create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems, provide substantial additional sources of polluted runoff, or otherwise substantially degrade water quality.

The proposed CSD and subdivision would not result in any physical modifications to the existing drainage pattern and do not involve alteration of a stream course or river. A minor increase in runoff associated with the development of three vacant residential and two commercial parcels could occur under the proposed subdivision. The impact of this increase on the area stormwater drainage system is not expected to exceed the capacity of the existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.

Although there are existing uses located in flood hazard areas within the town of Scotia, the proposed CSD and subdivision would not expose people or structures to a significant risk of loss, injury, or death, including flooding as a result of higher river flows, above the existing level of exposure. As part of the WWTF upgrades, the electrical controls will be relocated outside flood elevation (see Section 3.1.1).

According to the PEIR, during the 2006 NPDES permit renewal process for the Scotia Mill and Town of Scotia, it was determined that industrial stormwater discharges from the Scotia Mill operations would best be regulated under the General Industrial Permit for Stormwater Discharges associated with Industrial activity (WQ Order No. 97-03-DWQ). A notice of intent to comply with the Industrial Stormwater Permit was submitted to the State Water Resource Control Board (SWRCB) on March 23, 2005, for coverage starting during the 2005-2006 stormwater monitoring season. After CSD formation, HRC will continue to maintain industrial permits for current industrial operations.

Throughout the town of Scotia, there is some commingling of residential and industrial stormwater discharges. However, during the NPDES permit renewal process, it was determined that stormwater discharges from the town of Scotia were not required to be covered under an NPDES permit because the town of Scotia is not currently designated as a regulated Small Municipal Separate Storm Sewer System (Small MS4) by the SWRCB or the RWQCB. The town of Scotia was neither listed on Attachment 2 of the General Municipal Permit, nor designated by the RWQCB or SWRCB after adoption of the General Permit; consequently the Phase II regulations of the Municipal Stormwater Permitting Program do not apply.

The Scotia CSD would not constitute an automatically designated Small MS4 because Scotia does not qualify as an Urbanized Area (an area of population of 50,000 and a population density of 1,000/square mile). At some point in the future, if the SWRCB or the RWQCB chooses to designate the Scotia CSD as a regulated Small MS4, then the CSD would be required to obtain coverage under the General Municipal Permit and comply with the general permit requirements.

3.3.3 Implementation Schedule

Proposed stormwater system infrastructure modifications will occur concurrently with proposed water distribution and wastewater collection system improvements. A preliminary capital improvement program being proposed by TOS indicates stormwater drainage system construction starting in 2011 and continuing into 2014.

3.3.4 Determination

Upgrades to the existing infrastructure to meet level of service standards will bring the services into compliance with applicable stormwater regulations. With completion of these upgrades, the Scotia CSD will be able to continue providing operation and maintenance of storm drainage systems to the town of Scotia for an additional 20 to 30 years without creating negative impacts on existing levels of service or the environment.

With completion of the stormwater drainage infrastructure upgrades, the Scotia CSD is an appropriate drainage service provider for the town of Scotia.

Completion of stormwater facilities upgrades is part of the ongoing maintenance. Upon formation of the Scotia CSD, these facilities will have the capacity to meet levels of service standards and standards of practice normally associated with such services as well as comply with applicable regulatory requirements.

As part of the WWTF upgrades, the electrical controls will be relocated outside the 100-year flood elevation.

Although there are existing uses located in flood hazard areas within the town of Scotia, the proposed CSD and subdivision would not expose people or structures to significant or new risk from flooding above the existing level of exposure.

3.4 Circulation

3.4.1 Existing Level of Service and Improvements

Scotia has a network of arterial and collector streets that provide service to the various neighborhoods. This road system was constructed by PALCO and the California Department of Transportation. Many of the roads were accepted into the County-maintained road system and are maintained by the Humboldt County Public Works Department. In addition to the road system, there are a number of alleys that are used as common access to garages. There are also several privately maintained roads. The County of Humboldt is responsible for maintaining the following streets in the town of Scotia: B Street, Bridge Street, Church Street, Eddy Street, Main Street, Mill Street, North Court, Williams Street, 1st Street, 2nd Street, 3rd Street, 4th Street, 5th Street, and 6th Street. TOS provides maintenance on the remaining streets on an as needed basis.

Main Street is the only street in Scotia classified by the County of Humboldt as a "Collector." Main Street is accessed by way of Northbound U.S. Highway 101 and SH 283. All other roads in Scotia are classified as "Local Roads." Scotia does not have official bike routes, trails, or paths. Many of the streets are unnamed. The streets appear to be in good condition, and residential streets have sidewalks on one side only. There are approximately four marked crosswalks, all of which are centered on the commercial Main Street.

As a result of installation of new wastewater collection, water distribution, and stormwater collection systems, the street system in Scotia will be in need of repair. The Detailed Engineering Analysis (Appendix A) indicates that 75% of existing roadways will require repair. Selected roadways/streets are anticipated to need a 0.2-foot asphalt overlay. Before final pavement overlaying, it is anticipated that preliminary work to address patching, leveling with appropriate base course thickness, and some curb replacement will be needed.

The proposed repairs, as described in the Detailed Engineering Analysis (Appendix A of the MSR) include:

- 0.2-foot overlay of asphalt concrete pavement throughout affected streets;
- patching, leveling with appropriate base course thickness;
- some curb replacement in kind;
- repair to the retaining wall at south end of B Street; and
- safety improvements to address basic signage and stop bars.

Scotia is serviced by the Redwood Transit System, which operates a fixed route service along the US 101 corridor from Trinidad in the north to Scotia in the south. A small population and low ridership limit public transit within Scotia. At present, there is one bus stop at Hoby's Market in Scotia. Regional bus service from Monday to Friday has seven scheduled stops going north: four in the morning and three after noon. Those times are 6:29 a.m., 7:23 a.m., 8:29 a.m., 10:29 a.m., 2:29 p.m., 4:32 p.m., and 6:48 p.m. There are six scheduled stops proceeding south from Hoby's Market. Two are in the morning and four are after noon. Those times are 8:08 a.m., 10:15 a.m., 1:58 p.m., 4:16 p.m., 6:31 p.m., and 7:34 p.m. According to the census population count, 0% commute to work by bus, 14.4% commute to work by carpool, 62.4% commute to work by automobile, and 3.2% work from home (2000 U.S. Census).

3.4.2 Scotia Level of Service with Improvements

Upon completion of proposed underground utility construction (includes temporary paving) in each area of Scotia, roadway surfaces will be reconstructed with the final asphalt concrete pavement overlays discussed above. Refer to the Detailed Engineering Analysis (Appendix A) for detail.

The County will continue to be responsible for maintaining B Street, Church Street, Eddy Street, Main Street, Mill Street, 1st Street, 2nd Street, 3rd Street, 4th Street, 5th Street, and 6th Street. The CSD will take over Bridge Street, North Court, and Williams Street, and will be responsible for all other streets.

There will be no change in the public transportation because it is not currently provided by TOS.

According to the Traffic Analysis in Section 7 of the Detailed Engineering Analysis (Appendix A), the proposed rezone and subdivision of the town of Scotia will not have an adverse affect on traffic flow. The current traffic count data and the traffic count data from Caltrans and the Humboldt County Public Works Department attest to the fact that there has been no significant change in traffic flow from 1973 to present. If the subdivision were to incorporate a new population of people who were employed outside the town limits of Scotia, an observable increase in traffic may occur during a.m. and p.m. peak hours at the Junction 283 intersection with Highway 101. However, this slight increase would not significantly affect traffic flows in the area. In addition, the PEIR concluded that the CSD and subdivision would not result in any significant impacts associated with traffic increases, Level Of Service (LOS), roadway geometry (design features), or incompatible land uses affecting emergency access.

Consultant Downey/Brand, Attorneys, LLP, evaluated the issues associated with the provision of pedestrian access as required by the Americans with Disabilities Act (ADA) (see PEIR). Due to the historical resources present in Scotia, any planned changes to existing roads require consultation with the Design Guidelines prepared in support of the PEIR and State Historic Preservation Office to avoid or minimize impacts to historical resources. Ready access is already being met; existing curb ramps are in place. Some additional curb ramps may be required as a result of other work related to the capital improvement project.

The sale of homes will result in an increase in property tax for the County. A fraction of that increase will go to the County for road repair and maintenance. A combination of assessment fees along with TOS's participation to provide raw materials will fund road maintenance for the CSD. The CSD will still be subject to the Humboldt County Public Works road standards, therefore, a change in the LOS that Humboldt County or the CSD can provide is not anticipated. Additionally, no new roads are necessary for subdivision approval or maintaining LOS.

3.4.3 Implementation Schedule

The proposed overlay work, being part of the capital improvement plan, is anticipated to begin in 2013 and be completed in 2014. See Appendix B for a detailed schedule.

3.4.4 Determination

The Scotia CSD and Humboldt County Public Works Department are able to continue to provide road maintenance to the town of Scotia without altering or creating a negative impact to existing LOS.

The Scotia CSD is an appropriate road maintenance provider for those roads not maintained by the County for the town of Scotia. Completion of road/street upgrades is part of relocating public utilities within public rights-of-way. Upon formation of the Scotia CSD, these roads/streets will have the capacity to meet LOS standards and standards of practice normally associated with such services as well as comply with applicable regulatory requirements.

3.5 Fire Protection

3.5.1 Existing Level of Service and Improvements

The Scotia Volunteer Fire Department (SVFD) is unique in Humboldt County because it is organized as part of TOS rather than a special district. Volunteers for the SVFD are residents of Scotia, and employees of HRC, TOS, or other Scotia businesses. The SVFD has one fire station located at 145 Main Street, roughly in the center of town; provides Emergency Medical Services (EMS) and fire service calls; and operates three water pump engines, two water tenders, and one medical rescue vehicle. The California Department of Forestry and Fire Protection (CDF) provides dispatch services for the SVFD through the Humboldt County Fire Dispatch Cooperative. The SVFD provides service throughout the town of Scotia and has often responded to CDF dispatches to incidents on Highway 101 and as far south as Redcrest. The SVFD has mutual aid agreements with CDF and surrounding fire departments. The SVFD responds to about 45 calls for service per year, approximately 80 percent of which are medically related.

The SVFD has secured outside Workers Compensation Insurance to allow non-company employees to join the fire department. Town residency has also opened up to those not directly related to either company. This has brought some very qualified volunteers to the SVFD. The current SVFD membership consists of 20 volunteers for a population of approximately 860.

The majority of firefighters have attended the Humboldt County Firefighter 1 Academy, which is State-certified. The volunteers are sent to other County-offered trainings (such as, the Humboldt County Firefighter Workshops). The majority is trained to the EMS First Responder level and all are trained in CPR/First Aid and Professional Rescuer Level, which incorporates Automated External Defibrillator with OX Administration certification.

The current fire suppression water supply tank farm is accessible by means of an existing road. The two, 500,000-gallon tanks share a level pad on the north side of the access road, surrounded by a clear zone to keep debris and falling limbs and trees away from the tanks. A 1,000,000-gallon raw (untreated) domestic water tank occupies a pad independent from the fire supply tanks on the south side of the access road. The water tank farm and surrounding land are zoned for timber production and share the setting with second-growth timber.

In addition to filling the two fire suppression water tanks, the fire system also supplies raw water to the cogeneration power plant. A new meter was installed at the power plant in April 2006, and the current estimate of raw water use at the plant totals 354,000 gpd, or approximately 246 gallons per minute (gpm) averaged over a 24-hour period. This represents a baseline demand for the fire system. The system has more than adequate capacity to meet minimum fire flow and duration requirements of 1,500 gpm for 5 hours in residential, commercial, and industrial areas of Scotia in addition to supplying the power plant.

Insurance Services Office, Ltd. (ISO) establishes fire insurance ratings for communities throughout the United States. One of ISO's services is to evaluate the fire suppression delivery systems of fire departments and districts. The result of those reviews is an individual Public Protection Classification (PPC) rating number assigned to the community which the respective fire department protects. The ratings are presented in a rating class structure which ranges from 1 to 10. Class 1 is the highest rating, representing excellent fire protection, and Class 10 is the lowest, meaning the community's fire department did not meet the minimum requirements of the Fire Suppression Rating Schedule and is not recognized by ISO. The PPC is commonly used by insurance providers to establish home and business fire insurance rates. Scotia's most recent PPC was in the 4.9 to 5.9 bracket and has been in this range since 2003. This is a rating similar to the most recent results for the neighboring cities of Fortuna and Rio Dell, while surrounding rural areas have higher (i.e., less desirable) ratings (John Broadstock, personal communication, 2009).

The SVFD also provides basic life support and EMS. Most members are trained to the first responder level with four trained to the Emergency Medical Technician-1 level. City Ambulance of Eureka provides 24-hour advanced life-support and ambulance service to Scotia from its facility located on South Fortuna Boulevard in Fortuna. The service area of City Ambulance is established by the North Coast Emergency Medical Services Authority (NCEMSA) and would not be affected by the CSD and subdivision. The NCEMSA is a joint powers authority created in 1975 to develop a regional EMS system on behalf of its members: Del Norte, Humboldt, Lake, and Trinity counties. The NCEMSA establishes the procedures for the delivery of emergency medical services in Humboldt County and is responsible for emergency medical training program

approval, personnel certification, base hospital and provider designation, quality improvement/ assurance, system coordination, and evaluation.

According to the PEIR, the current water supply system is considered adequate to fulfill the demand on the system without necessary upgrading, and the proposed CSD and subdivision would not cause or create a substantial increase in the existing water demand for the town of Scotia.

3.5.2 Scotia Level of Service with Improvements

The SVFD will be organized as part of the CSD, which has enabling powers to oversee fire districts, and would continue to function as a volunteer fire department. No change would result in the capacity of fire protection services to meet current demand. Further, the development of the few vacant parcels that exist will have a negligible impact on the ability to provide the current level of service.

The Scotia CSD would combine elements of existing fire and domestic water systems into a single system owned, operated, and maintained by the Scotia CSD that meets domestic demands and provides fire protection for the proposed service areas (not including industrial areas). The CSD would own the fire storage tanks and HRC would retain ownership of the components of the fire system serving the industrial areas.

Issues associated with operating a fire district under the auspices of the CSD have been evaluated in the financial analysis (Appendix C). The fire district estimated costs include various options for staffing (full time, part time, and volunteer) along with equipment and truck needs. An annual reserve budget of $64,000 is included for the replacement of all fire district operating equipment, gear, and vehicles.

In October 2008, engineers recommended that the two existing 500,000-gallon water tanks used for fire protection be replaced by one new 750,000-gallon concrete water tank (SHN, October 2008). The new tank will best serve the fire protection needs of the town and industrial facilities well into the future, as well as limiting the liability of the CSD. Replacement of the existing tanks is required as appropriate maintenance of the existing fire protection system, and is not a result of the proposed project. This tank replacement will occur even under the no-project alternative.

3.5.3 Implementation Schedule

There will be no change in the level of service being provided during SVFD's transition of ownership from TOS to the CSD. TOS owns Water Right License 6373, which authorizes diversion of up to 7.1 cubic feet per second that appears to be adequate for HRC's industrial operations and the residential, commercial, and fire suppression uses. TOS also owns the water intake structure, pumping station, and distribution system. TOS would convey the water right and the diversion works to the CSD.

The SVFD would be merged under the CSD, which has enabling powers to oversee fire districts, and would continue to function as a volunteer fire department. Under a CSD, the SVFD would have a full-time, paid fire chief, whose primary responsibilities would focus on training and recruitment in addition to managing operations supports the current level of service.

3.5.4 Determination

The SVFD, under the CSD, will be able to provide fire protection services and basic life support without altering the level of service or becoming a burden to the ratepayers. Having all of the town's basic services under one management entity would provide efficiencies in operation, elected directors, and be responsive and responsible to local needs and concerns. Alternatives such as a separate fire district would add another layer of government that would operate separately from the CSD, which could affect efficiencies.

The SVFD, merged under the Scotia CSD, is an appropriate fire protection service provider for the town of Scotia. Upon formation of the Scotia CSD, the SVFD will have the capacity to meet levels of service standards and standards of practice normally associated with fire protection services as well as comply with applicable regulatory requirements.

3.6 Power

3.6.1 Existing Level of Service and Improvements

TOS currently provides all electric power to Scotia, with a 32.5-megawatt biomass-powered cogeneration plant (combined heat and power). TOS owns the power distribution system within Scotia, including the poles, conductors, transformers, and meters. TOS sells power developed from wood waste from HRC milling operations, to PG&E to produce electricity to run the manufacturing facilities and to light homes and businesses in Scotia, and is considered a "qualifying facility" (which is defined as a small power producer that meets the federal Public Utility Regulatory Policies Act of 1978 guidelines and qualifies to supply generating capacity to electric utilities, which must purchase this power at a price approved by the California Public Utility Commission [CPUC]). Some of the TOS-owned power poles are joint poles containing telephone facilities owned by AT&T and coaxial cable facilities owned by Suddenlink (formerly Cox Communications). TOS establishes its own rates and charges for providing electric service to its customers (SHN, September 2007).

Currently, TOS provides electrical power, on its own grid, to the town of Scotia with 13.8 kilovolt (kV) service supply. Subject to the change from TOS ownership of Scotia to private, multiple ownership, the electrical supply and distribution will be transferred to PG&E. The new PG&E service supply will be 12 kV.

PG&E has inventoried and studied the existing TOS electrical system in Scotia, and has provided TOS with several options for the transfer of services, none of which alter the level of service currently being received. Each alternative combines the electrical, telecommunication, and cable lines and requires decommissioning selected light poles, installing new power/light poles, and relocating portions of the transmission line underground. Very few original poles exist in Scotia. The majority of changes are located in the residential and commercial areas with few in the industrial area.

3.6.2 Scotia Level of Service with Improvements

Prior to transfer of the existing electric distribution system responsibility, PG&E is requiring electric facility improvements, in order to meet the minimum CPUC safety and reliability requirements, as PG&E is regulated by the CPUC (SHN, September 2007).

TOS maintains Scotia's streetlights. Ownership of electrical utilities will be transferred to PG&E. Very few original poles exist in Scotia. PG&E is looking at alternatives that will combine the electrical, telecommunication, and cable lines. That action may require decommissioning selected light poles, installing new power/light poles, and relocating portions of the transmission line underground.

3.6.3 Implementation Schedule

PG&E is currently moving ahead with making changes to the existing electrical system.

3.6.4 Determination

PG&E currently provides electric power supply and distribution to incorporated and unincorporated areas of Humboldt County. PG&E will incorporate existing power supply and distribution systems into its regional operation without creating a negative impact on existing levels of service.

TOS or a subsequent company will operate the cogeneration plant and sell the power to PG&E. PG&E is the only viable option to provide electric power distribution and maintenance to the town of Scotia.

3.7 Parks and Recreation

3.7.1 Existing Level of Service and Improvements

Scotia is one of the most walkable towns in Humboldt County, and features generous green spaces and landscaped areas. Scotia's recreation facilities include a community park, one baseball field, and one soccer field. Fireman's Park, also known as Scotia Park, is the town's community park, and there is an indoor recreation center. Fireman's Park is a fenced park with redwood trees, picnic tables, and barbeque pits. The park's proximity to the Eel River and the ball fields makes it convenient to a large number of users, primarily Scotia residents and visitors. The baseball field, known as Carpenter's Field, is a fenced baseball field with bleachers, located opposite Fireman's Park. A grass, fenced soccer field (known as Slaughterhouse Field) is located north of the Fireman's Park. Together, the baseball field, Fireman's Park, and soccer field form the core recreation area for Scotia.

Scotia landscaped areas include "pocket parks" adjacent to the Scotia Museum near the corner of Main Street and B Street and by the HRC timber sales office on Main Street.

The Recreation Center complex adjunct to the Stanwood A. Murphy Elementary School, located at the east end of Mill Street, is another component of Scotia's recreation facilities. The Recreation Center is a large building, approximately two-stories in height, with an indoor pool at its south end; it was recently sold to the Scotia Union School District (APN 205-351-020). The Recreation Center includes a basketball court, racquetball court, weight room and cardiovascular room, and locker rooms. The former Industrial Rehabilitation Center is located in a portable building south of the pool and is part of the facilities acquired by the Scotia Union School District, which plans to operate it as a gymnasium and recreation facility.

TOS currently manages and administers Scotia's park and recreation facilities, including structure maintenance, trash pickup, lawn mowing, park gardens maintenance, landscaping, fencing, watering, and schedule administration for the recreation facilities

Landscaping and landscape maintenance in Scotia is provided by TOS. Landscaping and maintenance areas include roadside areas such as Main Street, the downtown commercial area, streetscapes, building setback areas, residential areas, and some industrial areas.

3.7.2 Scotia Level of Service with Improvements

The CSD will be responsible for the same duties that TOS currently manages and administers. Under the CSD, the level of service for parks and recreation would be substantially similar to that currently found in Scotia. As a public entity, the CSD would be eligible for state and federal funding for improvements.

3.7.3 Determination

The subdivision will not result in an increase in population or increase in demand for park and recreation facilities. No new park and recreation facilities, or new maintenance of such facilities, will be required.

The CSD is an appropriate agency to continue the operation and maintenance of Scotia's park and recreation facilities including public landscaped areas. Upon formation of the Scotia CSD, parks and landscape open spaces will continue to be operated and maintained by the CSD and will have the capacity to meet levels of service standards and standards of practice normally associated with park, recreation, and open space as well as comply with applicable regulatory requirements. Existing parks and landscaped open spaces are considered as "contributing resources" to the town's eligibility for historic district status. Any changes and improvements to park and public open spaces will be subject to design guidelines and design review.

3.8 Law Enforcement

3.8.1 Existing Level of Service and Improvements

The Humboldt County Sheriff provides law enforcement for Scotia. Scotia is included in the south patrol beat, which extends from Humboldt Hill south to Redcrest. In addition, PALCO formerly provided and HRC currently provides private security services for their offices and industrial facilities in the town of Scotia (7 days a week, 24 hours a day). The focus of these services is primarily to provide security related to the industrial and logging operations; they provide no law enforcement. Law enforcement services in Scotia are on par with neighboring areas of Humboldt County and are adequate for the demand.

3.8.2 Scotia Level of Service with Improvements

Under CSD formation, the Humboldt County Sheriff would continue to provide law enforcement for Scotia. HRC would continue to provide security to HRC-owned industrial and commercial properties. Because the size of Scotia is not changing, and only a few undeveloped parcels exist, no change would occur in the capacity of public services to meet current demand.

3.8.3 Determination

The formation of the CSD and the subdivision will not result in an increase in population or increase in demand for law enforcement services.

3.9 Other Services Not Changing

3.9.1 Telecommunications

AT&T (formerly SBC Communications) is regulated by the CPUC and provides a full range of telephone service to businesses and residences in the Town of Scotia. AT&T operates a central office for Scotia telephone service located on Sequoia Street in Rio Dell. AT&T owns its facilities within Scotia; however, some AT&T facilities are attached to TOS-owned utility poles (SHN, September 2007). Telecommunication services in Scotia are on par with neighboring areas of Humboldt County and are adequate for the demand.

As part of the transfer of electrical services from TOS to PG&E, the telecommunication (provided AT&T Communication) and cable lines (provided by Suddenlink) requires decommissioning selected light poles, installing of new power/light poles, and relocating portions of the transmission line underground. This service will not be interrupted or changed when a CSD is formed, or under the annexation or HOA alternatives.

Determination: The formation of the CSD and the subdivision will not result in an increase in population or increase in demand for telecommunication services.

3.9.2 Natural Gas

Scotia is the most southern Humboldt County community served by PG&E natural gas facilities. PG&E owns and operates the natural gas distribution network in Scotia and all users are individually metered (SHN, September 2007). Natural gas services in Scotia are on par with neighboring areas of Humboldt County and are adequate for the demand.

Several commercial buildings and approximately 9 residential buildings used steam and are being converted to natural gas, fed by the existing PG&E main line; the conversion is almost complete at the time of this writing and is not part of the proposed project. Natural gas service will not be interrupted or changed as a result of CSD formation, or under the annexation or HOA alternatives.

Determination: The formation of the CSD and the subdivision will not result in an increase in population or increase in demand for natural gas supply.

3.9.3 Cable

Suddenlink provides cable television and broadband Internet service to residents of Scotia. Suddenlink owns its cable facilities within Scotia, which are located on joint utility poles. Although AT&T owns and operates a fiber optic line in Scotia, TOS owns its own fiber optic telecommunications facilities that distribute broadband communications services to certain TOS offices within Scotia. These are customer-owned facilities and are not regulated by the CPUC. Cable services in Scotia are on par with neighboring areas of Humboldt County and are adequate for the demand.

As part of the transfer of electrical services from TOS to PG&E, the telecommunication (provided by AT&T Communication) and cable lines (provided by Suddenlink) require decommissioning selected light poles, installing new power/light poles, and relocating portions of the transmission line underground. This service

will not be interrupted or changed as a result of CSD formation, or under the annexation or HOA alternatives.

Determination: The formation of the CSD and the subdivision will not result in an increase in population or increase in demand for cable services.

3.9.4 Solid Waste

Solid waste collection and disposal is provided by Eel River Disposal & Resource Recovery, a privately owned firm. According to Eel River staff, the quantity of solid waste collected in Scotia is not accounted for separately from other unincorporated areas; one truck provides collection in residential areas once a week, and other waste is collected at the Fortuna transfer station and various drop-off locations in the area (Karen Smith, personal communication). Typical residential waste generation rates are on the order of 0.44 tons per person per year in Humboldt County (California Integrated Waste Management Board, 2007), which corresponds to approximately 375 tons of waste per year for Scotia.

Scotia is within the County jurisdiction and the County is a member of the Humboldt Waste Management Authority. Scotia solid waste is disposed at the transfer station in Eureka. From there, the waste is transported by truck to existing, permitted disposal facilities, either Anderson Solid Waste Disposal Site in Shasta County, California or Dry Creek Landfill near Medford, Oregon. Waste management services in Scotia are on par with neighboring areas of Humboldt County and are adequate for the demand.

This service will not be interrupted or changed as a result of CSD formation, or under the annexation or HOA alternatives. Waste collection, recycling, and disposal services will continue to be provided by Eel River Disposal & Resource Recovery.

Determination: The formation of the CSD and the subdivision will not result in an increase in population or increase in demand for waste management services.

Chapter 4. Finances and Rate Structure

This chapter draws on information provided in the financial analysis, which discusses expected revenues and expenditures for the proposed CSD formation (Appendix C). The financial analysis includes financial information from a number of sources including representations of similar operations in neighboring communities and service districts, engineering studies, interviews of County officials, and recent TOS and PALCO financial statements.

4.1 CSD Formation

Ongoing O&M costs for the Scotia CSD will be financed using a combination of resources. These will include at a minimum reallocation of a portion of property taxes from the County and user fees. Other operational sources that could be considered include benefit assessments, impact fees, and special taxes implemented by the CSD's Board of Directors.

4.1.1 Capital Finance Plan

The Capital Finance Plan discussed in the financial analysis outlines a financial proposal for the future CSD to finance the infrastructure upgrades specified in the detailed engineering analysis through debt financing. The plan comprises a short-term component, covering the first few years of transition and operation, and a long-term component.

For the **short-term financing**—up to six years—a $12.7 million Tax Assessment Bond (TAB) will be issued, payable from tax assessments levied on the current property owner (TOS) and the sale of improved parcels and homes. Full repayment will be from TOS through the sale of properties, not from the residents and new homeowners of the Scotia CSD. This short-term financing will provide the funding for the improvements as described in the Detailed Engineering Analysis (Appendix A). The completed facilities are anticipated to have substantial working life with no projected major capital improvement costs for the next 20 years.

For the **long-term financing**, a $5 million low-interest water and sewer loan or bond will be issued by the time the TAB has been fully repaid. This financing will be repaid from the new property owners' monthly user fees. The three most likely options for long-term, low-interest funding are the State Clean Water Revolving Loan Fund program, the U.S Department of Agriculture Rural Development's Rural Utilities Services loan program, and the California Special Districts Association's pooled bond program (Pooled Transaction Certificates of Participation).

The Capital Finance Plan will not result in extraordinary expenses for Scotia residents and will allow the CSD to be self-sufficient.

4.1.2 Anticipated Revenues

Revenues for financing the ongoing operations of the proposed CSD will come from an assessment of user fees for each of the services and, it is proposed, an allocated share of property taxes from the County of Humboldt.

The primary source of revenue for CSD O&M is associated with traditional monthly user fees. The basis for the projections contained in the Financial Analysis is predicated on a user-based system as it is measured by Equivalent Dwelling Unit (EDU). Rates were estimated based on the typical anticipated monthly usage of water, wastewater, storm drainage, parks, streets, and fire protection costs for O&M for a typical household, and are presented in Table 4-1. Data was analyzed from existing meter operations to determine likely industrial usage for water and wastewater. The Financial Analysis (Appendix C) projects the anticipated expenditures for the first years of operations associated with the provision of these services.

For determining revenue generation associated with the CSD, the average single-family residence is assigned one EDU. All other customers are assigned a proportionate number of EDUs based on use in each service area, and charged accordingly. The annual revenue requirement for funding the various services and programs is divided by the estimated number of EDUs in the CSD to determine the per-EDU rate needed to generate the funds.

The proposed monthly user fees per EDU and associated with each of the services to be provided by the CSD are presented in Table 4-1. (Note: Table 4-1 is based on the possibility that the CSD might receive no tax share allocation from the County and, therefore, represents the most conservative scenario. See Appendix C, Financial Analysis, for a discussion of other scenarios.)

Table 4-1

Proposed Monthly User Fees by Year Five, Including Recommended Reserve/Replacement Fund

TOS[1] Municipal Service Review

Service	Cost per EDU[2]
Water Supply	$ 42.50
Wastewater Collection, Treatment and Disposal	$ 78.29
Road Maintenance and Street Lighting	$ 22.85
Stormwater Drainage	$ 21.55
Parks and Recreation	$ 7.29
Fire Protection	$ 11.51
TOTAL	$184.00

1. TOS: Town of Scotia, LLC.
2. EDU: Equivalent Dwelling Unit

This table is based on a possible zero-percent tax share allocation from Humboldt County. The Water Supply line item includes a debt service of $12.72, and the Wastewater Collection line item includes a debt service of $17.50.

Once formed, the CSD should be entitled to an allocation of property taxes from a portion of those received by Humboldt County. The amount of allocation is not pre-determined and will be subject to negotiations with the County. Unlike incorporated cities, the CSD will not receive any sales tax, transient occupancy tax, or gas tax revenue from the County upon its formation.

The CSD will receive a yet to be negotiated allocation from revenues received by the County from an established property tax assessment. In future years, the Scotia CSD would receive an increase in its tax allocation share as the sale of the existing homes in Scotia occurs. The increase in property tax values is predicated on the sale of the majority of Scotia's single-family residences in the first five years of CSD operations. The resale and subsequent tax reassessment by the County Assessor will generate a sizable increase in Scotia's tax base. The current average assessed residential property value is $31,400. The average estimated resale market value of Scotia's houses ranges from $175,000 to $225,000, which will result in an increase in assessed value ranging from $143,600 to $193,600.

4.1.3 Anticipated Expenditures

Limited population growth is expected in Scotia due to the lack of available vacant land, substandard lot sizes that cannot support additions under County requirements, and physical restrictions; current industrial uses are expected to remain the same. The WWTF is expected to have sufficient capacity to serve the newly created residential and commercial lots. The subdivision and formation of a CSD will not result in any need to increase capacity of the WWTF. There is an adequate water supply to sustain ongoing and future industrial operations.

Expenditures for the CSD include personnel services, materials and services, capital expenditures, and debt service. A breakdown of monthly costs associated with each service (water, wastewater, streets and lighting, stormwater, parks, and fire protection services) is provided in the Financial Analysis. A separate table is included with staffing needed and estimated CSD start-up costs for office and equipment. An operating reserve contingency fund of $135,000 is included from the start of the CSD's operation in order to cover unanticipated or emergency costs.

Personnel services in the budget include a district manager, clerk, fire chief, WWTF field manager/operator, WTF operator/lead foreman, and two utility workers.

The financial analysis projects an estimated annual debt service related to long-term financing of approximately $200,000 per year or the equivalent of $30.22/month per EDU by Year Five.

4.1.4 Affordability

Affordability to residents and future homeowners of Scotia is an important consideration and was the object of extensive review. However, the new CSD would provide services not typically available from other service districts or not funded through user fees, such as road maintenance and street lighting, stormwater drainage, parks and recreation, or fire protection services; this makes it difficult to compare to other service providers. The more frequently used and available points of comparison for user fees are those assessed for water and wastewater services.

A commonly recognized benchmark for determining the affordability of the cost for water and sewer services has been established by EPA. That benchmark is based upon the Annual Median Household Income (AMHI) of the affected area and defines the affordability range from 1.5 to 2.0% of the AMHI. In the case of Scotia, the AMHI for Humboldt County is used. The EPA defined benchmark for affordable water and sewer rates combined is in the range of $113 to $150 per month per EDU. The proposed operating budget projects an EDU rate for both water and sewer of approximately $121/month by Year Five of the CSD's existence (based on a 0% tax allocation), which falls within the acceptable bracket.

The long-term debt financing by the CSD is projected to net $5 million, which will be applied toward the capital project costs, and is expected to incur an annual debt service of approximately $200,000 per year. This equates to about $30.22/month per EDU. This long-term bond financing debt repayment of $30.22/month per EDU is comparable to bond fees that could be levied under the Mello-Roos bond financing. The Mello-Roos Community Facilities Act of 1978 enables cities, counties, special districts, and school districts to establish Community Facilities Districts (CFDs) and to levy special taxes to fund a wide variety of facilities and services. As a point of comparison, the monthly Mello-Roos bond levy per parcel for community infrastructure improvements in the Roseville Woodcreek West Community Facilities District is $90.

4.2 Determination

The projected Scotia CSD water and wastewater user fees are comparable to other similar service providers in northern California and will be within the range of EPA's limits of affordability. User fees for other services were reasonable considering the range of services to be provided by the CSD.

These user fees and a reasonable allocation from property taxes, to be negotiated with the County, will provide the necessary revenues to match the anticipated expenses resulting from personnel services, materials and services, capital expenditures, and debt service.

Under a CSD structure, Scotia will be able to collect sufficient revenues to cover its anticipated expenses while charging user fees, assessing taxes, and assuming debt at rates comparable to similar communities in Humboldt County.

Chapter 5. Cost Avoidance Opportunities and Shared Facilities Opportunities

5.1 CSD Formation

When considering cost centers for services provided by the CSD or a city, typical costs include expenditures associated with O&M, capital expenditures, debt service, and annual contributions to funding future capital replacement. The primary area for exercising savings due to economies of scale is associated with O&M. Upon reviewing projected line item expenditures, economies of scale could be pursued in such areas as bonds, dues, publications, general supplies, general maintenance and repair, insurance, and contracted maintenance services.

The Scotia CSD will be assuming management and operations for wastewater treatment, water supply, stormwater drainage, road maintenance and street lighting, fire protection, and landscape maintenance, and will be assisted in cost-reducing strategies by the following measures:

- The ability to purchase goods and services through joint purchasing programs as available through Humboldt County and the State Community Services District Association.
- Avoid the leasing costs associated with locating a CSD office building by using office space for the CSD and SVFD in the existing SVFD operations building in Scotia at no cost. The joint use of space between the SVFD and CSD should lead to economies of scale for operational costs, utilities costs, and maintenance.
- By co-locating the SVFD and other CSD operations, all local utilities for Scotia residents will reside in the same facility. This can promote the efficiency in the provision of all CSD services with all administrative and billing services functionally operating in the same building. Additionally, space to conduct public meetings is available at this facility.
- The CSD administrative staff could provide assistance to the SVFD staff in various administrative and billing notifications, as needed. This administrative assistance could lead to lower SVFD overhead operational costs.
- With absorption into the Scotia CSD, the SVFD will be able to expand on its record of service coordination with the County of Humboldt and the City of Rio Dell Fire Protection District for mutual response to emergencies and technical coordination of local needs.
- The CSD could also reach an agreement with the Scotia Union School District for the use of joint meeting facilities.
- By providing an operational location for local park services in the CSD offices, the parks programs will be more effectively managed and could become eligible for available capital improvement grants and program support through area non-profit programs.

- The Scotia CSD, by virtue of the transfer of water rights, will acquire available water resources and be able to retain the existing water collection system and pumping station facilities. Therefore, it will be able to provide a cost-effective water resource for its users and will not need to rely on any other area provider.

- The County of Humboldt will continue to provide ongoing maintenance services for the main thoroughfare through Scotia as well as several adjacent streets. The Scotia CSD will assume the annual O&M for other local streets, thereby relieving the County of Humboldt of this potential service issue.

- The annual budget for the Scotia CSD will implement a capital reserve fund in order to prudently budget for long-term capital equipment and facility replacement costs. This will provide CSD customers with the ability to maintain service rates at reasonable levels in the future.

- The proposed CSD will provide for those typical municipal services outlined within the proposed boundary that have been in existence and provided privately for many years. The proposed CSD will assume governance of the pre-defined service in an area that has been established for a considerable time with no known gaps adjacent to or within the boundaries or any duplication of services with other providers in the area.

Major services that are currently and will continue to be provided by and contracted out to private providers include:

- Solid waste collection and disposal
- Roadway maintenance
- Cable
- Natural gas
- Telecommunications

5.2 Determination

The Scotia CSD will be able to coordinate its level of services to its customers by offering a reasonable level of cost avoidance options, including joint-use facility for operations and meetings, purchasing cost-savings options, consolidated billing services, use of local volunteers, and using the latest in technology in equipment and office work procedures.

The CSD formation does not preclude future opportunities for additional combined operations or facilities, if such opportunities arise.

There are opportunities available to provide shared costs with the SVFD in terms of administrative assistance, billing services, and joint use of community meeting facilities. Additionally, the CSD is in a position to provide cost-effective water and wastewater functions to its users.

Chapter 6. Evaluation of Management Efficiencies

6.1 CSD Formation

The Scotia CSD will operate under generally accepted accounting practices and policies regarding the adoption of an annual budget and monthly billing statements sent to customers. The CSD will retain an outside auditor to provide annual review of the practices and accounting records maintained by the CSDs' administrative staff.

The CSD's adopted annual budget will be an indicator of the organization's management capabilities. The CSD's projected first-year budget is essentially a break-even operation-cost-to-revenue-received budget. In order to ensure a balanced program budget, there is an operational reserve of $150,000 per year established in the CSD's initial five-year budgetary plan. The CSD will include eight full-time positions for the day-to-day operations. Some necessary but less frequent or more specialized district functions will be handled through outside contracting for services.

For hiring purposes, preference will be given, in decreasing order of preference, to employees already providing these or similar services for TOS, HRC, or other local businesses; other existing employees of TOS, HRC, or other local businesses; current residents of Scotia; other residents of Humboldt County; and newcomers. Regardless, all candidates will have to meet pre-established competence and experience requirements.

Improvements are planned for the wastewater facilities, water distribution system, and stormwater drainage system. The CSD will also maintain and operate Scotia's existing ball fields and parks program, provide road maintenance and street lighting, and fire protection.

The Scotia CSD will initiate those measures outlined in Chapter 5 in order to avoid duplication of service and attempt to achieve economies of scale in the provision of services to its customers. Upon creation of the Scotia CSD, the service area of Scotia will also be served by private providers (PG&E for power and natural gas, Eel River Disposal and Resource Recovery Inc. for waste collection, and AT&T and Suddenlink for telecommunications and cable services), and by the County (law enforcement and maintenance of certain roads). There are no apparent management deficiencies relative to coordination or oversight of these services as provided by outside agencies.

6.2 Determination

The Scotia CSD Capital Improvement Program (CIP) will provide the CSD's overall management, contract with outside providers for services as needed, and an operating reserve to cover unanticipated costs.

Through its planned CIP and structure, the Scotia CSD will provide necessary services and maintain operations in an efficient and cost-effective manner. Management efficiencies will be possible through combining administrative and management functions of the CSD and the SVFD, including clerical, accounting, purchasing, operation, and maintenance.

Chapter 7. Local Governance and Accountability

7.1 CSD Formation

CSDs are granted powers by the State of California, pursuant to Section 61000 of the California Government Code, to carry out the functions designated in the petition for formation and any additional services approved by the board of directors and district voters. Services to be provided by the Scotia CSD include wastewater collection and treatment, water supply, storm drainage, street lighting, parks, recreation, open space, road maintenance, landscape maintenance within public rights-of-way, and fire protection.

The proposed CSD will be governed by a legislative body known as a board of directors, which will meet at least once every three months. The board will establish policies for operation of the CSD and appoint a general manager, who will have responsibility for implementation of those policies. The CSD will establish an alternate depository pursuant to the CSD Law and will appoint a CSD treasurer to serve in the place of the county treasurer. The Scotia CSD Board of Directors will oversee the staff and management of infrastructure for the provision of services.

The CSD board of directors will have five at-large members, each of which will be elected from, and by voters of, the CSD as a whole. The initial election of board members will occur contemporaneously with the election to confirm formation of the CSD, and it will be held by Humboldt County generally pursuant to the Uniform District Election Law. The procedures for the election of the initial board are put in place as a part of formation of the CSD itself. That is, when the LAFCo approves the CSD, the LAFCo's approval resolution would contain both a statement as to when the formation is to be effective, but also a requirement for election of the board; presumably this would be concurrent with a formation election for the CSD. Once elected, the board members must meet within 45 days of the effective date of the formation of the CSD. In order to establish staggered terms of service, at this meeting they would divide themselves into two classes by lot, one consisting of three members and the other consisting of two members. Those in the three-member class have four-year terms, and those in the two-member class have two-year terms. Subsequent terms of all board members will be four years.

For the one-year transition period leading up to the election of the board of directors, an interim CSD director will be appointed by TOS.

7.2 Determination

The CSD will have the ability to make information available to the public and comply with the Brown Act.

The CSD will be governed by a board of directors elected by residents within the CSD boundary under the direction of Humboldt County pursuant to the Uniform District Election Law. As elected officials, members of the CSD board of directors will be subject to the provisions of the Brown Act per meetings and decision-making open to the public. Accountability will occur through compliance with election and open meetings laws and voter approval of any fees or taxes proposed by the board of directors.

Chapter 8. Government Structure

It is unusual, nowadays, for a private entity to provide the range and types of public services currently provided by TOS. Services like water supply, wastewater treatment, road maintenance and street lighting, stormwater drainage, parks and recreation, and fire protection are considered to be of public concern and are typically provided by public entities such as counties, cities, service districts, public utilities districts, etc. for the public good.

8.1 CSD Formation

CSDs are granted powers by the State of California, pursuant to section 6100 of California Government Code, to carry out the functions designated in the petition for formation and any additional services approved by the board of directors and CSD voters. Services to be provided by the Scotia CSD include: wastewater, water, stormwater drainage, street lighting, parks and recreation, road maintenance, landscape maintenance within public rights-of-way, and fire protection.

The CSD is proposed to operate through direction of a five-member board of directors elected by the general population served by the CSD. The CSD will include seven full-time positions including a CSD manager, a city clerk, a fire chief, a field manager for the WWTF, a lead foreman for the WTF, and two utility service workers. Day-to-day operations will be carried out by paid and volunteer (firefighters), who will most likely be organized by service department and managed/administered by an overall general manager. Other necessary district functions (such as legal, accounting/auditing, and engineering services) will be handled through outside contracting for services. An example of an organization chart for the CSD is represented on the next page.

For the one-year transition period leading up to the election of the board of directors, an interim CSD director will be appointed by TOS.

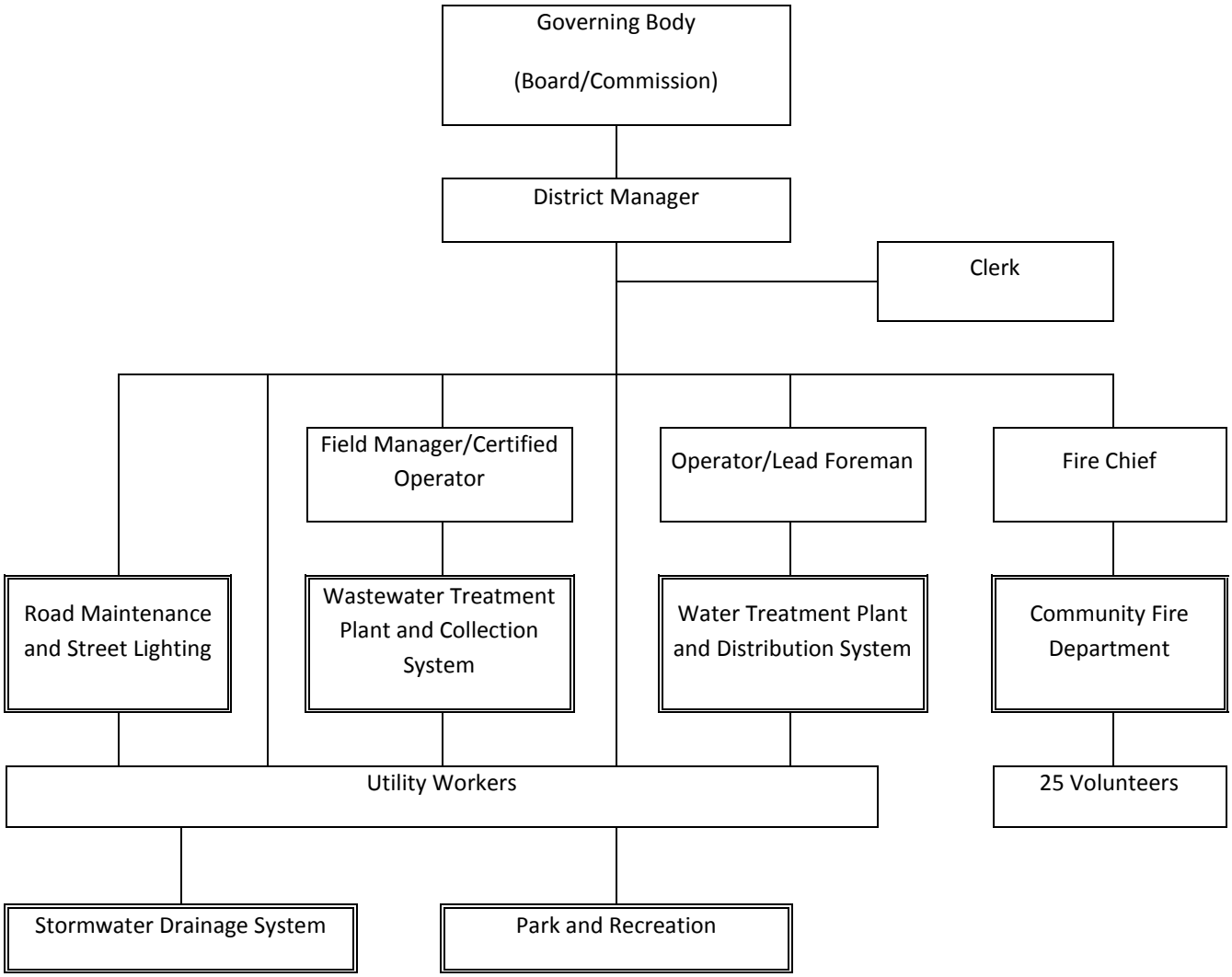
The CSD and the SVFD will both use the fire house for offices and equipment storage. A public facility, not yet chosen at this time, will hold the monthly public meetings. The CSD will provide public notice in a generally circulated newspaper of its regularly scheduled meetings and also post a copy of their meeting agenda at the CSD's office location. Copies of the agenda may be requested by the public by phone request, facsimile, or mail.

8.2 Determination

Opportunities for other service providers are limited by the rural setting and topography that surround Scotia; therefore, the boundaries determined for the Scotia CSD are logical and orderly. **The CSD will be able to provide the necessary services to Scotia at a suitable level with a simple, well-established structure.**

Governance under the CSD will continue to focus on Scotia as a distinct community, with a timber heritage and will continue to work cooperatively with HRC as operators of ongoing timber production facilities. The responsibilities of the CSD would be to improve, operate, and maintain its existing water, wastewater, and stormwater facilities.

Organization Chart



Legend

Responsibilities/Services
Road Maintenance and Street Lighting
Wastewater Treatment Plant and Collection System
Water Treatment Plant and Distribution System
Community Fire Department
Stormwater Drainage System
Park and Recreation

Personnel
District Manager
Clerk
Field Manager/Operator
Operator/Lead Foreman
Fire Chief
Utility Workers (2)

Chapter 9. Sphere of Influence

9.1 Scotia's "Sphere of Influence"

A "Sphere of Influence" is defined as a "plan for the probable physical boundaries and service area of a local government agency as determined by the Commission," such as a city or special district: (sections 56076 and 56425 of the California Government Code).

1) The Present and Planned Land Uses In The Area, Including but Not Limited To, Residential, Commercial, Industrial Development, and Agricultural and Open Space Lands

The town of Scotia is located on a flat river terrace, surrounded by steep forested slopes and the Eel river floodplain. Scotia is a developed town that once the subdivision is approved will only include five vacant parcels. Existing land uses include a mix of commercial, residential, industrial/timber production, public facilities (after the transfer from TOS ownership to the CSD), and recreational uses. As discussed in the CSD and subdivision PEIR, a General Plan amendment is proposed that would make land use designations consistent with the actual uses that have occurred in the town of Scotia for the last 100 years. No new uses are proposed for the Town of Scotia or adjacent areas. Any future changes to the land use designations in Scotia will be processed through the Planning and Building Divisions of the Community Development Services Department of Humboldt County.

Scotia, which was originally known as Forestville, was founded in 1882. The present land uses within the Town of Scotia include industrial/timber production, commercial, residential, and public facilities (such as, parks, ball fields, and landscaped open space). Proposed amendments to the Humboldt County General Plan and zoning code will essentially bring the land use designations of the General Plan and land uses allowed in the underlying zoning in compliance with what already exists on the ground. Scotia is essentially "built out." No new uses are proposed within the boundaries of the proposed CSD or the industrial areas to be operated by HRC. Any future changes to the land use designations in Scotia would require additional amendments to the General Plan and zoning code and would be administer by the Planning Division of the Community Development Services Department of Humboldt County. The proposed CSD boundary is surrounded on the south, east, and west by HRC timberland, and on the north by the City of Rio Dell (separated by the Eel River).

2) The Present and probable need for public facilities and Services In The Area

TOS was formed as a result of the Plan of Reorganization submitted by the secured creditor (Marathon), joined by MRC, and confirmed by the Bankruptcy court. Pursuant to that plan, the entirety of the town of Scotia and its real and personal assets transferred to TOS, the reorganized entity.

An application has been filed with Humboldt County to subdivide the town of Scotia in order to be able to sell the residential and commercial lots and buildings. The subdivision requires a General Plan amendment and rezoning classification, along with transfer of some of the public utilities and services to other entities, most of which are currently provided by TOS.

The public services and utilities currently managed by TOS will be transferred to a CSD in support of the subdivision include water, wastewater, stormwater, fire protection, road and park maintenance. The electrical distribution system will be transferred to PG&E. Roads not currently maintained by the County will be maintained by the CSD. TOS or a subsequent company operate the co-generation plant and sell power to PG&E. The County Sheriff's Office will continue to provide law enforcement services. Other utilities such as telephone, cable, natural gas, and solid waste collection would remain under current private providers. The CSD would be administered by an elected board of directors, which would hire staff, oversee budgets, hold public meetings, and basically be in charge of future upgrades, O&M of water, wastewater, stormwater, road maintenance and street lighting, fire protection, and park and recreation facilities. No new public facilities and services will be required.

3) The Present Capacity of Public Facilities and Adequacy of Public Services That The Agency Provides or is Authorized To Provide

TOS currently provides wastewater, water, stormwater drainage, road maintenance, fire protection, EMS (basic life support), electric power, parks and recreation, landscaping and landscape maintenance, and street lighting services. The County of Humboldt provides other public services, such as law enforcement, land use regulation, county-maintained roads, social services, and general government services.

The newly formed Scotia CSD will need one or more funding sources in order to ensure the orderly transfer and provision of public services. A financial analysis of expected revenues and expenditures was prepared in order to evaluate the CSD's ability to be self-sufficient (Appendix A). The financial analysis lays out a financially conservative plan analyzing the CSD's forecasted revenues and expenses. Operation of the CSD would be funded through a mix of property tax allocation (negotiated with Humboldt County) and user fees. Expenses would include personnel services, material and services, capital expenditures, and debt service. The capital improvement plan described above would be funded through a combination of short-term and long-term bonds. User fees as projected are adequate to provide for the ongoing operation and maintenance of all infrastructure systems, along with a set-aside of annual funds for deposit into a long-term replacement fund for major repairs and improvements.

Evolving regulatory changes and unknown future commercial and industrial demands will dictate infrastructure capital improvement expenditures as these changes are planned and implemented. Therefore, existing system upgrades or modifications will be planned and constructed for maintaining appropriate levels of service while minimizing operation and maintenance costs to the effected users. All described public service components will be designed and constructed to meet or exceed standard-of-care for similar public works facilities in the local area or as noted in the following specific system sections.

All existing public services and utilities currently provided by TOS are considered to be fully functional. All TOS-provided services to Scotia are in technical compliance with the appropriate regulatory oversight agencies. The proposed infrastructure improvements will be comparable to system needs for a town similar in size and character to Scotia. Overall, the services currently provided by TOS meet level of service standards, with the exception of the domestic water line distribution system (distribution pipes 3 inches in diameter or less that are in need of upsizing and repair). The improvements as detailed in the Detailed Engineering Analysis (Appendix A) will be financed by TOS and a combination of increased tax revenue from

property sales and the issuance of bonds by the CSD, as necessary. These measures will ensure that the systems' operations will not become a long-term financial burden to the ratepayers.

The public services and utilities currently provided by TOS have been reviewed and can be accomplished with the establishment of a CSD board of directors and staff. The current level of services provided to Scotia can be characterized as "comparable to other similarly sized, local municipally incorporated communities." The level of maintenance to residential, commercial, industrial, and recreational facilities has been sustained over many years, since the town was constructed. As with any infrastructure system, there will be ongoing maintenance and upgrades needed to continue the level of service desired by area residents and required regulatory agencies. Scotia's CSD will be responsible for ensuring that these services are continuously provided and are in compliance with applicable County and State regulations.

4) The Existence of Social and Economic Interdependence and Interaction Between the Area Within the Boundaries of a Local Governmental Agency and the Area That Surrounds It and That Could Be Considered Within the Agency's Sphere of Influence

Social and economic interdependence between the town of Scotia and the ongoing timber production operations of HRC will continue. Although the role of HRC will change from owner to neighbor, HRC's commitment to the town's future will continue to be important during the transition period from TOS to CSD, as well as in the future as a major employer in Scotia. Scotia's relationship with the City of Rio Dell will also continue as a cooperative neighbor where families and friends live in both communities, people live in one and work in the other, and cooperation occurs in areas such as fire protection. The surrounding timber land will continue to be managed for harvest and will be among the sources of timber for production at the HRC mill.

5) The Maximum Possible Service Area of the Agency Based Upon Present and Future Service Capabilities of the Agency

Scotia is essentially built-out. Very little growth is feasible due to limited available space, lots sizes, and the scarcity of vacant lots. In addition, there are physical restraints to development outside of the proposed boundaries. The town of Scotia is located adjacent to the City of Rio Dell. Scotia is bound to the east by Highway 101 and to the north, south, and west by the Eel River. Scotia's topography ranges from flat areas in the west and central parts of the town, to sloped terrain in the eastern portion toward Highway 101. Steep, forested hillsides and mountains surround the town and river, making expansion in those areas undesirable/impractical.

Services are already provided in the City of Rio Dell, the closest community to Scotia. The next closest community is Stafford, located to the southeast along U.S. 101; it is separated from Scotia by steep terrain and the Eel River, making it impractical as a zone of future influence.

Within the proposed CSD boundary, the Scotia CSD will be able to provide the same level of service that has been provided historically and is currently available. The services provided will be essentially the same as under previous conditions (private ownership), with the benefit of an $18 million CIP, which will grant the infrastructure substantial working life with no projected major capital improvement costs for the next 20 years.

6) The Range of Services the Agency is Providing or Could Provide

CSDs are granted powers by the State of California, pursuant to section 61000 of California Government Code, to carry out the functions designated in the petition for formation and any additional services approved by the board of directors and CSD voters. Initially, the services to be provided by the Scotia CSD include wastewater, water, storm drainage, street lighting, parks, recreation, road maintenance, landscape maintenance of public spaces, and fire protection.

7) The Projected Future Population Growth of the Area

As of January 2009, the TOS housing office estimates that there are 272 residential dwelling units in Scotia, with an estimated residential population of approximately 860 persons; TOS employs 67 people, including those who work at the Scotia Inn; with an estimated 88 additional employees working for other businesses in Scotia (Frank Bacik, personal communication). Based on the U.S. Census, and using census blocks that are approximately coterminous with the town, the year 2000 population was 849 (Tract 06023- 011100 and blocks 4 through 7, 10 through 25, 27 through 33, and 38) (SHN, September 2007).

Scotia is essentially "built out" as there is limited availability of development within the proposed boundaries. The vast majority of parcels are "substandard" when compared to County Zoning requirements for Residential One-Family zone especially regarding lot sizes, yard, and maximum ground coverage requirements, thus the necessity of the P combining zone. The P combining zone allows these non-conforming lots to be created because the town was developed prior to the zoning code being adopted. In essence, with the P overlay, existing non-conforming standards become the standards for each individual lot. However, County code does not allow a lot that does not comply with the code to change in a way that further exacerbates non-compliance. Simply put, there is not adequate space for most residential lots in Scotia to accommodate secondary dwelling units. Of the existing residential lots, only 11 conform to current zoning requirements. Of those 11, only 5 have adequate size or yard dimensions or maximum lot coverage to accommodate secondary dwelling units. At this time, it is speculative to say that the three vacant residential lots would support second dwellings, because it would depend on the extent of site development. The subdivision will result in 3 vacant residential lots and 2 vacant commercial lots. Development of these new parcels could result in a very slight increase in population (SHN, 2009).

The industrial areas of the town zoned MH/Q will be used by HRC as it continues to harvest timber and produce lumber at the Scotia mill. Essentially, areas used for outdoor lumber storage and the sedimentation pond will continue to be used as part of the lumber mill operations and are not considered vacant. No plans exist to change from lumber production to some other industrial use in the foreseeable future (SHN, 2009).

8) Local Governmental Agencies Presently Providing Services to Such Area and the Present Level Range and Adequacy of Services Provided by Such Existing Local Governmental Agencies

Currently, services provided by local governmental agencies include law enforcement (County Sheriff), road maintenance (County Department of Public Works), land use regulation (Planning Division, County Department of Community Development), new construction/design review (Building Division, County Department of Community Development), public health (County Department of Public Health), and other County administrative duties (such as, elections, coroner, libraries, etc.). These services will continue to be

provided after formation of the CSD. No changes are expected in range and adequacy of the services provided.

9) The Existence of Agricultural Preserves or Farmland Security Zones in the Area That Could Be Considered Within An Agency's Sphere of Influence and the Effect On Maintaining the Physical and Economic Integrity of Such Preserves in the Event That Such Preserves are Within a Sphere of a Local Governmental Agency (56426, 56426.5a)

No Farmland Security Zones or agricultural preserves exist within in or adjacent to Scotia.

9.2 Determination

Based on the above analysis, a "status quo" sphere of influence is sustainable and appropriate for the Scotia CSD (Figure 3). The SVFD will continue to serve its current response area, with no intentions to provide services to nearby communities because they are already served by other entities. The boundaries are consistent with the subdivision boundaries being processed by Planning and Building Divisions of the Community Development Services Department of Humboldt County.

No changes to the current conditions within the sphere of influence will occur as the result of forming a CSD and creating a subdivision. Existing land uses will remain the same. Little growth in population will occur that could exceed capacity of public utilities and services. Cooperative measures will continue in the area of fire protection and emergency response contributing to the maintenance of social and economic interdependence.

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20090515-DEA.doc

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Appendix A

Detailed Engineering Analysis

Town of Scotia
Community Service District
Detailed Engineering Analysis
Revision 3

Development of the Scotia Community Services District LAFCo Application

(Appendix A to the Municipal Service Review)

Prepared for:

Town of Scotia, LLC

Consulting Engineers & Geologists, Inc.

812 W. Wabash Ave.
Eureka, CA 95501-2138
707-441-8855

May 2009
005161.903

Reference: 005161.903

Town of Scotia
Community Service District
Detailed Engineering Analysis
Revision 3

Development of the Scotia Community Services District LAFCo Application (Appendix A to the Municipal Service Review)

Prepared for:

Town of Scotia, LLC

Prepared by:

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May 2009

QA/QC: KJN___

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Abbreviations and Acronyms

≤	less than or equal to
CF	Cubic Feet
cfs	cubic feet per second
cm/yr	centimeters per year
CY	Cubic Yard
d	day
EA	Each
ft/day	feet per day
ft/s	feet per second
gal	gallon
gpcd	gallons per capita per day
gpd	gallons per day
gpd/EDU	gallons per day per Equivalent Dwelling Unit
gpd/SF	gallons per day per Square Foot
gpm	gallons per minute
gpm/SF	gallons per minute per Square Foot
gVSS	grams of Volatile Suspended Solids
gBOD	grams of Biochemical Oxygen Demand
hp	horsepower
in/day	inches per day
in/mo	inches per month
kg	kilogram
kg/ha	kilogram per hectare
kg/m^2/yr	kilograms per square meter year
kV	kilovolts
kwhr	kilowatt hour
kwhr/day	kilowatt-hours per day
lbs	pounds
lbs/day	pounds per day
LF	Linear Foot
LS	Lump Sum
m/yr	meters per year
m^2	square meter
MG	Million Gallons
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MGD	Million Gallons per Day
MPN	Most Probable Number
MPN/100 mL	Most Probable Number per 100 milliliters
n	Manning's Coefficient
NTU	Nephelometric Turbidity Units
ppcd	pound per capita per day
ppd	pounds per day
PPH	Persons Per Household
psi	pounds per square inch
Q	flow
SF	Square Feet
S_0	BOD in influent
yr	year

AAF	Average Annual Flow
AASHTO	American Association of State Highway and Transportation Officials
ABF	Activated Biofilter
ACP	Asbestos Cement Pipe
ADT	Average Daily Traffic
ADWF	Average Annual Dry Weather Flow
AS	Activated Sludge
AWWF	Average Annual Wet Weather Flow
BF/AS	Biofilter/Activated Sludge
BMPs	Best Management Practices
BOD	Biochemical Oxygen Demand
$CaCO_3$	Calcium Carbonate
Cal-EPA	California Environmental Protection Agency
Caltrans	California Department of Transportation
CCB	Chlorine Contact Basin
CCR	California Code of Regulations
CCTV	Closed Circuit Television
CDFG	California Department of Fish and Game
CDWR	California Department of Water Resources
CEQA	California Environmental Quality Act
CFR	U.S. Code of Federal Regulations
CIP	Cast Iron Pipe
CMP	Corrugated Metal Pipe

Abbreviations and Acronyms, Continued

CPP	Corrugated Plastic Pipe
CSD	Community Services District
CT	Chlorine Concentration over Time
CWA	Clean Water Act
DFG	Department of Fish & Game
DHS	California Department of Health Services
DI	Drainage Inlet
Dia.	Diameter
Dist.	Distribution
DT	Detention Time
DWR	Division of Water Rights
EDU	Equivalent Dwelling Unit
EPA	U.S. Environmental Protection Agency
EQ	Excellent Quality biosolids, as defined in 40 CFR Part 503
FHWA	Federal Highway Administration
HA_c	Acetic Acid
HDPE	High Density Polyethylene
HRC	Humboldt Redwood Company
ICPRB	Interstate Commission on the Potomac River Basin
I/I	Infiltration and Inflow
ITE	Institute of Transportation Engineer
K^+	Potassium cation
K_2O	Potash
LACO	LACO Associates
LAFCo	Humboldt County Local Agency Formation Commission
LOS	Level Of Service
LT1ESWTR	Long Term 1 Enhanced Surface Water Treatment Rule
MCL	Maximum Contaminant Level
MEP	Maximum Extent Practicable
MH	Manhole
MMDWF	Maximum Month Dry Weather Flow
MMWWF	Maximum Month Wet Weather Flow
MOU	Memorandum Of Understanding
MRP	Monitoring and Reporting Program
MS4	Municipal Separate Storm Sewer Systems
MSR	Municipal Service Review
N_2	Nitrogen
NA	Not Applicable
ND	No Data
NFPA	National Fire Protection Association
NH_3	Ammonia
NH_4	Ammonium
NO_2	Nitrous Oxide
NO_3	Nitrate
NOI	Notice Of Intent
NPDES	National Pollutant Discharge Elimination System
NR	No Reference
O&M	Operations and Maintenance
P_2O_2	Phosphorous
PALCO	The Pacific Lumber Company
PAN	Plant-Available Nitrogen
PC	Pollutant Concentration biosolids, as defined in 40 CFR Part 503
PDAF	Peak Day Average Flow
PEIR	Program Environmental Impact Report
PFRP	Processes to Further Reduce Pathogens
PIF	Peak Instantaneous Flow
PPT	Precipitation
PSRP	Processes to Significantly Reduce Pathogens
PVC	Polyvinyl Chloride
PW	Peak Weekly Flow
RAS	Return Activated Sludge
RCP	Reinforced Concrete Pipe
RP	cumulative Pollutant loading Rate
RWQCB	California Regional Water Quality Control Board, North Coast Region
SCADA	Supervisory Control and Data Acquisition
SD #	Storm Drain number
SDR	Standard Dimension Ratio
SDWA	Safe Drinking Water Act
SFDH	Single Family Detached Homes

Abbreviations and Acronyms, Continued

SHN	SHN Consulting Engineers & Geologists, Inc.
SiO_2	Silica
SOR	Surface Overflow Rate
SRT	Sludge Retention Time
SWMP	Storm Water Management Program
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
SWTR	Surface Water Treatment Rule
TF/SC	Trickling Filter/Solids Contact
TI	Traffic Index
TOS	Town of Scotia, LLC
TRB	Transportation Research Board
TS	Total Solids
TSS	Total Suspended Solids
U	Unknown
USA	Underground Service Alert
USGS	United States Geological Survey
VCP	Vitrified Clay Pipe
VFD	Variable Frequency Drive
VSS	Volatile Suspended Solids
W&K	Winzler & Kelly Consulting Engineers
WAS	Waste Activated Sludge
WRCC	Western Regional Climate Center
WTF	Water Treatment Facility
WWTF	Wastewater Treatment Facility

Foreword

The Humboldt County Local Agency Formation Commission (LAFCo) approved the use of the Municipal Service Review (MSR) process to support the application for district formation for all local agencies within Humboldt County. In order for the LAFCo to approve the formation of a new agency, information must first be collected which documents the service capabilities of that agency. The MSR is used to present this information and document service capabilities.

This detailed engineering analysis was prepared to support the MSR process and constitute Appendix A of the MSR report. For a description of the general context, goals, and objectives of the Community Service District formation project, please refer to the main MSR report of which this Detailed Engineering Analysis is a part.

1.0 Wastewater Collection

1.1 Introduction

This chapter summarizes the wastewater collection system for the town of Scotia, California as currently owned and operated by Town of Scotia, LLC (TOS) and provides an infrastructure assessment for the proposed formation of a Scotia Community Service District (CSD). The sections in this chapter describe the existing sanitary sewer pipeline system and services in the town of Scotia, the projected demand on and capacity of the sewer system, the regulatory and design criteria under which improvements will be made, and recommended improvements. The terms "sanitary sewer" and "wastewater collection" are used interchangeably in this chapter.

1.2 Description of Existing System and Services

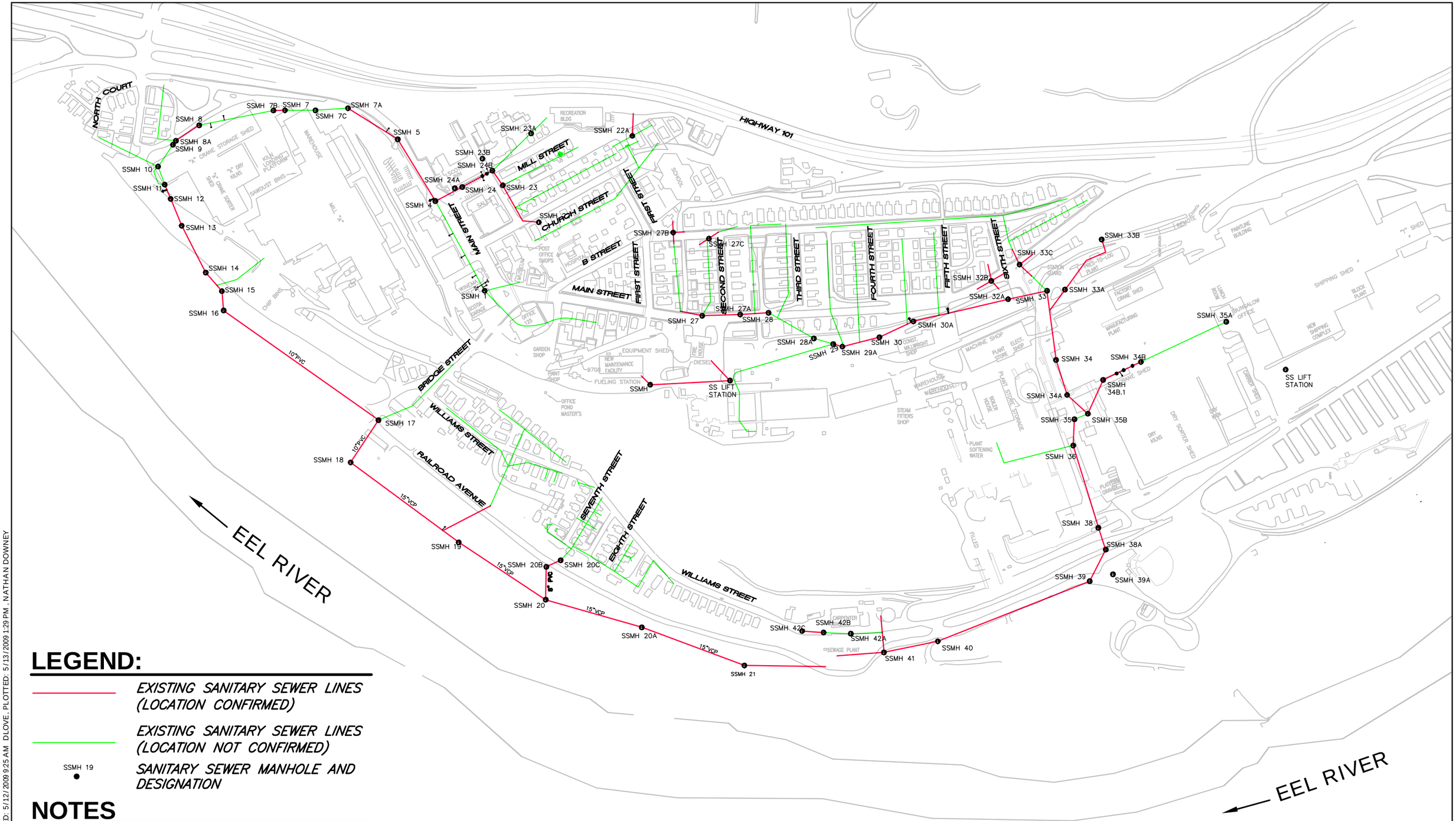
1.2.1 Background

Presently, the Scotia sanitary sewer system is comprised of two separate mainlines in the north and south areas of the town. Figure 1-1 presents the existing wastewater collection system layout as provided by TOS and developed by SHN Consulting Engineers & Geologists, Inc. (SHN). The northern system (Mill A line) collects wastewater from the Scotia Shopping Center along Main Street, Mill A, the residential area bound by First Street to the south and Main Street to the west, the section in the northeast corner of Scotia known as North Court, and part of the residential area on and around Williams Street. The southern system (Mill B line) serves residences south of First Street, the former Mill B area and new HRC facilities south of Mill B (mill, planer, kilns, factory), the Fisheries Exhibit building, the cogeneration plant, and part of the residential area on and around Williams Street.

The existing system consists of approximately 5 miles of gravity sewer mains and two lift stations. The lift stations are located in the existing industrial areas. One of the lift stations is located at the cogeneration plant facility and the other is located in the active HRC lumber mill complex. The lift station at the cogeneration plant collects wastewater from a truck washing facility, the cogeneration plant restrooms, and from an oil/water separator located in the cogeneration plant. The lift station at the HRC lumber mill collects wastewater from the mill restrooms.

There is no available documentation describing when the various portions of the system were constructed so the exact age of the various components of the sewer system is unknown. In a technical memorandum on the Scotia wastewater collection system, prepared on behalf of the City of Rio Dell in support of a possible annexation (Alternative A of the Project Environmental Impact Report [PEIR] accompanying the MSR of which this detailed engineering analysis is a part), Winzler & Kelly (W&K) estimated the age of the system between 50 and 70 years (W&K, October 11, 2006b).

In the past, the system functioned as a combined sewer and stormwater collection system. However, in the last few years an effort was made to separate the stormwater connections, including roof downspouts. Smoke test studies were conducted to help identify and disconnect stormwater inflow piping. All known stormwater connections were separated. Additional smoke testing may be conducted as a part of TOS's effort to comply with National Pollution Discharge Elimination System (NPDES) permit requirements.



LEGEND:

EXISTING SANITARY SEWER LINES (LOCATION CONFIRMED)

EXISTING SANITARY SEWER LINES (LOCATION NOT CONFIRMED)

SSMH 19 — SANITARY SEWER MANHOLE AND DESIGNATION

NOTES

ADDITIONAL SEWER LINES EXIST BUT THEIR LOCATIONS WERE NOT FOUND ON PALCO MAPS OR DURING CCTV INSPECTIONS.

NOTE: THIS MAP IS NOT A PRODUCT OF SURVEY. ALL LINEWORK SHOWING EXISTING FACILITIES WAS CREATED USING INFORMATION RECEIVED FROM PALCO AND OR THE 2006 CCTV INSPECTION. ADDITIONAL WASTEWATER FACILITIES MAY EXIST THAT ARE NOT SHOWN ON THIS DRAWING.

0 400'

1"=400'

SHN Consulting Engineers & Geologists, Inc.

Scotia CSD Formation
Detailed Engineering Analysis
Scotia, California

Existing Wastewater Collection System

SHN 005161.903

May 2009 | 005161-903-E-SS-COLL-SYS_1-1 | Figure 1-1

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TOS staff responsible for maintaining the collection system indicated that there has been limited routine maintenance performed on the system and that, in most cases, sewer mains and laterals were worked on only when emergency repairs were needed. The large amount of debris removed from the sewer mains during the closed circuit television (CCTV) inspection in the summer of 2006 confirms this. According to the W&K technical memorandum, the collection system had never been cleaned prior to the recent cleaning performed in conjunction with the CCTV camera inspection.

1.2.2 Collection System Investigation and Findings

SHN conducted a physical evaluation of Scotia's existing sewer facilities from May 12, 2006, through July 28, 2006. Activities that were conducted for this investigation included manhole inspections, CCTV camera inspections, and smoke testing (including pressure cleaning of lines). The CCTV inspection was conducted manhole to manhole (as found or accessible), one manhole at a time, using a self-propelled camera specifically designed for pipeline inspection. An inspection log identifying and detailing pipe system defects and their locations was made for each pipe run. The CCTV inspection report includes DVDs of the inspection video that can be analyzed to help prioritize which lines require replacement or repair. The inspection work was also used for exploratory mapping of the system. The CCTV inspection report has not been distributed but is available from TOS or SHN.

As reported in SHN's *Wastewater Collection System Evaluation, Scotia California* report (August 2006), in general the upper half of the Mill A trunk line is in poor condition, the lower half of the Mill A line is in fair to good condition, the upper two thirds of the Mill B line are in poor condition, and the lower third of the Mill B line is in fair to good condition. Poor condition is defined here as pipeline with longitudinal and circumferential cracks jeopardizing the integrity of the conduit, large avenues for infiltration and inflow (I/I)[1], and/or pipe where structural failure is imminent. Fair condition describes pipe that has circumferential and small longitudinal cracks, offset joints, minor root intrusion, and moderate avenues for I/I. As such, "Fair Condition" does not imply suitability for long-term continued service without some degree of repair or rehabilitation. Many of the manholes that were inspected also provide opportunities for I/I to enter the sewer system, and a few previously unknown sources of stormwater were found directly entering the system (SHN, September 2006).

Many sections of branch pipeline and a few sections of trunk line were not inspected, due to inadequate access at manholes or pipe defects that prevented the camera from traveling the length of the section. A conservative assumption would be that their condition is not better than that of the neighboring sections. Because the exact location of these un-inspected sections is not known, finding defective areas and repairing the branch lines would be extremely difficult and possibly more expensive than replacing them in whole.

1.2.3 Piping Materials and Condition

The sewer collection system is comprised of vitrified clay pipe (VCP), cast iron pipe (CIP), asbestos cement pipe (ACP), and polyvinyl chloride (PVC). The system is primarily constructed of 8-inch

[1] Infiltration refers to water entering a collection system from a variety of entry points including cracked or broken sewer laterals, defective pipes, pipe joints, or manholes. Inflow refers to water entering the sewer system from direct groundwater and surface water sources, such as cellar and foundation drains, roof drains, and cross-connections from storm drains.

VCP in 4-foot laying lengths. The segments of PVC pipe in the system were installed in repair areas addressed during the last 10 years. There is also a recently installed 848-foot section of PVC sewer main on the lower portion of the Mill A system. The PVC segments of the system are Standard Dimension Ratio (SDR) 35 sewer pipe (3034 PVC), typically 10 to 20 feet long. A few sewer mains are constructed of ACP, but there is very little ACP in the overall system (less than 0.1%). There are also a few CIP mains in the system.

Typical problems associated with VCP are present in Scotia's system. These problems include minor to severe longitudinal and circumferential cracking, wall crushing with longitudinal cracks (deformation) at 9:00, 12:00, and 3:00, offset joints, deflected joints, sags, root intrusion at pipe joints and cracks, and pipe that has almost completely collapsed.

Based on observations from the CCTV inspection, the PVC sewer pipe appears well constructed. There were no obvious signs of leakage or infiltration, and there is minimal root intrusion. Other than a few sags, the PVC pipe is well aligned and in good structural condition. There were many minor sags observed during the CCTV inspection. Some of the flatter portions of the VCP collection system near the wastewater treatment facility have significant sags that could trap large amounts of debris. This problem was evidenced during the collection system cleaning and CCTV inspection. Portions of the system are also located within the 100-year floodplain and the manholes in this low-lying area are not equipped with bolt-down or watertight lids.

There were few fittings observed during the CCTV inspection of the sewer system except for an occasional wye or tee used to join two intersecting mains. Most connections (including laterals) were made by field cutting the pipe and sealing the connection with cement mortar. When installed, changes in the alignment were accomplished at manholes. In several areas, alignment changes were made by deflecting the bell-and-spigot joints. Changes in line size were generally made at manholes. Cement mortar was used to cap dead ends or abandoned lines.

1.2.4 Horizontal System Alignment

In general, the sewer mains in Scotia were laid out in a manner that served the intended hydraulic function. However, most sewer lines were constructed without consideration of the town being subdivided, as is currently being proposed. Many sewer mains are located behind houses and in other areas that could become private property as a result of the proposed subdivision. In some cases, sewer mains are located under buildings and in other inaccessible areas. Those trunk lines not in the proposed public rights-of-way would be very difficult for the proposed CSD to access and maintain. Ideally, the only portion of the collection system on private property would be the sewer service laterals (serving only the building or buildings on that individual property). Any portion of a sewer main located under a building is unacceptable because these lines would be impossible to access if repairs were required, there is potential for occupant exposure to sewer gasses and overflows, and the pipes could be damaged during any foundation work conducted on the buildings.

1.2.5 Sewer Laterals

A sewer lateral is the portion of the collection system that connects a building sewer to the mainline. Building sewer refers to that portion of the collection system that serves an individual building or residence that is located under the building to 2 feet outside the building perimeter.

Existing sewer laterals for individual private residences are primarily 4-inch VCP. Sewer laterals for industrial and commercial installations range from 4 inches to 8 inches in diameter. Sewer laterals were typically cut-in to the sewer mainline and grouted in place without the use of gasketed saddles or specialized fittings.

Most laterals do not have cleanouts. When repairs become necessary, the laterals are accessed by excavating and cutting into the line. In a few cases, ABS cleanout fittings have been installed on the laterals when repairs were made. In general, lateral cleanouts are only found on laterals that have had recurring blockage problems.

1.2.6 Sewer Manholes

Sewer manholes in Scotia are primarily nonstandard structures. There are very few standard round manholes with cast iron lids in Scotia. Most existing manholes are non-standard (of industry) rectangular, cast-in-place concrete structures with rectangular 3/8-inch thick steel covers. The sewer manholes do not have standard manhole rings and are not sealed to prevent infiltration. Manhole inside dimensions range from 1.6 feet by 1.6 feet to 4 feet by 4 feet, with the typical dimensions being about 3 feet by 3 feet. Most of the cast-in-place manholes have fabricated steel steps that are heavily deteriorated. The manhole depths range from 2 feet to 16 feet, depending on the grade of the mainline. There are also several manholes that were built using precast concrete water meter boxes and corrugated plastic pipe. The connection of sewer mains at manholes is likely a significant source of groundwater infiltration, based on observations made during the CCTV inspections.

It is common practice in sewer design and construction to locate manholes in a right-of-way. The typical criteria for manhole placement are:

1. wherever pipelines intersect,
2. where there is a substantial change in slope,
3. where there is a change in horizontal alignment or pipe size,
4. to reduce distances to less than or equal to 500 feet between manholes, and
5. to ensure sewer lines remain in a right-of-way.

Some of Scotia's manholes are located in yards, on sidewalks, under fences, and under buildings. Several manholes were found during the CCTV inspection that had been paved over or were otherwise covered with soil so that they were no longer accessible from the surface. It is possible that additional manholes exist that have not yet been found in pipelines where the CCTV camera could not pass due to pipe size and/or condition. Intervals between sanitary sewer manholes in Scotia vary from less than 50 feet to more than 800 feet. There does not appear to be a typical design interval. Manholes were generally placed at locations where the line needed to change alignment or at junctions with other lines.

1.2.7 Recent Repairs and Improvements

During the summer and fall of 2006, former owner Pacific Lumber Company (PALCO) completed improvements to the collection system to reduce I/I and increase the reliability and hydraulic capacity of the sewer system.

Several of these improvements included:

- Sewer line cleaning;
- Sewer line replacement by Beacom Construction at 13 repair sites, with 422 lineal feet of replacement;
- Concrete plugging of abandoned Mill B restroom water closet floor connections directly exposed to rainfall;
- Repair and sealing 12 manholes from storm runoff; and
- Separating stormwater receiving facilities from wastewater collection facilities

Following these upgrades, increased influent total suspended solids (TSS) and biological oxygen demand (BOD) concentrations provided some evidence that I/I has been reduced, allowing the wastewater treatment facility (WWTF) to perform more effectively (that is, operate within its discharge permit limitations at lower hydraulic loadings). However, data gathered during the 2006-2007 rainy season indicate that substantial I/I still enters the collection system. Additional flow monitoring should be conducted in the collection system in order to determine the most significant sources of I/I within the sections of pipeline that will be repaired (rather than replaced). This information will be compiled and used in conjunction with ongoing NPDES permit compliance of the WWTF.

1.3 Demand and Capacity

Scotia's sanitary sewer system serves a population of approximately 1,000 people. The collection system has 272 residential sewer connections, several connections in the HRC mill industrial areas, and approximately 20 commercial connections.

Based on analysis of data from 2003 through the first half of 2006, the Average Annual Dry Weather Flow (ADWF) into the WWTF was 0.178 million gallons per day (MGD). The Average Annual Wet Weather Flow (AWWF) for the same period was 0.287 MGD. The peak day flow recorded during this period was 1.394 MGD in February 2004. The peak flows indicate that I/I into the wastewater collection system is excessive.

As the collection system is currently configured, the hydraulic capacity of the sewer system has been adequate to meet the historic peak flow events. A substantial reduction of the I/I levels will reduce the peak hydraulic loadings, increasing available capacity used for several parts of the system. Nevertheless, current standards of practice require that wastewater collector lines that convey wastewater by gravity flow be at least 6 inches in diameter, while some short sections of Scotia's existing sewer pipe are 4 inches or less. Although these smaller pipes may have been generally adequate to convey the flows they have received, pipes less than 6 inches in diameter are prone to clogging.

The composition of Scotia's wastewater (not including I/I) is considered similar to typical domestic wastewater, which has average BOD and TSS concentrations ranging from 250 to 300 milligrams per liter (mg/L). A thorough discussion of flows and loads is provided in "Chapter 2: Wastewater Treatment."

Scotia is essentially at the residential build-out development level, and below the historical industrial level; wastewater flows and loads are not expected to increase significantly over historical use. However, some additional businesses and industry may eventually occupy a future industrial park in the present Mill A area, which already includes a brewery. A determination of specific wastewater flows and characteristics from any additional businesses will be required for proposed collection system rehabilitation design.

1.4 Regulatory Criteria

1.4.1 Authority

For the powers and responsibilities under which the proposed CSD will operate (with regard to wastewater collection), the California Water Code, Sections 31100-31106, provides some guidance:

> *A district may acquire, construct, and operate facilities for the collection, treatment and disposal of sewage, waste and storm water of the district and its inhabitants and may contract with any public agency including but not limited to sanitation districts for sewer outfall facilities. A district also may acquire, construct, and operate facilities for the collection, treatment and disposal of sewage, waste and storm water of inhabitants outside its boundaries; provided that it shall not furnish any such service to the inhabitants of any other public agency without the consent of such other public agency expressed by resolution or ordinance.*
>
> *The district may prescribe, revise, and collect rates or other charges for the services and facilities furnished pursuant to this article.*
>
> *A district may supply sewage and waste services to property not subject to district taxes at special rates, terms, and conditions as are determined by the board for the services.*
>
> *The district may provide that such rates or other charges may be collected with the water rates of the district and that all rates shall be billed upon the same bill and collected as one item, and that in the event of failure to pay the whole or any part thereof, the district may discontinue any and all service for which such bill is rendered, but this provision shall not be construed to prohibit the collection of rates or charges by the district in any other lawful manner.*

1.4.2 Permit Constraints

Scotia's current NPDES permit has set a limit on inflows to the WWTF, which has occasionally been exceeded during major rainfall events. Low influent concentrations do not directly create regulatory issues, but the governing water quality regulatory agency, the California Regional Water Quality Control Board, North Coast Region (RWQCB) mandates that concentrations of influent constituents be reduced by 85% by the WWTF; when the wastewater is diluted by I/I and influent constituent concentrations are already low, it is very difficult to obtain reductions of 85%. Prior to limited improvements made to the collection system and the WWTF in the fall of 2006, Scotia's influent concentrations of BOD and TSS were frequently below 30 mg/L entering the facility,

making the achievement of 85% reductions virtually impossible. During the 2007-2008 winter season, the incidence of influent concentrations of BOD and TSS below 40 mg/L entering the facility was limited to major storm events.

1.4.3 Collection System

Two references were used to establish baseline standards for wastewater collection systems in order to determine what improvements would be proposed for Scotia's systems during initial CSD formation, and subsequent capital improvements planning (for upgrading system components to area municipal standards). The nearby Cities of Rio Dell and Fortuna have standard improvement specifications, referred to in this section as the "City Standards," which were used to determine potential CSD requirements and specifications for wastewater collection systems, including materials, installation, and design criteria (for new construction).

These City Standards provide details and specifications for the installation of sanitary sewer collection facilities, including laterals, cleanouts, mains, and manholes. The City Standards were created in the 1960s, and though much of the materials for sewer construction called out in the details are outdated, the designs are still compatible with modern construction practices.

The condition of Scotia's sewer system and its wastewater composition have created two regulatory issues that require attention in the short term:

1. high flows during the rainy season that exceed the wastewater treatment facility's hydraulic capacity, and
2. low influent BOD and TSS concentrations.

Furthermore, if Scotia forms a CSD to administer and maintain the town's municipal facilities, the CSD would need to be able to locate and access all parts of the sewer system for repairs and maintenance, except the portions privately owned by property owners.

For placement of new sewer lines, Title 22 of the California Code of Regulations (CCR), Division 4, Chapter 16, Article 5 describes the minimum separation requirements for water mains and sewer mains. This chapter, also called the "California Water Works Standards," states that water mains shall typically be installed at least 10 feet horizontally from and 1 foot higher than sanitary sewers located parallel to sewer mains, and 1 foot higher than sanitary sewers crossing the water main. Separation distances are measured from the nearest edges of the facilities.

Variations of the separation distances can be decreased to 4 feet horizontally by using specific pipe materials and a greater pressure class rating.

1.5 Improvements

1.5.1 Proposed

Evolving regulatory changes and unknown future commercial and industrial demands will dictate future infrastructure improvement as these changes are planned and implemented. Therefore, existing system upgrades or modifications will be planned and constructed for maintaining appropriate levels of service while minimizing operation and maintenance costs to the affected

users and meeting known regulatory requirements. All described system improvements will be designed and constructed to meet or exceed standard-of-care for area public works facilities. For quantities of existing components as well as of proposed rehabilitated and new components, please see Table 1-1.

Collection System. Phased rehabilitation of the existing VCP sewer mains can be accomplished based on their location and the results of CCTV inspection. Pipes that are well aligned and have no signs of major distress or I/I can be rehabilitated by relining or maintained as they currently exist. Lining sewer mains with slipline PVC or high-density polyethylene (HDPE), or installing fold-in-form or cure-in-place pipe, creates a seamless pipe within a pipe, which eliminates I/I and can increase the structural integrity of the sewer main. However, where misalignment and major structural defects cannot be corrected before relining, portions of the system will require replacement. Sags in the pipeline will require repair in order to allow sufficient flow velocities for cleansing action to prevent debris from accumulating in the line. Furthermore, the minimum acceptable line size is 6 inches. Sewer mains that are smaller than 6 inches will require replacement with larger pipes. Acceptable mains with improperly installed lateral connections will also need to have lateral connections replaced.

Given the condition of the existing collection system and the fact that much of the system is located outside of typical right-of-way areas (in backyards, under buildings—places that will become private property), a majority of the system within the residential and commercial areas needs to be replaced. SHN prepared a preliminary layout of a replacement collection system and prepared cost estimates for initial phase construction (Figure 1-2). Pending final design, some lines may need to be realigned from the proposed alignments shown on Figure 1-2 in order to maintain gravity flow.

Sewer Manholes. Sewer manholes in areas of no collection system replacement and that are in serviceable condition will require retrofitting with manhole rings and standard cast iron manhole lids. In addition, these manholes will need to be sealed to reduce or eliminate groundwater infiltration. Substandard manholes in similar areas will be replaced with modern manhole structures. Manholes located on private property, under buildings, and in otherwise inaccessible or unacceptable locations will require relocation to within the street right-of-way or to a location that will allow access to the manhole for inspection and maintenance.

Sewer Laterals. The majority of existing sewer laterals are located in private property and in areas outside the proposed right-of-way. All residential service laterals will require replacement with PVC sewer pipe and have clean-outs installed to provide access for maintenance. Placing the sewer laterals and cleanouts at the edge of the public right-of-way allows the CSD to service the portion of the line for which it will be responsible. Commercial service laterals will be replaced if they are not to CSD standards or in inaccessible locations.

Conceptual Layout. The conceptual layout depicted in Figure 1-2 shows the sections of existing sewer mains that are recommended for rehabilitation, and areas where new sewer mains and laterals will be needed. Table 1-1 summarizes the existing and proposed sewer system pipe and appurtenance quantities. Table 1-2 presents the engineer's opinion of the probable costs for construction of the proposed improvements.

The existing pipelines and manholes within the 100-year flood zone will be made watertight and equipped with bolt-down lids. Avoiding lift stations will minimize future operation and maintenance costs.

NORTH COURT

HIGHWAY 101

PROPOSED INDIVIDUAL LIFT STATIONS

SSMH 12
SSMH 13
SSMH 15
SSMH 16
SSMH 17
SSMH 18
SSMH 19
SSMH 20B
SSMH 20
SSMH 20A
SSMH 21
SSMH 4
SSMH 24B
SSMH 24
SSMH 23
SSMH 33
SSMH 34
SSMH 34A
SSMH 39
SSMH 39A
SSMH 40
SSMH 41

MILL STREET
CHURCH STREET
MAIN STREET
B STREET
MAIN STREET
FIRST STREET
SECOND STREET
THIRD STREET
FOURTH STREET
FIFTH STREET
SIXTH STREET
FIRST STREET
BRIDGE STREET
WILLIAMS STREET
RAILROAD AVENUE
SEVENTH STREET
EIGHTH STREET
WILLIAMS STREET

LIFT STATION

(E) WWTP

EEL RIVER

EEL RIVER

LEGEND:

- PROPOSED MANHOLE
- PROPOSED CLEANOUT
- EXISTING MANHOLE
- 8" — PROPOSED SEWER LINE AND SIZE
- 15" — EXISTING SEWER LINE (AND SIZE) TO BE INCORPORATED
- INCORPORATED PORTIONS TO BE REHABILITATED

NOTE: THIS MAP IS NOT A PRODUCT OF SURVEY. ALL LINEWORK SHOWING EXISTING FACILITIES WAS CREATED USING INFORMATION RECEIVED FROM PALCO AND/OR THE 2006 CCTV INSPECTION. ADDITIONAL WASTEWATER FACILITIES MAY EXIST THAT ARE NOT SHOWN ON THIS DRAWING.

0 400'

1"=400'

REV 1/28/08

Consulting Engineers & Geologists, Inc.

Scotia CSD Formation
Detailed Engineering Analysis
Scotia, California

Proposed Wastewater Collection System Improvements
SHN 005161.903

May 2009 | 005161-903-PROP-SS-IMPROV | Figure 1-2

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Table 1-1
Summary of Existing Sewer System and Proposed Improvements[1] (Revised 1/28/2008)
TOS Detailed Engineering Analysis

Sewer Main Size/Appurtenance	Unit	Existing			Proposed						
					Rehabilitate Existing			Install New			System Improvement Total
		Unpaved	Paved	Total	Unpaved	Paved	Total	Unpaved	Paved	Total	
Unknown Size	LF[2]	7,890	1,750	9,640	0	0	0	0	0	0	0
4-Inch or less	LF	1,780	200	1,980	0	0	0	0	0	0	0
6-Inch[3]	LF	2,700	940	3,640	0	0	0	0	12,400	12,400	12,400
8-Inch	LF	4,800	600	5,400	552	444	996	0	3,950	3,950	4,946
10-Inch	LF	1,870	0	1,870	162	0	162	0	1,000	1,000	1,162
12-Inch	LF	2,080	0	2,080	0	0	0	230	900	1,130	1,130
15-Inch	LF	3,500	0	3,500	3,200	0	0	0	0	0	3,200
Commercial Lateral	Each	26	0	26	0	0	0	0	26	26	26
Residential Lateral	Each	272	0	272	0	0	0	0	272	272	272
Industrial Lateral	Each	U[4]	U	U	0	0	0	0	10	10	10
Industrial Cleanout	Each	U	U	U	0	0	0	0	13	13	13
Manhole	Each	54	12	66	0	0	0	0	63	63	63

1. All quantities are approximate and based on best available information; assumes trench paving with overlays in paved roadways.
2. LF: Linear Foot
3. Realignment and consolidation of main to service connections reduces total line length of size 6-inches and less from existing to proposed improvements
4. U: Unknown

Table 1-2
Estimated Cost of Wastewater Collection System Improvements (Revised 2/24/2009)
TOS Detailed Engineering Analysis

Item (Unit Type)	Unit(s)	Quantity	Unit Cost	Total Cost
Mobilization/Demobilization	LS[1]	1	$40,000	$40,000
Demolition & Abandonment	LS	1	$63,000	$63,000
Miscellaneous Excavation & Backfill [2]	CY[3]	2,000	$10	$20,000
Install 6-inch Polyvinyl Chloride (PVC) C900 Sanitary Sewer Gravity Main[2,4]	LF[5]	12,400	$60	$744,000
Install 8-inch PVC C900 Sanitary Sewer Gravity Main[2,4]	LF	3,950	$70	$276,500
Install 10-inch PVC C900 Sanitary Sewer Gravity Main[2,4]	LF	1,000	$95	$95,000
Install 12-inch PVC C900 Sanitary Sewer Gravity Main[2,4]	LF	1,130	$150	$169,500
Total New Manholes[4]	Each	63	$5,000	$315,000
Total New Clean-outs[4]	Each	13	$1,000	$13,000
Residential Lateral Connections (to house) [4,6]	Each	272	$3,000	$816,000
Residential Lift Stations[4]	LS	3	$10,000	$30,000
Commercial Lateral Connections (to bldg.)[4]	Each	26	$4,000	$104,000
Industrial Lateral Connections[4]	Each	10	$5,000	$50,000
Cured-In-Place Main Line Liner	LF	4,358	$75	$326,850
Wastewater Collection System Improvements Subtotal				**$3,062,850**
Engineering[7] (20%)				$612,570
Contingency (20%)				$612,570
Total Wastewater Collection System Improvement Cost, Call:				**$4,288,000**

1. LS: Lump Sum
2. Assumes Humboldt Redwood Company (HRC) provides gravel material at no cost.
3. CY: Cubic Yard
4. Assumes temporary paving. Final paving in road overlay is accounted for in Chapter 7.
5. LF: Linear Foot
6. Unit Costs assume TOS installs residential lateral connections (includes service cleanout).
7. Engineering includes design, permitting, and construction management for the project.

Three houses at the south end of Main Street are located at lower elevation (about 10 feet) than other houses in that area, making gravity collection difficult. Possibilities for servicing these three houses include:

1. putting a small lift station at the bottom (south end) of B Street;
2. running a pipeline access across a residential right-of-way, thence under Main Street, with final connection to the manhole at Main Street west of the three homes; or
3. installing individual lift stations at each of the three residences with storage capacity for approximately 2 days of wastewater flows (recommend alternative, pending detailed design).

Recommendations presented in this chapter address defects as identified by SHN and alignment issues identified from mapping and field reconnaissance. A complete list of defects and their locations is presented in the *Wastewater Collection System Evaluation: Scotia California* report (SHN, August 2006). The following list addresses the major issues found during the pipeline investigation. Issues are not presented in any priority.

Issue 1:	Large portions of the system are in poor condition.
Recommendation 1:	*All such sections are slated for repair and/or realignment and replacement.*
Issue 2:	Parts of the existing collection system are located within the 100-year flood zone.
Recommendation 2:	*All failing or deteriorating sewer collection lines located within the 100-year floodplain will be waterproofed through cured-in-place lining or replacement, and existing manholes will be rehabilitated into watertight manholes. The pipeline work for the three houses at the south end of Main Street will not be completed as part of the proposed project, but must be accounted for in future capital improvements for Humboldt County Local Agency Formation Commission (LAFCo) planning purposes.*
Issue 3:	The lower trunk lines (Manhole [MH] 39 to WWTF and MH 16 to WWTF) are in usable condition, but they have minor to moderate defects (light cracks, minor root intrusion, and offset joints) in places.
Recommendation 3:	*Selected portions of trunk lines will be rehabilitated with cured-in-place lining during the proposed improvements work.*
Issue 4:	Most of the smaller collector lines in the residential and commercial areas could not be inspected due to pipe size, pipe condition, or lack of access. The condition and exact location of these lines is unknown.
Recommendation 4:	*The residential/commercial collection system will be replaced and/or relocated with new materials; 6-inch minimum diameter sewer pipe will be used for all common collector and trunk lines.*
Issue 5:	Most of the service laterals in the residential and commercial areas do not have cleanouts and the condition and exact location of these laterals is unknown.
Recommendation 5:	*All service laterals will be replaced using a 4-inch minimum diameter PVC collection pipe to each building and will include a service cleanout at the edge of the right-of-way.*
Issue 6:	Sewer manholes in Scotia are primarily nonstandard structures. The sewer manholes do not have standard manhole rings and are not sealed to prevent infiltration. The connection of sewer mains at manholes is likely a significant source of groundwater infiltration.

Recommendation 6:	*New manholes and cleanouts will be installed in the residential and commercial areas. HRC will repair existing manholes on their industrial property.*
Issue 7:	Excavation and construction work will require digging up most of the roads in the commercial and residential areas.
Recommendation 7:	*The utility infrastructure work will require temporary paving. A final overlay asphalt pavement surface will be constructed upon completion of a specific area's utilities.*
Issue 8:	Many sewer lines and manholes are located on private property and/or under buildings. The CSD will not have adequate access to maintain and repair them.
Recommendation 8:	*The residential/commercial collection system will be replaced and/or relocated, as shown in Figure 1-2, so that all parts are within the public right-of-way. There will be easements for the portions of the trunk lines that run through the TOS Wastewater Treatment Facility to HRC industrial areas.*

These upgrades to the sewer system are intended to significantly reduce I/I, thus reducing flows (primarily in the winter) to the wastewater treatment facility. The upgrades will also facilitate future maintenance and repair of the system and protect the public health and welfare of the residents of Scotia.

1.5.2 Issues of Operation

Replacing the sewer system in the residential and commercial areas will require extensive excavation, which will likely impede normal vehicular traffic. Provisions will have to be made to designate alternate routes and provide adequate signage to allow access to the affected areas.

There will be short, temporary interruptions of service as residences and businesses are connected to the new system. Residents and business owners must be provided prior notification for any planned interruptions of service.

Because the exact locations of many existing collector lines and most laterals are unknown, there is a good possibility that some of these lines will be inadvertently broken during excavation for the new system. Provisions must be made to minimize disruption of service and to contain wastewater that exits through broken pipelines.

There are other underground utilities in Scotia that are not thoroughly and precisely mapped. Underground Service Alerts (USAs) must be implemented prior to excavation, but excavators will be alerted to the fact that underground utilities may be encountered. Because Scotia has several underground steam pipes, as a safety precaution TOS needs to close off the supply to all steam lines within areas that are being excavated.

PG&E likely has good location information for its gas lines (TOS controls electrical service at present), but the possibility of unexpectedly encountering them during excavation exists. All excavation contractors and crews must be prepared to safely deal with this possibility. It may be necessary to turn off gas and/or electric service to some areas during excavation. If so, affected residents and business owners need to be given prior notification, whenever possible.

Upon CSD formation and assumption of responsibility for the proposed wastewater collection system, additional annual costs will be incurred through regular Operation and Maintenance (O&M) requirements associated with the system. Annual costs to the CSD will include labor, equipment, and parts. Adequate CSD staff will be required to ensure proper O&M of the system.

As described in "Section 1.4: Regulatory Criteria" above, the CSD will need to charge sewer use fees for residences and businesses that use the wastewater collection system. This may cause an economic impact to the residents and businesses of Scotia. Sewer and water services are currently provided by TOS at no cost to residents. User fees are discussed in the Financial Analysis included as Appendix C to the MSR.

2.0 Wastewater Treatment

2.1 Introduction

This section provides an overview of the existing treatment processes at the Scotia WWTF and assesses the condition, performance, and capacity of those processes. The assessment is based on analysis of wastewater operational data provided by PALCO and TOS for the period from October 2000 through December 2006 and on-site inspections by SHN of the wastewater treatment facilities. Recommendations are included where deficiencies have been identified and system upgrades are required.

2.2 Description of Existing Treatment System

The TOS Scotia WWTF was constructed in 1954 and has not undergone any significant upgrades since start-up. The equipment has been well maintained and replaced or rebuilt as necessary, but much of the equipment and all of the main structural components are more than 50 years old. However, the existing WWTF has been operating in compliance with its existing NPDES permit conditions.

The treatment system as illustrated in Figure 2-1 consists of the following processes:

1. Pre-treatment: grit removal channel with grinder and bypass bar screen
2. Primary treatment: clarification
3. Secondary treatment: redwood trickling filter followed by clarification
4. Disinfection: gas chlorination
5. Advanced treatment: three treatment/polishing ponds following chlorine contact
6. Biosolids: anaerobic digestion and unlined dewatering trench

Influent enters the WWTF through two gravity sewer mains that discharge into a headworks channel provided with a grinder and Parshall flume for flow metering. From the headworks, the sewage flows into a wet-well called the "deep well" where it is pumped to the primary clarifier. The effluent from the primary clarifier discharges to a second wet-well called the "shallow well" before being pumped to the trickling filter for secondary biological treatment.

The trickling filter effluent flows into a recirculation box where it is split into flow streams across two weirs. Operations staff has estimated that during normal operations, 60% of the trickling filter effluent flows to the secondary clarifier and the remaining 40% is diverted to the shallow well for re-circulation through the trickling filter.

From the secondary clarifier, secondary effluent is discharged to the chlorine contact chamber where chlorine solution is injected into the flow stream for disinfection. Disinfected effluent from the chlorine contact chamber is then pumped to a series of three treatment ponds. From the treatment ponds, treated effluent is sampled for compliance before being pumped to the log pond for disposal. The effluent from the treatment ponds flows through the log pond to the log pond clarifier, which discharges to the Eel River during wet weather, and to a percolation pond during dry weather (May 15 – September 30), when discharge to the river is prohibited. Based on 24-hour composite samples of the influent wastewater (monitoring site M-INF) and effluent discharged from Treatment Pond 3 (monitoring site M-012B) the facility achieved average removal rates greater than 96% for both BOD and TSS.

EFFLUENT TO TREATMENT PONDS

OVERFLOW TO EEL RIVER

(2) ONE TON CYLINDERS.

CHLORINE GAS INJECTOR MIX WITH WATER

LIQUID CHLORINE LINE

CHLORINE CONTACT CHAMBER
PUMPS
(1) 8"@800 GPM
(1) 4"@350 GPM

(M-012A)

GRAVEL ROAD

GRAVEL ACCESS ROAD

CHLORINE SENSOR ALARM PANEL

TRICKLING FILTER
44.5' DIA
70,000 GAL

40%

60%

SECONDARY CLARIFIER
30' DIA
42,000 GAL

SHALLOW WELL
(2) 4" PUMPS
500 GPM EACH

DEEP WELL
(2) 4" PUMPS
650 GPM EACH

GRINDER

(M-INF)

CONTROL ROOM (GROUND FLOOR)

"A" SEWER MAIN INFLUENT

DIGESTER
19.5' DIA
31,300 GAL

SLUDGE

SLUDGE

PRIMARY CLARIFIER
30' DIA
42,000 GAL

"B" SEWER MAIN INFLUENT

MANHOLE

ONE TON CYLINDER SECURED INSIDE STORAGE BUILDING

(M-003) TO RIVER/ PERCOLATION POND

SLUDGE

RAILROAD TRACK

WILLIAMS STREET

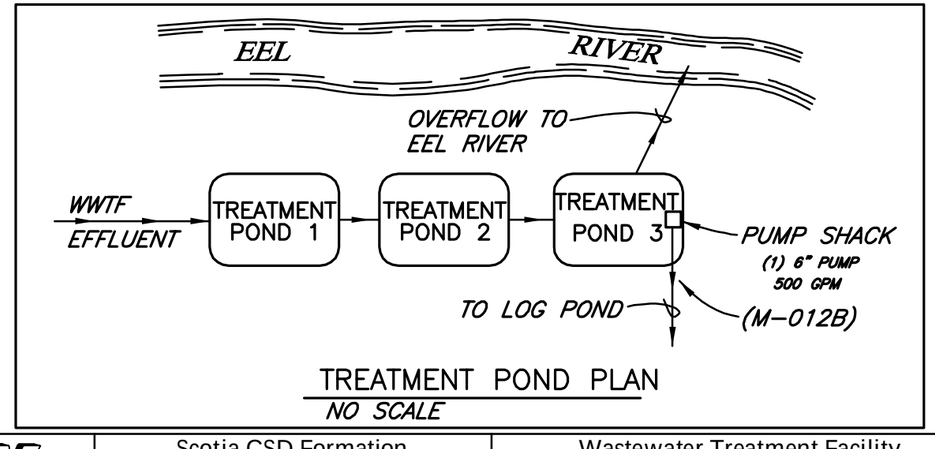
CARPENTER'S SHOP

LOG POND CLARIFIER

LOG POND EFFLUENT

NO SCALE

(M-INF) INDICATES SAMPLING LOCATION AND DESIGNATION



TREATMENT POND PLAN
NO SCALE

Consulting Engineers & Geologists, Inc.

Scotia CSD Formation
Detailed Engineering Analysis
Scotia, California

Wastewater Treatment Facility
Flow Diagram
SHN 005161.903

May 2009 | 005161-903-WWTP-FLOW_2-1 | Figure 2-1

I:\2005\005161\005161.903, SAVED: 5/12/2009 9:19 AM DLOVE, PLOTTED: 5/12/2009 2:33 PM, NATHAN DOWNEY

New discharge requirements for the TOS Scotia WWTF became effective on September 30, 2006. (See Section 2.3.3 below for s discussion of permit changes.)

2.2.1 Headworks: Pre-treatment/Flow Monitoring

Influent wastewater enters the WWTF through one of two gravity trunk mains. The Mill A line is a 15-inch VCP that conveys flows from the north end of the facility. Mill Line B is a 15-inch VCP line that conveys flows from the south end of the facility. The influent wastewater from the Mill A and B lines is combined at the headworks, before passing through a non-aerated grit channel and grinder. A bypass channel equipped with a bar rack is provided for flows diverted around the grinder. These flows are typically diverted to the Parshall flume for grinder maintenance or repair.

After the influent goes through the grinder, it is routed to the deep well through a Parshall flume. Level is recorded using an ultra sonic level sensor that measures the water at the throat of flume. Depending upon the level of water ahead of the flume, the level sensor reading equates to a measurement of the flow into the WWTF. The flow meter is located in the chlorine control room and is equipped with a totalizer and recorder for 24-hour flows. The meter has a local readout of instantaneous flow rates in gallons per minute (gpm).

2.2.1.1 Condition

TOS operators have noted that the grit chamber does not require frequent cleaning. It has also been noted that the collection system is in poor condition and it appears grit may settle out elsewhere in the collection system; or at high flows, the grit may wash through the channel and collect in the deep well.

Pre-treatment consists of a Muffin Monster grinder purchased in 1996. Much of the non-biodegradable material settles out in the primary clarifier or is scraped off with the floatables and delivered to the digester as primary sludge. The non-biodegradable material poses a maintenance concern contributing to wear and plugging of wastewater and biosolids pumps throughout the treatment process. Digested biosolids and non-biodegradable material that pass through the treatment and digestion processes are stored on TOS property in an unlined drying ditch. The material must be raked up and disposed of periodically.

The influent flow meter was installed in 2002 and is in good condition. During high flows, the grinder and sensor must be removed to avoid inundation and resulting damage. The grinder and sensor were last removed in late December 2005 and reinstalled in January 2006.

2.2.1.2 Headworks Issues

- The system lacks automated notification of a bypass condition or metering of overflow from the headworks channel.
- The system lacks prescreening and removal of non-biodegradable material.
- The headworks is a confined space and requires a minimum of two operators for safe entry.
- The system lacks flow readings during major storm events.

2.2.2 Primary Treatment

From the headworks, the sewage flows into the deep well, where it is pumped to the primary clarifier by the deep well submersible sewage pumps. Effluent from the primary clarifier gravity feeds back to the shallow well through a 10-inch pipe.

2.2.2.1 Condition

The primary clarifier is a 30-foot-diameter buried concrete tank constructed in 1954. The distribution and collection system is a bridge-supported unit with a worm gear drive. The drives have been regularly maintained, but there is no record of replacement or rebuild. The drive equipment is experiencing corrosion. The scrapers and collection arm were replaced in 1997. The top of the tank is covered by a square mesh screen supported by steel framework to deter vandalism and bird activity.

TOS operators have noted that the capacity of the discharge line to the shallow well is limited, and when both deep well pumps are on, the water level in the launders (primary effluent trough) increases to a point that it overflows and spills onto the ground on the low side of the clarifier. The 10-inch discharge line from the primary clarifier is cast iron and has an approximate slope of 1.2%. Assuming a Manning's coefficient (n) of 0.015 for rough, uncoated cast iron pipe, the full flow capacity is estimated to be 1.5 MGD.

The deep well pumps are two 20 horsepower (hp) submersibles with a design firm capacity (firm capacity assumes one pump is off-line) of 650 gpm (0.94 MGD). The pumps were replaced in November 2006. The new pumps were installed with a rail system so that they can be pulled for maintenance from the surface, eliminating the need for confined space entry.

2.2.2.2 Primary Treatment Issues

- The second deep well pump cannot be brought on line for a significant period of time without overflowing the clarifier.
- The equipment is aging and the clarifier drives require replacement.
- There is differential settlement of the primary clarifier and a new level overflow weir needs to be installed.

2.2.3 Secondary Treatment

Secondary wastewater treatment at the WWTF consists of a trickling filter with redwood slat filter media, followed by a secondary clarifier. Primary effluent is pumped to the trickling filter distribution arms by the shallow well pumps.

2.2.3.1 Condition

The shallow well pumps are line shaft turbines with an estimated firm capacity of 500 gpm. The pumps were rebuilt, one in 1994 and one in 1996, and are in good condition. The filter beds are dosed through a rotary/reaction distributor made up of two horizontal pipes supported by a center column.

The trickling filter is contained in an above-ground circular concrete tank that appears to be in good condition, with no visible cracks or leakage. The tank is approximately 5 feet deep and 44.5 feet in diameter. The redwood slats filter media are original and appear in good condition. The distributor arm was replaced in 2004.

The secondary clarifier, identical in construction to the primary clarifier, is 30 feet in diameter and approximately 7 feet deep. The clarifier is shallower than typical depths recommended for secondary clarifiers following trickling filters (typically 11 feet). The shallow depth limits the treatment performance at high flow rates. The effects of the depth on the design Surface Overflow Rate (SOR) and the resulting treatment capacity are discussed in Section 2.4.

2.2.3.2 Secondary Treatment System Issues

- Intermittent hydraulic loading allows filter media to dry out.
- Since the brewery has been brought on line at the future industrial park in the Mill A area, the trickling filter is organically overloaded, and acts as a roughing filter preceding tertiary ponds (see discussion below, under Section 2.4.2).
- The secondary clarifier drive and sludge collection mechanism are more than 50 years old and need to be replaced.
- The existing secondary clarifier is shallow, surface overflow rate is exceeded during peak flows.

2.2.4 Disinfection

Chlorine gas contained in one-ton cylinders is injected into potable water by a chlorinator in the chlorine room to form chlorine solution for disinfection. Chlorine solution is piped to diffusers in the chlorine contact basin where it is mixed with secondary effluent. At the end of the chlorine contact basin (CCB), the disinfected effluent is pumped to the treatment ponds for additional treatment.

2.2.4.1 Condition

The chlorinator, installed in 2003, is in good condition and is regularly serviced by the equipment suppliers. The chlorinator is flow-paced based on a signal from the influent flow meter, which is also located in the chlorine control room. Dosage is adjusted at the chlorinator control panel based on the pounds per day (lb/day) readout on a rotameter (a variable area flow metering device used for chemicals), which is located on the gas line prior to the injector.

Two pumps at the end of the CCB pump disinfected effluent to the treatment ponds. A 15-hp line-shaft turbine with a capacity of 800 gpm (1.15 MGD) was installed in October 2006 and operates as the lead pump. The lag pump is a 10-hp line shaft turbine pump with an estimated capacity of 350 gpm (0.50 MGD). There was an existing overflow pipe at the end of the CCB that allowed disinfected effluent to discharge to the Eel River; however, this outfall point has been removed. With both pumps running during high flow events, peak flows can be pumped to the treatment ponds without overtopping or diverting to the river.

The chlorine contact basin is a serpentine concrete basin constructed in 1954 and has a series of under-and-over baffles designed to prevent short-circuiting and maximize contact time in the basin. The weir wall that separates the effluent pumps from the CCB historically leaked but was recently repaired (February 2007).

2.2.4.2 Disinfection Issues

- Storage of 1-ton cylinders may not meet *Uniform Fire Code* recommendations (National Fire Protection Association [NFPA], 2006).
- System needs a second 15-hp pump in the contact basin to provide redundancy.

2.2.5 Treatment Ponds

The CCB discharges into three aerobic treatment ponds. The ponds have been operated with highly variable levels, but generally function as aerobic low rate or "maturation ponds." Aerobic maturation ponds are lightly loaded, relatively shallow ponds 3 to 5 feet deep. Oxygen is provided in the ponds by surface re-aeration, photosynthesis by algae, and denitrification of nitrate (NO_3). A summary of the treatment ponds sizing and equipment is provided in Table 2-1.

Table 2-1
Wastewater Treatment Facility Size and Equipment Assessment—Treatment Ponds
TOS Detailed Engineering Analysis

Equipment	Description	Size			Installation	Major Repair
		Area (SF)[1]	Depth (feet)	Volume (MG)[2]		
Treatment Pond 1	Aerobic pond	28,000	4	0.84	1960	2005 Cleaning
Treatment Pond 2	Aerobic pond	45,000	4	1.35	1960	2005 Cleaning
Treatment Pond 3	Aerobic pond	40,000	4	1.20	1960	2005 Cleaning
		(inches)	(gpm[3])	(hp[4])		
Effluent Pump	Line shaft turbine	6	500	40	2004	

1. SF: Square Feet
2. MG: Million Gallons
3. gpm: gallons per minute
4. hp: horsepower

2.2.5.1 Effluent Pumps

Effluent from Treatment Pond 3 is pumped to the log pond by the line-shaft turbine pump located at the end of the pond. A single pump is activated by the level in the treatment pond. The pump is accessed by a catwalk that extends out into the pond. An emergency overflow is plumbed to the Eel River at the end of Pond 3.

A small pump house adjacent to the catwalk contains the pump controls and a composite sampler. Samples collected from Pond 3 are analyzed for compliance with discharge requirements for BOD, TSS, and pH.

2.2.5.2 Condition

The ponds are full of biosolids. Although the ponds are reportedly more than 10 feet deep in some sections, depth of clear water above the sludge blanket is only approximately 4 feet during winter months and approximately 2 feet in the summer months. Vegetation continually encroaches on the edge of the ponds and at times, Pond 3 has been almost entirely covered with duckweed. In June 2006, much of the vegetation was removed from the treatment ponds. It is necessary to perform this maintenance on an annual basis, and this task will be part of the Operations and Maintenance Plan that will be developed in accordance with the NPDES permit requirements. A sludge inventory and removal plan is included as recommended improvements in Section 2.5.2

2.2.5.3 Treatment Pond Issues

- Culverts between ponds need replacing.
- There is a lack of level control in the ponds.

2.2.6 Biosolids

Solids are pumped from the primary and secondary clarifiers to the anaerobic digester using one of two sludge pumps located in the pump room. The digester's floating cover allows the volume of the digester to change without allowing air to enter. Gas from the digester is vented to the atmosphere. A heat exchanger in the pump room functions to heat the digester contents using hot water. Digested biosolids are periodically drained to a sludge dewatering trench. A summary of the biosolids system equipment is provided in Table 2-2.

Table 2-2
Wastewater Treatment Facility Biosolids System Equipment Assessment
TOS Detailed Engineering Analysis

Equipment	Description	Dia.[1] (feet)	Depth (feet)	Volume (gal.)[2]	Installation Date	Major Repair
Sludge Digester	Anaerobic	19.5	15	31,300	1954	New floating cover, 2004
Sludge Pump	Piston, Marlow				1954	Rebuilt, 2000

1. Dia.: Diameter
2. gal.: gallons

2.2.6.1 Condition

The sludge pumps are positive displacement, plunger pumps that were installed when the WWTF was constructed in 1954. According to the operator, the pumps were rebuilt in 2000. They are well maintained and in good condition. The floating cover on the digester was replaced in 2004 when the digester was cleaned out and is currently in good condition.

The exterior surface of the concrete digester is in poor condition, with numerous cracks. The structural integrity of the digester will be determined by investigating the depth of the exterior cracks and taking the digester off-line so the interior can be examined.

The biosolids removed from the digester are applied to a relatively unimproved dewatering trench. The trench is unlined and overgrown with brush. The RWQCB requires TOS to provide appropriate handling and disposal practices for sludge in the next permit cycle.

2.2.6.2 Biosolids Issues

- Solids loading from the primary and secondary clarifiers is not monitored.
- Volatile solids reduction in the digester is not monitored.
- The exterior of the digester is badly cracked.
- The unlined dewatering trench needs to be replaced with sludge drying beds.

2.3 Regulatory Criteria

This section summarizes the NPDES waste discharge requirements for the TOS Scotia WWTF. TOS currently discharges under Order No. R1-2006-0020 and NPDES Permit No. CA0006017. This permit was adopted by the RWQCB on June 29, 2006, by Order No. R1-2006-0020, and contains the waste discharge requirements for both the Scotia municipal WWTF and the Scotia cogeneration plant. The new permit went into effect on September 30, 2006, and expires on September 30, 2011.

2.3.1 Discharge Prohibitions

The Scotia WWTF is prohibited from discharging wastewater to the Eel River during the period May 15 through September 30 each year. During the period October 1 through May 14 of each year, discharges of treated wastewater to the Eel River shall not exceed one% of the flow of the Eel River, based on the most recent daily flow measurement, as measured at the Scotia gauging station (United States Geological Survey [USGS] Station 11477000). Additionally, the total volume of treated wastewater discharged to the Eel River in a calendar month shall not exceed 1% of the total volume of the Eel River in the same calendar month.

2.3.2 Effluent Limitations

The effluent limitations contained in the new permit are similar to the previous permit. However, with the new permit, the point of compliance for BOD and TSS has been moved from the log pond clarifier discharge (M-003) to the end of Pond 3 (M-012B). Disinfection requirements continue to be monitored at the chlorine contact basin effluent weir (M-012A). Table 2-3 summarizes the monitoring locations for compliance with the effluent limitations. These locations are also shown in Figure 2-1.

Table 2-3
Wastewater Treatment Facility Monitoring Locations[1]
TOS Detailed Engineering Analysis

Monitoring Location Name	Monitoring Location Description
M-INF	Influent monitoring location—a point in the facility headworks preceding any treatment and receiving all waste from the collection system
M-012A	Chlorine contact basin effluent weir
M-012B	Point of discharge at the end of the sanitary waste treatment train prior to discharge into the log pond
M-003	Log pond effluent discharge

1. Reproduced from NPDES No. CA0006017, Attachment E: Monitoring and Reporting Program (MRP)

Table 2-4 summarizes the effluent limitations for the WWTF. Treated wastewater discharged to the Eel River from the log pond must not contain detectable levels of total chlorine, as measured at

Monitoring Location M-003. In addition to these effluent limitations, the permit requires that the average monthly removal of BOD and TSS shall not be less than 85% as measured at Monitoring Location M-1012B. The removal shall be determined from the monthly average influent concentrations and monthly average effluent concentrations for each constituent over the same period.

Table 2-4
Wastewater Treatment Facility Effluent Limitations[1]
TOS Detailed Engineering Analysis

Parameter		Compliance Point	Monthly Average[2]	Weekly Average[3]	Daily Max.	Instantaneous		Sampling	
						Min.	Max.	Type	Frequency
BOD[4]	mg/L[5]	M-012B	30	45	60	--	--	8-hr. Composite	Weekly
	lb/day[6,7]		64	96	129	--	--		
TSS[8]	mg/L	M-012B	30	45	60	--	--	8-hr. Composite	Weekly
	lb/day		64	96	129	--	--		
pH	unitless	M-012B	--	--	--	6.5	8.5	Grab	Weekly
Total Coliform	MPN/100 mL[9]	M-012A	23 (median)	--	230	--	--	Grab	Weekly

1. Reproduced from NPDES No. CA0006017
2. The arithmetic mean of all daily determinations made during a calendar month
3. The arithmetic mean of all daily determinations made during a calendar week
4. BOD: 5-day Biochemical Oxygen Demand at 20°C
5. mg/L: milligrams per liter
6. lb/day: pounds per day
7. Per the current NPDES permit, mass based effluent limitations are based on an average flow rate of 0.257 MGD. During wet weather periods, when the effluent flow rate exceeds 0.257 MGD mass limitations shall be calculated using the actual daily average effluent flow rate, but shall never be based on an effluent flow rate greater than 0.770 MGD.
8. TSS: Total Suspended Solids
9. MPN/100 mL: Most Probable Number per 100 milliliters

2.3.3 New Provisions

Order No. R1-2006-0020 rescinded the previous NPDES permit (Order No. 99-59) and contains the following significant changes:

1. Waste stream-specific effluent limitations will be applied for the first time to regulate the discharges from the steam-electric (cogeneration) power plant.
2. The compliance point for the WWTF has been moved from the end of the log pond to the end of the treatment ponds for BOD and TSS and at the end of the chlorine contact basin for coliform.
3. The technology-based standard of 85% removal for BOD and TSS will be applied for the first time.

4. The Order requires TOS to conduct three special studies, including:

   a. a hydrogeologic study to determine the fate and transport of pollutants discharged by seepage or percolation from the WWTF and/or conduct a study to determine an alternative treatment/disposal method to be implemented to ensure compliance with the Basin Plan discharge prohibitions;

   b. a WWTF treatability study to determine the design capacity of the existing facility related to hydraulic and biological loading; and

   c. a sludge disposal study to evaluate appropriate handling and disposal practices for sludge generated at the WWTF.

5. Specific requirements relating to the wastewater collection system, operations and maintenance, sanitary sewer overflows, and source control have been added as General Provisions.

2.4 Demand and Capacity

2.4.1 Influent Flow

Influent WWTF flow characteristics were evaluated based on influent flow and precipitation data provided by PALCO and TOS for the period from October 2000 to May 2006. The flow data indicated a decrease in the minimum or base influent flow in 2001 and 2002 following production and staffing reductions at PALCO (now HRC) mills; therefore, characterization of existing flows was based on analysis of the flow data for the period of 2003 through 2006. A summary of the wastewater flows characterized is included in Table 2-5.

Table 2-5
Wastewater Treatment Facility Influent Flow Summary
TOS Detailed Engineering Analysis

	MGD[1]	gpd/EDU[2]	gpcd[3]
Base Sanitary Flow	0.100	352	141
Base Inflow and Infiltration	0.08	282	113
Average Dry Weather Flow (ADWF)	0.18	634	255
Average Wet Weather Flow (AWWF)	0.287	1,014	407
Average Annual Flow (AAF)	0.24	845	339
Maximum Month Dry Weather Flow (MMDWF-10)	0.28	986	396
Maximum Month Wet Weather Flow (MMWWF-5)	0.42	1,479	594
Peak Weekly Flow (PW)	0.75	2,641	1,061
Peak Day Average Flow (PDAF-5)	1.67	5,880	2,362
Peak Instantaneous Flow (PIF-5)	2.5	8,803	3,535

1. MGD: Million Gallons per Day.
2. gpd/EDU: gallons per day per Equivalent Dwelling Unit (EDU); 284 EDUs associated with sewer
3. gpcd: gallons per capita per day (2.49 persons per household TOS Scotia)

The collection system is subject to high rates of I/I. The majority of the collection system was cleaned and logged using CCTV in 2006 and was found to have advanced stages of physical deterioration. Based on this investigation, it was determined that replacing a large portion of the collection system would decrease I/I. Once recommendations for repair and replacement are implemented, a proportional decrease in rates of I/I is expected. Table 2-6 includes estimates of flows based on current and projected Equivalent Dwelling Units (EDUs) assuming 70% I/I reduction.

2.4.2 Loading

Loadings in Table 2-7 are based on composite sampling conducted on the influent from October 2006 to August 2008. The Eel River brewery was brought on-line in September 2007. Prior to September, BOD loadings averaged 166 pounds per day (ppd) for an estimated 284 EDUs, or 0.59 ppd/EDU. Following installation of the brewery, average BOD loadings increased to 388 ppd. The additional loading of 222 ppd is equivalent to approximately 380 EDUs.

2.4.3 Performance

New discharge requirements for the TOS Scotia WWTF became effective on September 30, 2006. Based on 24-hour composite samples of the influent wastewater (monitoring site M-INF) and effluent discharged from Treatment Pond 3 (monitoring site M-012B), the facility achieved average removal rates greater than 96% for both BOD and TSS. These results are summarized in Table 2-8, which has been reproduced from the *2006 Annual Discharge Monitoring Report* (SHN, January 2007). The facility is not currently meeting permit limits, as there have recently been numerous exceedances for BOD due to the loads from the brewery.

Table 2-6
Wastewater Treatment Facility Flows
TOS Detailed Engineering Analysis

	Existing (Oct. 2000 through May 2006)[1]	Existing with 70% I/I[2] Reduction	Full Occupancy of Existing Homes with I/I Reduction	Commercial Development of Mill A with Brewery[3]
EDUs[4]	**284**	**284**	**309**	**435**
Flows	**MGD[5]**	**MGD**	**MGD**	**MGD**
Base Sanitary Flows	0.100	0.100	0.109	0.113
Base I/I[5]	0.080	0.024	0.026	0.026
Average Dry Weather Flow (ADWF)	0.180	0.124	0.135	0.139
Average Wet Weather (AWWF)	0.288	0.156	0.170	0.174
Average Annual Flow (AAF)	0.240	0.142	0.155	0.159
Maximum Dry Weather Flow-10 (MMDWF-10) [6]	0.280	0.154	0.168	0.172
Maximum Month Wet Weather Flow-(MMWWF-5) [7]	0.420	0.196	0.213	0.217
Peak Week (PW)	0.750	0.295	0.321	0.325
Peak Day Average Flow (PDAF-5) [8]	1.670	0.571	0.621	0.625
Peak Instantaneous Flow (PIF)	2.500	0.820	0.892	0.896

1. Includes lateral replacement
2. I/I: Inflow and Infiltration
3. Brewery discharge based on estimates obtained from Eel River Brewing Company brewery, Fortuna, CA
4. EDUs: Equivalent Dwelling Units
5. MGD: Million Gallons per Day
6. Maximum Month Dry Weather Flow (MMDWF) associated with a 10 year design storm (SHN, July 24, 2006)
7. MMDWF associated with a five-year design storm (SHN, July 24, 2006)
8. Peak day flow: Associated with a five-year design storm (SHN, July 24, 2006)

Table 2-7
Wastewater Treatment Facility Estimated BOD and TSS Loadings
TOS Detailed Engineering Analysis

	Existing without Brewery[1]			Existing with Brewery[2]			Full Occupancy		
	EDUs[3]	BOD[4] (ppd)[5]	TSS[6] (ppd)	EDUs	BOD (ppd)	TSS (ppd)	EDUs	BOD (ppd)	TSS (ppd)
Residential	247	144	199	247	144	199	272	158	219
Commercial	30	18	24	30	19	24	30	18	24
Industrial	7	4	6	387	226	81	387	226	81
Total EDUS	284	---	---	664	---	---	688	---	---
Average loading	---	166	229	---	388	304	---	402	324
Maximum Loading	---	417	669	---	872	684	---	903	729

1. Composite sampling conducted on the influent from October 2006 through October 2007
2. Composite sampling conducted on the influent from September 2007 through August 2008
3. EDUs: Equivalent Dwelling Units
4. BOD: Biological Oxygen Demand
5. ppd: pounds per day
6. TSS: Total Suspended Solids

Table 2-8
Wastewater Treatment Facility Removal Percentages for BOD[1] and TSS[2]
TOS Detailed Engineering Analysis

Parameter	October 2006	November 2006	December 2006
BOD	98%[3]	96%	97%
TSS	99%	99%	99%

1. BOD: Biochemical Oxygen Demand
2. TSS: Total Suspended Solids
3. Removal Percentage calculated using monthly average influent (M-INF) results and effluent results (M-012B)

2.4.4 Capacity

There are no design documents available that describe the biological design capacity of the WWTF; therefore, general design criteria for each of the treatment systems have been developed based upon published values.

The estimated hydraulic and biological treatment capacity of each treatment system component based on published design criteria is summarized in Table 2-9.

Table 2-9
Wastewater Treatment Facility Design Criteria
TOS Detailed Engineering Analysis

	Description	Design Criteria	Capacity
Preliminary Treatment			
Muffin Monster		-	
6-inch flume			Hydraulic capacity 3.6 MGD[1]
Primary Treatment			
Deep Well Pumps (2)	Submersible, 15 hp[2]	-	650 gpm[3] each (0.936 MGD)
Clarifier	Diameter 30 feet Depth 7.25 feet	SOR[4] @ ADWF[5] 800 gpd/SF[6] SOR @ PDAF[7] 900 gpd/SF	0.48 MGD 0.640 MGD
Secondary Treatment			
Shallow Well Pumps (2)	Vertical Turbine Wastewater Power 10 hp	-	Approximately 500 gpm (0.72 MGD)
Trickling Filter	Diameter 44.5 feet Depth 4 feet Volume 6,220 CF[8] Adjusted Volume: 4,350 CF	40 lbs BOD/d/1,000 CF[9]	216 ppd[10]
Secondary Clarifier	Diameter 30 feet Depth 7.25 feet	SOR @ ADWF 300 gpd/SF SOR @ PDAF 475 gpd/SF	0.20 MGD 0.40 MGD

Table 2-9
Wastewater Treatment Facility Design Criteria
TOS Detailed Engineering Analysis

	Description	Design Criteria	Capacity
Disinfection			
Chlorine Gas	Chlorinators One ton cylinders	-	-
Chlorine Contact Basin (CCB)	Volume 14,000 gallons	CT[11] @ ADWF 40 minutes CT @ PDAF 20 minutes	0.504 MGD 1.0 MGD
Chlorine Contact Basin Pumps (2)	Lead 15 hp Lag 10 hp	-	800 gpm (1.15 MGD) 350 gpm (0.50 MGD) 1,150 gpm (1.65 MGD)
Treatment Ponds			
Ponds	Total Area 2.6 Acres Volume @ 4 ft , 3.39 MG Volume @ 6 ft , 5.09 MG	Loading 15 lbs BOD/d/Acre DT[12] 5-20 Days	39 lbs BOD/day 0.678 MGD 1.0 MGD
Effluent Pump	Line shaft turbine Goulds 40 hp	-	500 gpm (0.72 MGD)
Biosolids			
Digester	Standard Rate Volume 33,500 gals. 4,470 CF	SRT[13] 30-60 days 40-100 lbs VSS[14]/1,000 CF 4-5 CF/capita	116 gpd 178 lbs VSS equivalent population: 1,118
Sludge Pumps (2)	Piston 15 hp	-	800 gpm (1.15 MGD)

1. MGD: Million Gallons per Day
2. hp: horsepower
3. gpm: gallons per minute
4. SOR: Surface Overflow Rate as a function of depth.
5. ADWF: Average Dry Weather Flow
6. gpd/SF: gallons per day per Square Foot
7. PDAF: Peak Day Average Flow
8. CF: Cubic Feet
9. lbs BOD/d/1,000 CF: pounds of Biological Oxygen Demand per day per 1,000 cubic feet; EPA Wastewater Technology Fact Sheet for Trickling Filters EPA 832-F-00-014. Loading based on intermediate filter corrected for specific area of redwood media
10. ppd: pounds per day
11. CT: Chlorine Concentration over Time
12. DT: Detention Time
13. SRT: Sludge Retention Time
14. VSS: Volatile Suspended Solids

A capacity study to evaluate the hydraulic and biological performance of individual treatment systems under varying hydraulic loadings is scheduled to be completed by March 2010. This analysis will be based on supplemental sampling and composite sampling of the influent and effluent. Samples will be collected from the influent, the primary clarifier effluent, the secondary clarifier effluent, the effluent from the contact basin, and the effluent from the chlorine treatment ponds.

2.5 Wastewater Treatment System Improvements

The Scotia WWTF is more than 50 years old, and has undergone no significant upgrades. As indicated in the performance summary, it has recently been unable to consistently meet its effluent permit for TSS and BOD. Factors contributing to permit exceedances include:

- increased organic loadings experienced since September 2007, when the Eel River brewery started operations; and
- sludge-filled tertiary ponds. This limits the detention time available in the ponds and can lead to TSS violations due to sludge washout.

The wastewater treatment system must provide reliable secondary treatment for at least the next 20 years. To achieve satisfactory performance within this timeframe, it will be necessary to upgrade or replace major components of the existing treatment systems. The proposed improvements presented in this section address the following concerns:

- Increase secondary treatment capacity and ability to handle increased organic loading.
- Provide for biosolids dewatering.
- Improve condition of tertiary treatment lagoon.
- Minimize the risk of the facilities location in the floodplain.

The estimated cost of proposed improvement projects presented in this report is preliminary in nature. Treatment requirements have been based on estimates of projected flow and loading that will be verified by additional sampling and flow monitoring. The capacity of the existing trickling filter has been summarized in Table 2-9 and is based on published design criteria for secondary treatment. Given the large range of published loading and performance data for trickling filters and the limited data available on redwood media, the capacity and performance of the trickling filter under actual loading conditions will need to be verified as additional data is accumulated.

Currently, the brewery (which leases its facility from TOS) is providing pre-treatment consisting of a septic tank, which is intended to prevent shock loading of the WWTF due to peak hour organic loadings. Monitoring during the first three months of discharge following the start-up of the brewery (October through December 2007) indicated that additional source controls were needed (SHN, 2008). TOS is currently negotiating with the Eel River Brewing Company to establish the terms of its new lease following the change of ownership resulting from the PALCO bankruptcy; this lease will include conditions of approval requiring additional pre-treatment and monitoring.

Final recommendations regarding proposed improvements to the Scotia WWTF will be made in a facilities plan scheduled for completion in October 2009. Alternatives to be considered as part of the facilities plan will include upgrading the existing system or constructing a new secondary treatment system. This report presents estimated costs for upgrading the existing facility. Other alternatives may be considered in the facilities plan.

2.5.1 Industrial Pretreatment

The brewery is required to provide pre-treatment to minimize the impact of its discharge on the WWTF. Pre-treatment consists of a septic tank with nominal capacity equal to one and a half times

the flow discharged on a daily basis during periods of peak production. The septic tank is intended to prevent shock loading of the treatment facility due to peak hour organic loading.
The septic tank is expected to remove 50 to 75% of the TSS. Based on sampling conducted at the Eel River brewery, effluent discharged from the septic tank was expected to have an average BOD concentration of 2,000 mg/L. However, monitoring of the brewery discharge conducted in January 2008 indicated BOD concentrations well exceeding this value (SHN, 2008). SHN recommended that the brewery be required to monitor all flows discharged to the sewer and that a monthly monitoring and reporting program be put in place to verify the organic load contributed by the brewery. In addition, SHN recommended that PALCO (now TOS) establish a provisional pretreated wastewater discharge permit for the brewery that sets forth the source control standards for the discharge, in accordance with the WWTF's NPDES permit requirements (SHN, 2008). The following brewery effluent limitations are proposed:

- Average monthly BOD/TSS concentrations shall be less than 500 mg/L.
- Peak daily BOD/TSS concentrations shall be less than 2,000 mg/L.
- The pH of waste discharged shall be between 6 and 9 pH units.

Enforcing the proposed limitations for the brewery discharge will help the Scotia WWTF effectively treat the process waste stream. However, consistent compliance with its permitted NPDES discharge limitations will require implementation of the secondary improvements recommended in Section 2.5.2.

2.5.2 Upgrades to Existing Treatment System

A description of the recommended upgrades to the existing treatment system is presented below. The estimated project cost for the recommended upgrades including a new secondary clarifier is itemized in Table 2-10 following the project description.

2.5.2.1 Primary Treatment

Recommended upgrades to the primary treatment system include:

- Clarifier drive replacement
- Installation of Variable Frequency Drive (VFD) on deep well pumps
- Leveling of primary weir

2.5.2.2 Minimize Effect of Floodplain

To minimize the impact of the facilities location in the floodplain, it is recommended that an elevated control room be constructed over or partially over and adjacent to the existing structure. The elevated room would be used for new equipment including VFDs and a new electrical control panel.

2.5.2.3 Secondary Treatment Capacity/Tricking Filter Solids Contact Process

Generally, intermediate rate filters can be loaded up to a maximum of 40 pounds BOD per 1,000 cubic feet per day (lbs BOD/d/1,000 CF). At higher loading rates filters are considered high-rate filters and secondary quality treatment may not be possible without a second-stage process (EPA, 2000).

Projected organic loading on the trickling filter is estimated at 73 lbs BOD/d/1,000 CF at average loading and 147 lbs BOD/d/1,000 CF at maximum day. To treat the projected loading it is recommended that the facility be upgraded to a combined suspended growth fixed/film process in which a suspended growth secondary treatment process follows the fixed-film trickling filter to increase BOD removal. In addition to providing additional treatment capacity, the suspended growth basin, whether a solids contact basin or somewhat larger activated sludge basin, will provide redundancy for the secondary treatment process when the trickling filter is off line. Given the projected loadings, there are two suspended growth processes that would be suitable.

Table 2-10
Wastewater Treatment Facility Organic Loading for Combined Processes
TOS Detailed Engineering Analysis

Process	Acronym	lbs BOD/d/1,000 CF[1]
Trickling Filter/Solids Contact	TF/SC	20–75
Biofilter Activated Sludge[2]	BF/AS	75-200

1. Pounds BOD per day per 1,000 cubic feet
2. Loading rate for Activated Biofilter (ABF) 10-75 lbs BOD/d/1,000 CF

In the TF/SC process trickling filter effluent is aerated in a small contact chamber prior to clarification. Solids from the secondary clarifier are either wasted as Waste Activated Sludge (WAS), or returned to this basin as Return Activated Sludge (RAS) as they would be in a conventional activated sludge process.

To create an Activated Biofilter (ABF), RAS is mixed with primary effluent and recycled over the redwood media to improved performance and sludge settleability. When an ABF is used in combination with an activated sludge basin, the process is called Biofilter/Activated Sludge (BF/AS). The suspended growth portion of the process is an activated sludge basin with a hydraulic residence time of approximately 2 hours. The activated sludge basin required for the BF/AS process is larger than the TF/SC solids contact basin. This BF/AS is designed to provide secondary treatment at high hydraulic and organic loading rates.

2.5.2.4 Shallow Well Pump Upgrade

In order to improve distribution of primary effluent across the trickling filter media, it is recommended that the filter recirculation rate be increased. Variable speed drives installed on the shallow well pumps are recommended in order to allow for a more continuous filter application rate.

2.5.2.5 Secondary Clarifier Upgrade

Due to its shallow depth (7.25 feet), the existing secondary clarifier is hydraulically overloaded during high flow events. At the projected Peak Day Average Flow (PDAF) of 0.622 MGD, the SOR exceeds 800 gallons per day per square foot (gpd/SF) compared to the recommended rate of 475 gpd/SF for a clarifier of this depth. A new clarifier sized with an SOR exceeding 800 gpd/SF is therefore recommended. The new secondary clarifier would allow the existing clarifier to be maintained as a redundant unit for the TF/SC process.

2.5.2.6 Summary of Secondary Treatment System Improvements

- Replacement of shallow well pumps with submersible pumps not impacted by flooding
- Installation of VFDs on the shallow well pumps
- Construction of a solids contact or small activated sludge basin following the trickling filter to operate as a combined suspended growth/trickling filter process
- Installation of RAS pumps to transfer solids from secondary clarifiers to the solids contact basin
- Installation of blowers for the solids contact process with controls installed in new control room
- New drive for existing secondary clarifier and horizontal baffling to increase settling
- Construction of an additional secondary clarifier to provide redundancy and improve treatment performance during peak flow events

2.5.2.7 Disinfection System

The gas chlorination must be inspected by the Fire Marshal and brought into compliance with Article 80 of the *Uniform Fire Code* (NFPA, 2006). At a minimum, Article 80 requires facilities using chlorine gas and not equipped with scrubber systems to have the following controls:

- Approved containment vessels or containment systems
- Protected valve outlets
- Gas detection system
- Approved automatic-closing fail-safe valve

2.5.2.8 Biosolids

It is recommended that the cracked Gunite coating on the outside of the digester be removed and the condition of the tank be assessed. The digester will be cleaned and inspected on the interior, and coated inside and out. Improved mixing equipment may be required, depending on the results of the capacity study.

The dewatering trench currently used for disposal of digested biosolids is inadequate. A covered drying bed with a drainage system that discharges into the influent sanitary sewer has been proposed, and preliminary costs are included in the summary of proposed treatment system upgrades in Table 2-11.

2.5.2.9 Tertiary Treatment Ponds

The tertiary ponds are full of biosolids. Although the ponds are reportedly more than 10 feet deep in some sections, depth of clear water above the sludge blanket is only 2 to 4 feet. The cost of removing biosolids from the tertiary ponds has been annualized and is included as an operations and maintenance item in Table 2-12. Based on a survey conducted in October 2006, there is approximately 6 million gallons of biosolids in the ponds, an accumulation of more than 20 years at current solids removal rates. After removing the biosolids currently in the ponds, biosolids removal should be performed on a regular basis.

2.5.2.10 Existing Treatment System Upgrade Cost Estimates

Costs for the existing treatment system upgrades are summarized in Table 2-11.

Table 2-11
Estimated Costs of Wastewater Treatment Facility Upgrades (Revised 2/24/2009)
TOS Detailed Engineering Analysis

Item (Unit Type)	Unit(s)	Quantity	Unit Cost	Total Cost
Mobilization/Demobilization	LS[1]	1	$80,000	$80,000
Equipment				
Primary Clarifier Drive	EA[2]	1	$75,000	$75,000
Shallow Well Pumps	EA	2	$8,000	$16,000
Secondary Clarifier Drive	EA	2	$75,000	$150,000
Weirs	EA	4	$15,000	$60,000
Blowers	EA	2	$10,000	$20,000
Aeration System	LS[2]	1	$30,000	$30,000
Redundant CCB[3] pump	EA	1	$10,000	$10,000
Chlorine Gas System, Containment System	LS	1	$25,000	$25,000
Pump VFDs[4]	EA	4	$15,000	$60,000
RAS Pumps[5]	EA	2	$18,000	$36,000
WAS Pumps[6]	EA	2	$10,000	$20,000
Scum Pump	EA	2	$10,000	$20,000
Electrical Integrated Circuit				
Electrical	LS	1	$325,000	$325,000
Construction				
Concrete for clarifier	CY	82	$1,200	$98,400
Suspended concrete	CY	14	$1,500	$21,000
RAS Pump Station	CY	25	$1,500	$37,500
Suspended Growth Reactor	CY	35	$1,200	$42,000
Modify Existing Clarifier	LS	1	$20,000	$20,000
Second Floor Control Room/Blower Rm	LS	1	$350,000	$350,000
Modifications to Chlorine System	LS	1	$20,000	$20,000
Stairs	LS	1	$16,000	$16,000
Digester Repair	LS	1	$60,000	$60,000
Construction of Drying Beds	LS	1	$65,000	$65,000
Earthwork				
Yard Piping	LS	1	$50,000	$50,000
Excavation / Grading	CY	400	$12	$4,800
Wastewater Treatment Facility Upgrade Costs Subtotal				**$1,711,700**
Engineering[7] (20%)				$342,340
Contingency (20%)				$342,340
Total Wastewater Treatment Facility Upgrade Cost, Call:				**$2,396,000**

1. LS: Lump Sum
2. EA: Each
3. CCB: Chlorine Contact Basin
4. VFD: Variable Frequency Drive
5. RAS: Return Activated Sludge
6. WAS: Waste Activated Sludge
7. Engineering includes design, permitting and construction management.

Table 2-12
Wastewater Treatment Facility Annual Operating Cost
TOS Detailed Engineering Analysis

	hp[1]	gpm[2]	MG[3]	% time	kwhr[4]	Annual Cost
Primary Pumping	15	500	0.72	0.31	3.417792	$2,395
Secondary Pumping	10	600	0.86	0.50	3.7285	$5,226
CCB[5]	15	800	1.15	0.19	2.13612	$1,497
From Treatment Pond	40	500	0.72	0.31	9.114111	$6,387
Aeration	5			1.00	3.7285	$2,613
Chlorine						$5,000
Tertiary Pond Sludge Removal						$15,000
NPDES[6] Permit Compliance						
Compliance Sampling /Reporting						$20,000
Special Studies						$30,000
Lab Analysis						$35,000
Total Annual Operating Costs, Call						$123,000

1. hp: horsepower
2. gpm: gallons per minute
3. MG: Million Gallons
4. kwhr: kilowatt hour
5. CCB: Chlorine Contact Basin
6. NPDES: National Pollutant Discharge Elimination System

2.5.2. 11 Annual Operating Costs

The previous sections discussed alternatives for improvements that are considered necessary to minimize the risk of the facility's location in the floodplain, provide redundancy for major components, and increase secondary treatment capacity. Operating costs are also a major issue of concern. Annual power costs at the existing facility are high because the wastewater is pumped through each treatment process and then treated effluent is pumped from the end of the treatment ponds before discharge to the log pond.

Annual operating costs for the existing WWTF, including the upgrade to a combined process, is presented in Table 2-12 and are estimated to be approximately $123,000/ year. A more detailed analysis of operating costs is presented in the Financial Analysis in Appendix C of the MSR.

3.0 Wastewater Disposal

3.1 Introduction

This section describes the existing treated wastewater effluent and sludge disposal practices and infrastructure within the town of Scotia, California (Figure 3-1). Additionally, this section assesses and proposes modifications to the current treated wastewater effluent and sludge disposal practices in the town of Scotia.

3.2 Description of Existing Services

3.2.1 Treated Wastewater Effluent

A description of the WWTF is included in Section 2.2 of this report. Treated wastewater, along with process water stemming from industrial activities, is pumped to a 25-acre log pond for temporary storage. The log pond water overflows to a clarifier.

Pursuant to RWQCB Order No. R1-2006-0020, which became effective on September 30, 2006, treated wastewater effluent from the log pond clarifier is discharged directly to the Eel River from October 1 through May 14 of the following year. Discharges in excess of 1% of the flow of the Eel River, during this period, are prohibited.

RWQCB Order No. R1-2006-0020 prohibits the discharge of wastewater from the log pond clarifier to the Eel River during the summer discharge prohibition period (from May 15 through September 30 of each year). During this period, a percolation pond is constructed on the floodplain adjacent to the Eel River. The percolation pond is typically constructed by grading approximately 6,000 cubic yards of existing gravel from the river bar to form a pond that is 10 feet deep, 800 feet long, and 100 feet wide. The total volume of the percolation pond is approximately 800,000 cubic feet, or approximately 6,000,000 gallons.

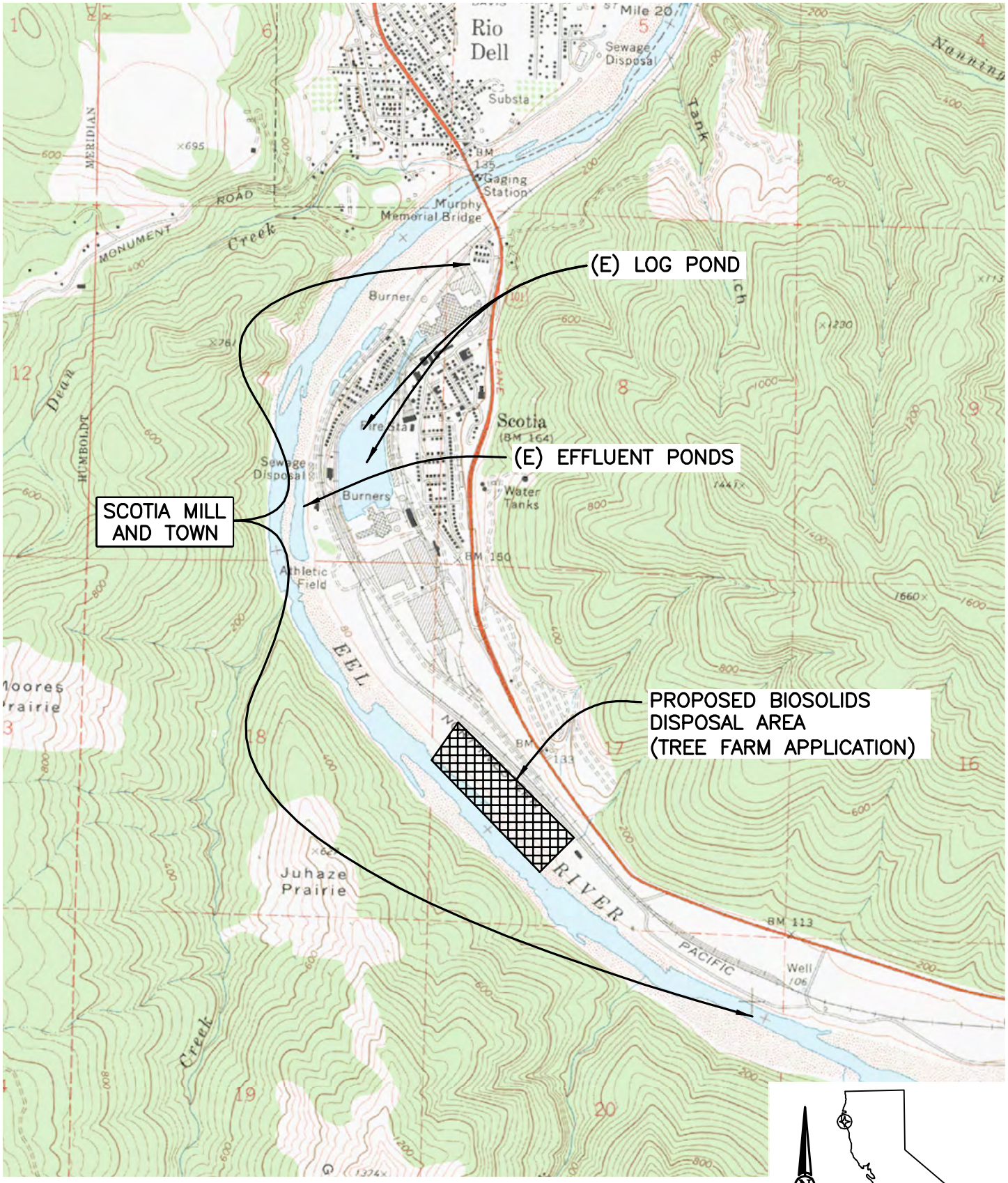
3.2.2 Sludge

Wastewater sludge from the Scotia WWTF is currently treated through an anaerobic digester and then disposed of in an unlined drying ditch. The ditch has not been cleaned out for many years.

3.3 Regulatory Criteria

3.3.1 Recycled Water Use

Section 13577, Division 7, Chapter 7.5 of the California Water Code, known as the Water Recycling Act of 1991, establishes a statewide goal to recycle 1,000,000 acre-feet of water per year by the year 2010. Treatment requirements and uses for recycled water, as proposed in the following sections, are regulated under Title 22 CCR, Article 3, Section 60304. Treatment requirements for land application of recycled water would require, at the minimum, un-disinfected secondary recycled water pursuant to Section 60304 (d).



SOURCE: SCOTIA USGS 7.5 MINUTE QUADRANGLE

Consulting Engineers & Geologists, Inc.

Scotia CSD Formation Detailed Engineering Analysis Scotia, California		Proposed Wastewater Disposal Facility Locations SHN 005161.903
May 2009	005161-903-LOCATION.dwg	Figure 3-1

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Use area requirements for irrigation with recycled water are regulated under Title 22 CCR Article 4. The following is a summary of the pertinent requirements, sections indicated in parenthesis, for land application:

- (c) No irrigation with, or impoundment of, disinfected secondary-2.2 Most Probable Number (MPN) or disinfected secondary-23 MPN recycled water shall take place within 100 feet of any domestic water supply well. (Disinfected secondary-23 MPN indicates disinfected water effluent that does not exceed a median concentration of fecal coliform bacteria MPN of 23 per 100 milliliters over a period of 7 days, and does not exceed an MPN of 240 per 100 milliliters in more than one sample in any 30 day period.)
- (e) Any use of recycled water shall comply with the following:
    - Any irrigation runoff shall be confined to the recycled water use area, unless the runoff does not pose a public health threat and is authorized by the regulatory agency.
    - Spray, mist, or runoff shall not enter dwellings, designated outdoor eating areas, or food handling facilities.
    - Drinking water fountains shall be protected against contact with recycled water spray, mist, or runoff.
- (f) No spray irrigation of any recycled, other than disinfected tertiary recycled water, shall take place within 100 feet of a residence or a place where public exposure could be similar to that of a park, playground, or school yard.
- (g) All use areas where recycled water is used that are accessible to the public shall be posted with signs that are visible to the public.
- (h) Except as allowed under Title 17 CCR Section 7604 no physical connection shall be made or allowed to exist between any recycled water system and any separate system conveying potable water.

Title 22, CCR Article 6 Section 60321(a) stipulates the sampling and analysis requirements for recycled water. The regulation requires that disinfected secondary-23 MPN and disinfected secondary-2.2 MPN recycled water shall be sampled at least once daily from the treated effluent and analyzed for total coliform bacteria.

Use of recycled water for cooling purposes is regulated under Title 22 CCR, Article 3, Section 60306. Water from the log pond is currently used for cooling towers at the cogeneration plant. Section 60306 states:

> *(a) Recycled water used for industrial or commercial cooling or air conditioning that involves the use of a cooling tower, evaporative condenser, spraying or any mechanism that creates a mist shall be a disinfected tertiary recycled water.*
>
> *(b) Use of recycled water for industrial or commercial cooling or air conditioning that does not involve the use of a cooling tower, evaporative condenser, spraying, or any mechanism that creates a mist shall be at least disinfected secondary-23 MPN recycled water.*

(c) *Whenever a cooling system, using recycled water in conjunction with an air condition facility, utilizes a cooling tower or otherwise creates a mist that could come into contact with employees or members of the public, the cooling system shall comply with the following:*

(1) *A drift eliminator shall be used whenever the cooling system is in operation.*

(2) *A chlorine, or other, biocide shall be used to treat the cooling system recirculating water to minimize the growth of* Legionella *and other microorganisms.*

Recycled water for use in structural fire fighting or industrial processes that may come into contact with workers must be disinfected tertiary recycled water pursuant to Title 22 CCR, Article 3, Section 60307(a).

Uses of disinfected secondary-23 MPN recycled water are regulated under Title 22 CCR, Article 3, Section 60307(b) and include:

- Industrial Boiler Feed
- Nonstructural fire fighting
- Backfill consolidation around nonpotable water piping
- Soil compaction
- Mixing concrete
- Dust control on roads and streets
- Cleaning roads, sidewalks, and outdoor work areas
- Industrial process water that will not come into contact with workers

3.3.2 Biosolids

Scotia's WWTF disposal of biosolids is currently regulated under RWQCB Order No. R1-2006-0020 and NPDES No. CA0006017. The RWQCB Order No. R1-2006-0020 states that biosolids may be disposed of through any of the following processes:

- Disposed in a Municipal Solid Waste Landfill
- Reused by Land Application
- Disposed in a sludge-only landfill
- Incinerated

The land application of biosolids is regulated through the following requirements:

- 40 CFR (Code of Federal Regulations) Parts 257, 258, 501, and 503;
- CCR Title 27, Division 2; and
- California State Water Resources Control Board Water Quality (SWRCB) Order No. 2004-0012-DWQ

TOS's NPDES permit contains general solids disposal and handling requirements for municipal WWTFs. More specific biosolid land application requirements are included in SWRCB Order No. 2004-0012-DWQ, which is intended to streamline the regulatory process; however, it does not supersede 40 CFR Part 503, EPA's Biosolids Rule. SWRCB Order No. 2004-0012-DWQ requires:

- All land-applied biosolids must comply with one of the pathogen reduction standards listed in 40 CFR Part 503.32. Table 3-1 summarizes the pathogen reduction standards.

Table 3-1
Wastewater Disposal System--Summary of Pathogen Reduction Requirements[1]
TOS Detailed Engineering Analysis

Class A Biosolids[2]	Class B Biosolids[3]
Alternative 1: Thermally Treated Biosolids. Use one of four time-temperature regiments.	**Alternative 1: Monitoring of Indicator Organisms.** Test for fecal coliform density as an indicator for all pathogens at the time of biosolids use or disposal.
Alternative 2: Biosolids Treated in a High pH-High Temperature Process. Specifies pH, temperature, and air-drying requirements.	**Alternative 2: Use of PSRP.** Biosolids are treated in one of the Processes to Significantly Reduce Pathogens (PSRP) identified in CFR[4] 40 Part 503.
Alternative 3: For Biosolids Treated in Other Processes. Demonstrate that the process can reduce enteric viruses and viable helminth egg ova. Maintain operating conditions used in the demonstration.	**Alternative 3: Use of Processes Equivalent to PSRP.** Biosolids are treated in a process equivalent to one of the PSRPs, as determined by the permitting authority.
Alternative 4: Biosolids Treated in Unknown Processes. Demonstration of the process is unnecessary. Instead, test for pathogens Salmonella sp. or fecal coliform bacteria, enteric viruses, and viable helminth ova--at the time the biosolids are used or disposed of, or are prepared for sale or give-away.	--
Alternative 5: Use of Further Reduce Pathogens (PFRP). Biosolids are treated in one of the PFRP identified in 40 CFR Part 503.	--
Alternative 6: Use of a Process Equivalent to PFRP. Biosolids are treated in a process equivalent to one of the PFRPs, as determined by the permitting authority.	--

1. From EPA September 1994
2. Class A Biosolids are biosolids that contain no detectable level of pathogens.
3. Class B Biosolids are biosolids that are treated but still contain a detectable level of pathogens.
4. CFR: Code of Federal Regulations

- All land applied biosolids must comply with one of the applicable vector attraction reduction requirements specified in 40 CFR 503.33. Table 3-2 summarizes the vector attraction reduction options identified in 40 CFR Part 503.

Table 3-2 Wastewater Disposal System--Vector Attraction Reduction Options[1] TOS Detailed Engineering Analysis	
Option Number	**Description of Option**
1	Reduce the mass of volatile solids by a minimum of 38%.
2	Demonstrate vector attraction reduction with additional anaerobic digestion in a bench-scale unit.
3	Demonstrate vector attraction reduction with additional aerobic digestion in a bench-scale unit.
4	Meet a specific oxygen demand uptake rate for aerobically treated biosolids.
5	Use aerobic processes at an average temperature of 40°C for 14 days or longer.
6	Add alkaline materials to raise the pH under specified conditions.
7	Reduce moisture content of biosolids that do not contain unstabilized solids from other than primary treatment to at least 75% solids.
8	Reduce moisture content of biosolids with unstabilized solids to at least 90%.
9	Inject biosolids beneath the soil surface within a specified time, depending on the level of pathogen treatment.
10	Incorporate biosolids applied to or placed on the land surface within specified periods after application to or placement on the land surface.
Source: EPA 40 CFR Part 503: Biosolids Rule, Land Application	

- Biosolids application rates must not exceed the nitrogen agronomic rates of the crop being planted.
- A biosolid with a moisture content of less than 75% shall not be applied during periods when wind speeds exceed 25 miles per hour.
- Biosolids are not to be applied in amounts exceeding the Risk Assessment Acceptable Soil Concentration as described by Equation 3.1:

$$BC = RP - 1.8(BS) \qquad \text{Equation 3.1}$$

Where:

BC = Background Cumulative Adjusted Loading Rate (pounds per acre [lbs/acre])
RP = 40 CFR Part 503 Cumulative Pollutant Loading Rate (lbs/acre)
BS = Actual Site Background Site Soil Concentration (milligrams per kilogram [mg/kg])

Table 3-3 summarizes 40 CFR Part 503 pollutant limits.

Table 3-3
Wastewater Disposal System Pollutant Limits for Land Applied Biosolids[1]
TOS Detailed Engineering Analysis

Constituent	Maximum Value in All Biosolids (mg/kg)[2]	Maximum Value in EQ[3] and PC[4] Biosolids (mg/kg)	Annual Loading Rate (kg/ha)[3]	Lifetime Loading Rate (kg/ha)
Arsenic	75	41	2.00	41
Cadmium	85	39	1.90	39
Chromium	3,000	1,200	150.00	3,000
Copper	4,300	1,500	75.00	1,500
Lead	840	300	15.00	300
Mercury	57	17	0.85	17
Molybdenum	75	18	0.90	18
Nickel	40	420	21.00	420
Selenium	100	36	5.00	100
Zinc	7,500	2,800	140.00	2,800

1. Table from EPA 1995
2. mg/kg: milligram per kilogram
3. EQ: Excellent Quality biosolids, as defined in 40 CFR Part 503
4. PC: Pollutant Concentration biosolids, as defined in 40 CFR Part 503
5. kg/ha: Kilogram per hectare

- Biosolids to be tilled into the soil must be incorporated into the soil within 48 hours in non-arid areas during the period from May 1 through October 31.
- Grazing of domesticated animals in areas where biosolids have been applied is restricted until the necessary waiting period has elapsed.
- Application of biosolids to slopes of greater than 10% requires an erosion control plan.
- Tail water from conveying structures shall be designed and maintained to minimize field erosion.
- Staging and biosolids application areas must be at least:
  - 10 feet from property lines;
  - 500 feet from domestic water supply wells;
  - 100 feet from non-domestic water supply wells;
  - 50 feet from public roads and occupied onsite residences;
  - 100 feet from surface waters, including wetlands, creeks, ponds, lakes, underground aqueducts, and marshes;
  - 33 feet from primary agricultural drainages;
  - 500 feet from occupied non-agricultural buildings and off-site residences;
  - 400 feet from a domestic water supply reservoir;
  - 200 feet from primary tributary to a domestic water supply;
  - 2,500 feet from any domestic surface water supply intake, and;
  - 500 feet from enclosed water bodies that could be occupied by pupfish.

3.4 Demand and Capacity

3.4.1 Treated Wastewater Effluent

Table 2-6 of this report summarizes the projected wastewater flows for the Scotia WWTF. In order to conservatively determine the demand on the system during the non-discharge period of the year (May 15-September 30), the AWWF was projected for the shoulder months of May and June and the ADWF was projected for the months of July, August, and September. Table 3-4 summarizes the projected wastewater flow information:

Table 3-4
Monthly Projected Wastewater Flows--Non-Discharge Period and Shoulder Months[1]
TOS Detailed Engineering Analysis

Month	Non-discharge Days per Month[1]	Projected Wastewater Flows (gpd)[2]	Source[3]
May	17	174,000	AWWF[4]
June	30	174,000	AWWF
July	31	139,000	ADWF[5]
August	31	139,000	ADWF
September	30	139,000	ADWF

1. Non-discharge period from May 15 – September 30
2. gpd: gallons per day
3. From Table 2.6 of this report
4. AWWF: Denotes Average Wet Weather Flow
5. ADWF: Denotes Average Dry Weather Flow

3.4.2 Biosolids Production

There is currently no available information regarding the annual production of biosolids for the Scotia WWTF. The daily production of biosolids can be estimated from literature values. Equation 3.2 summarizes the overall daily biosolids production at the Scotia WWTF.

$$BS = P_x + TSS_{nv} + TSS_{v,nx} \qquad \textbf{Equation 3.2}$$

Where:

- BS = daily biosolids production
- P_x = biosolid yield from cellular growth in the anaerobic digester
- TSS_{nv} = total suspended solids as non-volatile solids
- $TSS_{v,nx}$ = total suspended solids as volatile solids that do not get reduced through the trickling filter and the anaerobic digester.

3.4.2.1 Biosolid Yield, P_x

The biosolid yield can be estimated by using Equation 3.3 from Metcalf and Eddy's *Wastewater Engineering: Treatment and Reuse*, 4th Edition (Tchobanoglous et al., 2003) , commonly referred to as Metcalf & Eddy.

$$P_x = Y*Q*(S_o - S)/(1+k_d*SRT) \qquad \textbf{Equation 3.3}$$

Where:

- P_x = biosolid yield from cellular growth in the anaerobic digester
- Y = yield coefficient (gVSS/gBOD)
- Q = flow rate
- S_o = BOD in influent
- S = BOD in effluent
- K_d = endogenous die-off coefficient (day^{-1})
- SRT = Solids Retention Time (days)

Table 3-5 summarizes the values and references to calculate the biosolid yield from cellular growth in the anaerobic digester (P_x).

Table 3-5
Wastewater Disposal System--Biosolid Yield from Cellular Growth
TOS Detailed Engineering Analysis

Variable	Value	Reference
Y[1]	0.05 gVSS[2]/gBOD[3]	Metcalf and Eddy, 4th Edition
Q[4]	0.18 MGD[5]	Table 2.6 of this report
S_o[6]	126 mg/L[7]	SHN, 2007 Annual Report
S[8]	17 mg/L	Assumed 85% removal efficiency[9]
K_d[10]	0.03 1/day	Metcalf and Eddy, 4th Edition
SRT[11]	30 days	Facility design
P_x[12]	4.2 pounds VSS/day	Equation 3.3

1. Y: yield coefficient
2. gVSS: grams of Volatile Suspended Solids
3. gBOD: grams of Biochemical Oxygen Demand
4. Q: flow
5. MGD: Million Gallons per Day
6. S_o: BOD in influent
7. mg/L: milligrams per Liter
8. S: BOD in effluent
9. The WWTF currently achieves between 95% and 99% BOD removal efficiency. The 85% removal efficiency is considered a conservative estimate.
10. K_d: endogenous die-off coefficient
11. SRT: Solids Retention Time (days)
12. P_x: biosolid yield

3.4.2.2 Total Suspended Solids, Non-Volatile

The total non-volatile suspended solids are solids that are not reduced in the WWTF; however, they are removed from the waste stream. In order to obtain a conservative estimate of the amount of biosolids produced, it is assumed that total non-volatile suspended solids comprise 20% of the TSS removed by the WWTF (Metcalf and Eddy, 4th Edition). The amount of TSS removed by the WWTF can be estimated with Equation 3.4.

$$TSS_r = Q*(TSS_{in} - TSS_{eff})$$ **Equation 3.4**

Where:

TSS_r = total suspended solids removed
Q = wastewater flow
TSS_{in} = total suspended solids concentration in the WWTF influent
TSS_{eff} = total suspended solids concentration in the WWTF effluent

Table 3-6 summarizes the values and references used to calculate the total suspended solids removed.

Table 3-6
Wastewater Disposal System--TSS Removal
TOS Detailed Engineering Analysis

Variable	Value	Reference
TSS_{in}[1]	176 mg/L[2,3]	SHN, 2007 Annual Report
TSS_{eff}[4]	26 mg/L	Assumed 85% removal efficiency[5]
Q[6]	0.18 MGD[7]	Table 2.7 of this report
TSS_r[8]	**224.7 pounds per day**	**Equation 3.4**

1. TSS_{in}: Total Suspended Solids in WWTF influent
2. mg/L: milligrams per Liter
3. Represents the average influent concentrations to the WWTF during the fourth quarter 2006
4. TSS_{eff}: Total Suspended Solids in WWTF effluent
5. The WWTF currently achieves between 95% and 99% TSS removal efficiency. The 85% removal efficiency is considered a conservative estimate
6. Q: flow
7. MGD: Million Gallons per Day
8. TSS_r: Total Suspended Solids removed

The WWTF projected TSS removal rate would be approximately 225 ppd. Metcalf and Eddy, 4th Edition, estimates that approximately 20% of TSS is comprised of non-volatile solids and 80% is comprised of volatile solids (Tchobanoglous et al., 2003). Therefore, the daily rate of non-volatile suspended solids (TSS_{nv}) is estimated to be approximately 45 pounds per day.

3.4.2.3 Total Suspended Solids, Volatile

The total suspended solids that enter the WWTF as volatile solids comprise approximately 80% by mass of the total TSS (Metcalf and Eddy, 4th Edition). Of the volatile suspended solids that are removed by the WWTF, approximately 65% of the mass is removed by the anaerobic digester (Tchobanoglous et al., 2003). Equation 3.5 summarizes the calculation for the daily WWTF production of biosolids from volatile suspended solids that do not get treated by the WWTF.

$$TSS_{v,nx} = 0.8*TSS_r*(1-E_{ad})$$ **Equation 3.5**

Where:

TSS_r = Total Suspended Solids Removed
$TSS_{v,nx}$ = Total Suspended Solids as volatile solids that do not get reduced through the anaerobic digester
E_{ad} = Anaerobic Digester Removal Efficiency, as a decimal

The daily WWTF production of biosolids from volatile suspended solids that are not treated by the WWTF is approximately 63 pounds of biosolids per day. The total daily production of biosolids was calculated to be 112 pounds per day, or approximately 41,000 pounds of dry biosolids per year, (18,600 kg dry biosolids/yr) using Equation 3.2. The data is summarized in Table 3-7.

Table 3-7
Wastewater Disposal System--Daily Biosolids Production Rate
TOS Detailed Engineering Analysis

Parameter[1]	Value (lb/day)[2]
$TSS_{v,nx}$[3]	63
TSS_{nv}[4]	45
P_x[5]	4.2
BS[6]	**112**

1. Parameters from Equation 3.2
2. lb/day: pounds per day
3. $TSS_{v,nx}$: Total Suspended Solids as volatile solids that do not get reduced through the trickling filter and the anaerobic digester
4. TSS_{nv}: Total Suspended Solids as non-volatile solids
5. P_x: biosolid yield from cellular growth in the anaerobic digester
6. BS: daily dry biosolids production

The dry biosolids composition of sludge from a digester ranges from 2 to 5% (Metcalf and Eddy, 4th Edition). Using a conservative estimate of 3% by mass, the total volume of sludge produced annually is estimated to be approximately 163,500 gallons per year.

3.5 Proposed Improvements

SHN proposes that treated wastewater effluent continue to be discharged to the Eel River from October 1 through May 14 of the following year, as is currently the practice under RWQCB Order No. R1-2006-0020. However, SHN anticipates that the current practice of discharging the treated wastewater effluent to a percolation pond from May 15 through September 30 will not be allowed when the current NPDES permit expires in 2011. RWQCB Order No. R1-2006-0020 requires TOS to provide an outline and study of alternate wastewater disposal methods. SHN has researched several disposal methods and the following is a description of the preliminary findings for alternative disposal options.

3.5.1 Treated Wastewater Effluent Disposal

A water budget can be developed for any hydrologic system to account for flow pathways and storage components. The water budget follows the hydrologic continuity equation:

$$I - Q = \Delta S \qquad \text{Equation 3.6}$$

Where:

I = Inflow
Q = Outflow
ΔS = change in storage in a specified time period

The project specific water balance equation can be described as follows:

$$PPT_{in} + Q_{WW} = E_s + \Delta S \qquad \text{Equation 3.7}$$

Where:

PPT_{in} = Precipitation into the storage reservoir
Q_{WW} = Treated wastewater effluent into the storage reservoir
E_s = Evaporation from the storage reservoir
ΔS = Accumulated volume in the storage reservoir

The water balance equation is applied on an annual basis such that the inflow into the storage reservoir is equivalent to the outflow from the storage reservoir over one year.

3.5.1.1 Recycled Water Flow into Storage, Q_{WW}

The recycled wastewater flow into the reservoir pond (Q_{ww}) was detailed in Section 3.4 and assumes that the proposed wastewater collection system improvements outlined in Section 2.5 will reduce I/I by 70%. Table 3.4 describes the wastewater flow regime into the storage reservoir during the non-discharge period and shoulder months. In addition to the wastewater flow, the cogeneration plant also discharges process water to the storage pond. These discharges are estimated to contribute on average 10,000 gpd to the storage reservoir.

3.5.1.2 Precipitation into Storage, PPT_{in}

The conservative approach to estimating the amount of precipitation into the storage reservoir (PPT_{in}) assumes a heavy spring rain associated with a 100-year event. The volume of the 100-year event was scaled to a heavy spring event. This approach ensures that the storage and distribution systems are designed to handle the greatest anticipated flows. Table 3-8 summarizes the information.

Table 3-8
Wastewater Disposal System--Projected 100-year, Wet Spring Precipitation Event
TOS Detailed Engineering Analysis

Month	2005 PPT[1] Data (in/mo.)[2,3]	2005 Monthly PPT Distribution[2] (%)[4]	100-year Annual PPT Event Scaled to 2005 Distribution[2] (in/mo)	100-year Annual PPT Event Scaled to 2005 Distribution[2] (in/day)[5]
Jan	7.6	11.95	9.58	0.31
Feb	3.98	6.26	5.02	0.18
Mar	8.36	13.15	10.54	0.34
Apr	5.96	9.37	7.52	0.25
May	4.64	7.30	5.85	0.19
June	2.77	4.36	3.49	0.12
July	0.01	0.02	0.01	0.00
Aug	0	0.00	0.00	0.00
Sept	0.03	0.05	0.04	0.00
Oct	1.48	2.33	1.87	0.06
Nov	7.32	11.51	9.23	0.31
Dec	21.43	33.71	27.03	0.87
Totals	**63.58**	**100**	**80.18**	**--**

1. PPT: Precipitation
2. From W&K, October 11, 2006b
3. in/mo.: inches per month
4. %:percent
5. in/day: inches per day

In order to accurately calculate the storage requirements of the recycled water storage and distribution system, the catchment area for precipitation into the storage must be calculated. The post WWTF precipitation catchment surfaces include the log pond, three treatment ponds, and approximately 5 additional acres of land that drain to the ponds. Table 3-9 summarizes the catchment areas.

Table 3-9
Wastewater Disposal System--Storage Rainfall Catchment Areas[1]
TOS Detailed Engineering Analysis

Rainfall Catchment Component	Surface Area (SF)[2]
Log Pond	1,089,000
Treatment Pond #1	22,500
Treatment Pond #2	40,500
Treatment Pond #3	37,500
Additional Catchment	217,800
Total	**1,407,300**

1. Includes areas where precipitation contributes to storage requirement
2. SF: square feet

For the purposes of this analysis, the log pond is considered the storage reservoir. The amount of water entering the storage reservoir is dependent upon the catchment area, which is approximately 1,407,300 square feet. Table 3-10 summarizes the flow rates into the log pond due to precipitation.

Table 3-10
Wastewater Disposal System--Precipitation Rate into Log Pond
TOS Detailed Engineering Analysis

Month	100-year Annual PPT[1] Event Scaled to 2005 Dist.[2] (in/day)[3]	100-year Annual PPT Event Scaled to 2005 Dist. (ft/day)[4]	Catchment Area (SF)[5]	Precipitation Rate into Log Pond[6] (gpd)[7]
Jan	0.31	0.026	1,407,300	271,937
Feb	0.18	0.015	1,407,300	157,899
Mar	0.34	0.028	1,407,300	298,254
Apr	0.25	0.021	1,407,300	219,304
May	0.19	0.016	1,407,300	166,671
June	0.12	0.010	1,407,300	105,266
July	0.00	0.000	1,407,300	0
Aug	0.00	0.000	1,407,300	0
Sept	0.00	0.000	1,407,300	0
Oct	0.06	0.005	1,407,300	52,633
Nov	0.31	0.026	1,407,300	271,937
Dec	0.87	0.073	1,407,300	763,179

1. PPT: Precipitation
2. Based on 100-year storm scaled to 2005 monthly rainfall distribution
3. in/day: inches of rain per day
4. ft/day: feet of rain per day
5. SF: Square Feet
6. Precipitation rate into log pond determined by multiplying the catchment area by the precipitation rate.
7. gpd: gallons per day

3.5.1.3 Evaporation from Storage, E_s

The evaporation from the storage reservoir and treatment ponds (E_s) was estimated using the pan evaporation rate for the Western Regional Climate Center (WRCC) Ferndale Substation. The monthly data represent 10-year averaged data (from 1963 to 1973). The pan evaporation value was adjusted for a large water body by multiplying by a factor of 1.3 (Linacre, 1994). The additional catchment area, presented in Table 3.9 was not included in the area of storage surface for evaporation purposes. In order to determine the evaporation from the log pond, the following equation is used:

$$E_s = E_o \times F \times A \qquad \text{Equation 3.8}$$

Where:

E_s = Log Pond Evaporation rate
E_o = Pan Evaporation rate
F = Large water body adjustment factor
A = Area of storage surface

Table 3-11 presents evaporation rates for the system's storage reservoir.

Table 3-11
Wastewater Disposal System--Evaporation Rate From Storage Reservoir
TOS Detailed Engineering Analysis

Month	$[E_o]$[1] (in/mo)[2]	[F][3]	Adjusted Evaporation from Large Water Body Surface		[A][5] (SF)[6]	$[E_s]$[7] (gpd)[8]
			(in/mo)	(ft/day)[4]		
Jan	0.7	1.3	0.91	0.002	1,189,500	21,765
Feb	1.17	1.3	1.521	0.003	1,189,500	30,982
Mar	2.26	1.3	2.938	0.006	1,189,500	54,054
Apr	3.21	1.3	4.173	0.009	1,189,500	79,336
May	3.95	1.3	5.135	0.011	1,189,500	94,476
June	4.38	1.3	5.694	0.012	1,189,500	108,252
July	4.49	1.3	5.837	0.012	1,189,500	107,391
Aug	4.07	1.3	5.291	0.011	1,189,500	97,346
Sept	3.59	1.3	4.667	0.010	1,189,500	88,727
Oct	2.06	1.3	2.678	0.006	1,189,500	49,271
Nov	1.04	1.3	1.352	0.003	1,189,500	25,704
Dec	0.72	1.3	0.936	0.002	1,189,500	17,221
Total	31.6 in/yr[9] (80.4 cm/yr)[10]	---	41.1 in/yr (104.5 cm/yr)	---	---	23.6 MGD[11]

1. E_0: Pan Evaporation; from WRCC Ferndale Station
2. in/mo: inches per month
3. F: Large water body adjustment factor (Linacre, 1994), unitless
4. ft/day: feet per day; calculated by dividing the adjusted evaporation rate in feet per month by the number of days per month
5. A: Storage Surface Area
6. SF: Square Feet
7. E_s: Evaporation from Storage; calculated using Equation 3.8
8. gpd: gallons per day
9. in/yr: inches per year
10. cm/yr: centimeters per year
11. MGD: Million Gallons per Day; total calculated by multiplying the gallons per day by the number of days per month and summing for the year

3.5.1.4 Storage Requirements

In order to determine the storage requirements of the log pond, the water budget equation (Equation 3.6) is used. Because discharge to the Eel River is permitted until May 15 of each year and after September 30 of each year, the storage requirements were only calculated for the non-discharge period (May 15 through September 30). The required monthly storage space was determined by dividing the monthly accumulated precipitation and discharge volume by the surface area of the log pond. Table 3-12 summarizes the findings of the storage requirements for the summer non-discharge period.

Table 3-12
Storage Requirements During Non-Discharge Period
TOS Detailed Engineering Analysis

Month	Q[1] (gpd)[2]	PPT_{in}[3] (gpd)	E_s[4] (gpd)	ΔS[5] (gpd)	Monthly Storage Requirements (gallons/month)	Log Pond Elevation Change (feet/month)
May	184,000	166,671	94,476	256,196	4,355,324	0.53
June	184,000	105,266	108,252	181,014	5,430,408	0.67
July	149,000	0	107,391	41,609	1,289,867	0.16
Aug	149,000	0	97,346	51,654	1,601,278	0.20
Sept	149,000	0	88,727	60,273	1,808,177	0.22

1. Q: wastewater + cogeneration plant process water discharges
2. gpd: gallons per day
3. PPT_{in}: precipitation into storage
4. E_s: evaporation from storage
5. ΔS: change in storage

Based on SHN's analysis using the log pond as the recycled water storage basin, approximately 1.78 feet of free board space would be required to store the 14.5 million gallons of accumulated water. The accumulated water results from recycled water flows (Q) and precipitation into the log pond and treatment ponds (PPT_{in}) exceeding the evaporation rate out of the log pond and treatment ponds (E_s). Discussion with operating personnel indicates that the log pond can be drawn down at least 2 feet prior to May 15 of each year (Vogt, 2007). Therefore, the existing log pond will not require modifications to serve as the storage basin for accumulated recycled water flows.

3.5.1.5 Optional Uses of Recycled Water

Recycled water from the WWTF that is stored in the log pond could be used for a variety of uses including application to roads for dust suppression, use in the cogeneration plant cooling towers, irrigation of parks, or stored in the log pond until the non-discharge period is over (October 1). The stored water could then be released to the Eel River as long as the discharge does not exceed 1% of the Eel River flow and meets regulatory requirements. SHN proposes that application options and demand for the recycled water be further studied. TOS has expressed preliminary interest in using the recycled water for dust suppression on roads and has estimated the demand to be approximately 200,000 gpd, during the dry season.

3.5.2 Sludge Disposal

SHN proposes a modification of the current Scotia WWTF sludge disposal practices. The modification includes dewatering of WWTF sludge and land application at the tree farm that was part of the PALCO property and will be conveyed to the Humboldt Redwood Company (HRC) after the subdivision has been completed. Scotia WWTF biosolids have not been analyzed for chemical composition. There are several application methodologies to determine the location and rate of acceptable land application. These application methodologies are contingent upon certain chemical aspects of the biosolids.

For the purposes of land application of Scotia's WWTF biosolids, two application methodologies are relevant: (1) pollutant loading and (2) nutrient loading. Pollutant loading methods can be described by using Equation 3.1. In accordance with 40 CFR Part 503, bulk sewage sludge must be land-applied at the agronomic rate for nitrogen at the application site. Therefore, the preliminary design methodology for land application of biosolids at the tree farm is based on the agronomic uptake rates at the tree farm.

3.5.2.1 Scotia Biosolids Chemical Composition

Scotia WWTF biosolids have not been analyzed for metals (see Table 3-3 for required list), nutrients (nitrogen, phosphorus, potash, organic matter), pathogens (total fecal coliform, *salmonella* sp., or viable helminth ova), or vector attraction attributes. The composition of the biosolids must be fully characterized in order to determine the proper disposal methods.

In order to anticipate the disposal method of biosolids, the sludge composition for primary treated sludge was projected from Metcalf and Eddy, 4th Edition. Table 3-13 summarizes the projected composition.

Table 3-13
Typical Chemical Composition and Properties of Digested Sludge[1]
TOS Detailed Engineering Analysis

Component	Composition (Range)
Total Dry Solids (%)[2]	2.0-5.0
Volatile Solids (% of TS)[3]	30-60
Grease and Fats (% of TS)	5-20
Protein (% of TS)	15-20
Nitrogen (% of TS)	1.6-6.0
Phosphorus (P_2O_5, % of TS)	1.5-4.0
Potash (K_2O, % of TS)	0.0-3.0
Cellulose (% of TS)	8.0-15.0
Iron (% of TS)	3.0-8.0
Silica (SiO_2, % of TS)	10.0-20.0
pH	6.5-7.5
Alkalinity (mg/L as $CaCO_3$)[4]	2,500-3,500
Organic Acids (mg/L as HAc[4])	100-600

1. From Metcalf and Eddy, 4th Edition
2. %: percent by mass
3. TS: Total Solids
4. mg/L as $CaCO_3$: milligrams per liter as calcium carbonate
5. HAc: Acetic Acid

The nitrogen content of Scotia's WWTF treated wastewater effluent is currently not known. However, the nitrogen content of the anaerobically treated sewage sludge can be estimated from information presented in EPA's *Process Designing Manual, Land Application of Sewage Sludge and Domestic Septage* (EPA, 1995). Table 3-14 summarizes the total nitrogen content and speciation of nitrogen in anaerobically treated sludge. The concentrations and% composition are on a dry solids basis.

Table 3-14
Nitrogen Concentrations[1] and Annual Mass Production in Anaerobically Digested Sludge
TOS Detailed Engineering Analysis

Nitrogen Speciation	Mean Value[1,2]	Annual Mass Produced[3] (kg)[4]	Annual Mass Produced (lb/acre)[5]
Total Kjeldahl Nitrogen	5.0 (%)[6]	930	25.6
NH_4^+ - N[(7)]	9,400 (mg/kg)[8]	175	4.8
NO_3^- - N[(9)]	520 (mg/kg)	10	0.3
Organic Nitrogen[10]	-	745	20.5

1. From EPA 1995: EPA's *Process Designing Manual, Land Application of Sewage Sludge and Domestic Septage*
2. Concentrations and% composition are on a dried solids basis.
3. Based on assumed annual dried sludge production of 35,000 pounds
4. kg: kilogram
5. lb/acre: pound per acre, based on 80 acres
6. %:percent by mass
7. NH_4^+ - N: Nitrogen concentration in the form of ammonium
8. mg/kg: milligrams per kilogram
9. NO_3^- - N: Nitrogen concentration in the form of nitrate
10. Organic nitrogen is determined by subtracting the nitrogen as ammonium and the nitrogen as nitrate from the total nitrogen (EPA, 1995).

3.5.2.2 Tree Farm Nitrogen Agronomic Rate

Agronomic rate limited land application of biosolids is intended to prevent nitrogen over-application by matching the application rate of the nitrogen to the nitrogen uptake rates of the redwood trees within the tree farm. Nitrogen uptake rates for redwoods have not been studied. Table 3-15 shows the nitrogen agronomic uptake rate for a variety of trees.

Table 3-15
Literature Values for Tree Nitrogen Uptake Rates
TOS Detailed Engineering Analysis

Species of Tree	Nitrogen Uptake Rate (kg/ha/yr)[1]	Nitrogen Uptake Rate (lb/acre/yr)[2]	Reference
Hybrid Poplar	300	267.9	EPA, 1995
Hybrid Cottonwood	280	250.0	EPA, 1995
Douglas Fir	200	178.6	EPA, 1995
Hemlock	44	39.3	Ducnuigeen et al., 1997

1. kg/ha/yr: kilogram per hectare per year
2. lb/acre/yr: pounds per acre per year

Because the nitrogen uptake rate for redwoods has not been studied, we used the hemlock nitrogen uptake rate to provide a conservative estimate.

3.5.2.3 Nitrogen Mineralization

Not all forms of nitrogen are available for plant uptake. Plant-Available Nitrogen (PAN) in the form of ammonium (NH_4^+) and nitrate (NO_3^-), must be calculated to determine the actual amount of nitrogen available for plant uptake.

In order to estimate the land application rate of biosolids at the HRC tree farm, the PAN application rate was compared to the nitrogen uptake rate of redwood. Mineralization is the process where organic nitrogen (nitrogen that is stored in cellular material) is slowly converted to ammonium (NH_4^+) as the applied biosolids decompose. Literature values for estimating the nitrogen mineralization rate for anaerobically digested sludge are available and presented in Table 3-16 (EPA, 1995).

Table 3-16
Organic Nitrogen Mineralization Rates for Anaerobically Digested Sludge[1]
TOS Detailed Engineering Analysis

Time After Application (Years)	Fraction of Organic Nitrogen Mineralized
0-1	0.20
1-2	0.10
2-3	0.05

1. From EPA, 1995

3.5.2.5 Ammonia Volatilization

The loss of nitrogen through volatilization of ammonium as ammonia (NH_3) must be accounted for when budgeting nitrogen. Volatilization is dependent upon many factors (such as weather conditions, application method, duration sludge is on surface before being incorporated into the subsurface, and pH of the soil). A 50% loss of nitrogen (in the form of NH_3 by volatilization was estimated for land application of irrigation water and for land applied biosolids (EPA, 1995).

3.5.2.6 Nitrogen Losses due to Denitrification, Fixation, and Immobilization

Denitrification is the process by which nitrogen as NO_3^- is lost to the atmosphere as nitrogen (N_2) or nitrous oxide (NO_2) gases through reductive processes. Fixation is the process by which nitrogen is chemically fixed inside the cells of microbes, which can then be gradually released similarly to the nitrogen mineralization process described in Section 3.5.2.5 (Tchobanoglous et al., 1987). Immobilization of nitrogen occurs in soils containing hydrous mica clay minerals. The process involves NH_4^+ becoming fixed within crystal lattices normally occupied by potassium cations (K^+). The *EPA Process Design Manual* indicates that nitrogen losses due to denitrification, fixation, and immobilization may only be included if approved by a regulatory agency (EPA, 1995). In order to provide a conservative estimate, these losses were not included in the calculations.

3.5.2.7 Nitrogen Loading on the Tree Farm from Land Application of Biosolids

The nitrogen loading at the tree farm was calculated for land application of the biosolids. Literature values for sludge composition were used because analytical data is not available for TOS sludge. Table 3.17 summarizes the yearly nitrogen loading from biosolids application and includes a percentage of the agronomic demand for redwood trees supplied by the biosolids.

Table 3-17 Biosolids PAN[1] Loading and Percent Agronomic Demand TOS Detailed Engineering Analysis		
Years after Discharge Commences	**PAN Loading from Land Application of Biosolids[1] (lb/acre)[2]**	**Percentage of Tree Farm Nitrogen Agronomic Demand Met[3] (%)[4]**
1	6.77	17.2
2	8.41	21.4
3	9.15	23.3
4	9.15	23.3
5	9.15	23.3
6	9.15	23.3

1. PAN: Plant-Available Nitrogen; PAN from nitrate, ammonium assuming 50% loss due to volatilization, and PAN from mineralization of organic nitrogen
2. lb/acre: pounds per acres
3. Determined by dividing the loading rate from biosolids by the agronomic demand for hemlock (39.3 lb/acre/year)
4. %: percent by mass

3.5.2.8 Biosolids Handling

Sludge from the Scotia WWTF would be dewatered prior to being stored. Sludge is not currently dewatered prior to trench disposal. The dewatering method has not been determined, though SHN anticipates the use of drying beds, as land is readily available and operation and maintenance of drying beds is relatively low. Biosolids can be applied to mature forests year-round (EPA, 1995).

The preliminary surface area requirements for an uncovered paved drying bed can be estimated using Equation 3.9 from Metcalf and Eddy, 4th Edition (Tchobanoglous et al., 2003).

$$A = (1.04*S*[(1-Sd)/Sd-(1-Se)/Se] +10^3\ kg/m^3*P*A)/(10*Ke*Ep) \qquad \text{Equation 3.9}$$

Where:

- A = area of uncovered paved drying bed (in square meters [m^2])
- 1.04 = the assumed specific gravity of biosolids
- S = annual sludge production, dry solids, kg/yr
- Sd = percent dry solids in sludge
- Se = percent dry solids required
- P = annual precipitation rate (m/yr)
- 10 = conversion factor for cm/yr to kg/m^2/yr
- Ke = reduction factor for evaporation from sludge versus evaporation from free water surface
- Ep = free water pan evaporation rate (cm/yr)

However, the drying bed would have to be covered because of the high precipitation rates in Humboldt County. The sides of the drying bed would remain open to allow for free air flow. Therefore, Equation 3.10 will be used to estimate the preliminary surface area requirements for a covered paved drying bed, assuming a conservative 33% reduction in evaporation rate due to the loss of direct sun exposure.

A = (1.04*S*[(1-Sd)/Sd-(1-Se)/Se])/(10*Ke*Ep*0.66) **Equation 3.10**

Where:

A = area of covered paved drying bed (m^2)
1.04 = the assumed specific gravity of biosolids
S = annual sludge production, dry solids, kg/yr
Sd = percent dry solids in sludge, as a decimal
Se = percent dry solids required, as a decimal
10 = conversion factor for cm/yr to kg/m^2/yr
Ke = reduction factor for evaporation from sludge versus evaporation from free water surface
Ep = free water pan evaporation rate (cm/yr)
0.66 = reduced pan evaporation rate due to loss of direct solar exposure

Table 3-18 summarizes the values and references used to calculate the aerial requirement. The preliminary design area to effectively dry the biosolids produced annually from the Scotia WWTF to 15% dry solids is 1,060 square meters (m^2).

Table 3-18
Sludge Drying Bed Area Requirements

Parameter[1]	Assigned Value	Reference
S[2]	18,600 kg/yr[(3)]	From Section 3.4.2
Sd[4]	0.03	Metcalf and Eddy, 4th Edition
Se[5]	0.15	Assumed value of 15% solids to reduce mass for transportation purposes.
Ke[6]	0.6	Metcalf and Eddy, 4th Edition
Ep[7]	104.5 cm/yr[8]	From Table 3-11.
A[9]	1,250 m^2	Equation 3.10

1. Parameters from Equation 3.10
2. S: annual sludge production, dry solids
3. kg/yr: kilogram per year
4. Sd: percent dry solids in sludge, as a decimal
5. Se: percent dry solids required, as a decimal
6. Ke: reduction factor for evaporation from sludge versus evaporation from free water surface
7. Ep: free water pan evaporation rate
8. cm/yr: centimeter per year
9. A: paved, covered sludge drying bed area

3.5.2.10 Preliminary Costs

Table 3-19 outlines the major components and costs associated with the proposed sludge disposal option.

Table 3-19 Estimated Costs of Sludge Disposal Option (Revised 2/24/2009) TOS Detailed Engineering Analysis				
Item (Unit Type)	**Unit(s)**	**Quantity**	**Unit Cost**	**Total Cost**
Mobilization/Demobilization	LS[1]	1	$20,000	$20,000
Equipment				
Biosolids transportation truck	Each	1	$50,000	$50,000
Skid Steer	Each	1	$50,000	$50,000
Manure Spreader	Each	1	$15,000	$15,000
Construction				
Sludge Drying Bed	LS	1	$100,000	$100,000
Install groundwater monitoring wells	Each	8	$5,000	$40,000
Sludge Disposal Cost Subtotal				**$275,000**
Engineering[2] (20%)				$55,000
Contingency (20%)				$55,000
Total Sludge Disposal Option Cost, Call:				**$385,000**

1. LS: Lump Sum
2. Engineering includes design, permitting, and construction management for the project.

3.5.3 Issues of Operation

This section lists the performance limiting factors that were identified for the CSD formation during the course of this study. Below each issue of operation is a recommendation in *Italics* that may reduce or eliminate the issue. No priority is given to issues and recommended solutions.

Issue 1: Compliance with RWQCB Order No. R1-2006-0020 requirement that a written commitment to modify the existing treatment/disposal methods and a schedule of tasks to develop a study plan for selection and implementation of a treatment/storage method be prepared by March 30, 2007. The proposal to study the disposal alternatives must be prepared by March 2010. The proposal study must be completed by September 30, 2016.

Recommendation 1: *TOS has completed the written commitment and schedule of tasks and submitted them to the RWQCB. A study plan for selection and implementation of alternatives for disposal of wastewater effluent during the summer non-discharge period and biosolids will be prepared.*

Issue 2: The wet weather inflow and infiltration has not been clearly determined from the base wastewater flow.

Recommendation 2: *TOS is currently performing a wet weather flow study of the wastewater collection system to determine the amount of I/I.*

Issue 3:	The characteristics and annual production rates of the Scotia WWTF sludge are unknown, thus limiting the accuracy of the disposal alternative evaluation.
Recommendation 3:	*TOS has submitted a schedule to the RWQCB to study the annual sludge production rates at the Scotia WWTF. Additionally, samples will be collected and submitted to an analytical laboratory to determine the pathogen content, pollutant and nutrient concentrations, and vector attraction characteristics.*
Issue 4:	Wastewater effluent is currently stored in the log pond and is proposed to continue to be so stored. Water within the TOS log pond is used by HRC for industrial cooling processes. TOS is considering the use of log pond water as dust suppression for roads during the dry months of the year. The regulatory acceptability of applying treated wastewater effluent to roads for dust suppression has not been determined.
Recommendation 4:	*Coordination with the RWQCB will be performed to determine the regulatory acceptability of application of recycled water to roads for dust suppression during dry months.*
Issue 5:	TOS currently uses the log pond water for the backup fire suppression system.
Recommendation 5:	*TOS will identify an alternate source of water for the backup fire suppression system or apply for regulatory clearance to use the log pond water, which includes treated secondary effluent, for the fire suppression system.*
Issue 6:	TOS, HRC, and the CSD will use and benefit from the recycled water use, log pond storage, and land application of biosolids.
Recommendation 6:	*A Memorandum Of Understanding (MOU) needs to be prepared between the CSD, HRC, and TOS for access to the log pond and tree farm for biosolids application. Costs for operation and maintenance of the biosolids disposal and recycled water use will be covered by the monthly rates assessed to the CSD customers, including HRC.*
Issue 7:	Pan evaporation rates for the town of Scotia are estimated using available data for Ferndale.
Recommendation 7:	*A study will be conducted to determine the pan evaporation rate for the town of Scotia, specifically near the log pond and the treatment ponds.*
Issue 8:	Site characteristics for the HRC tree farm have not been analyzed to determine the efficacy of land application of biosolids.

Recommendation 8:	*Perform a pilot study to determine the agronomic uptake rate of redwoods. The pilot study will also include soil sampling to determine background metals and nutrient concentrations.*
Issue 9:	The tree farm is the preferred option for land application of biosolids. However, through characterizing biosolids and site conditions, the tree farm may not be suitable for biosolids disposal.
Recommendation 9:	*Additional sites will be identified (if necessary) for the land application of biosolids and irrigation using wastewater effluent from the log pond.*
Issue 10:	The drying bed was the only sludge drying option evaluated.
Recommendation 10:	*Additional sludge drying options will be identified and a comparative engineering analysis, performed to determine the appropriate sludge drying technology.*

4.0 Water Distribution

4.1 Introduction

The following sections describe the water distribution system and fire system in the town of Scotia and assesses the current condition of the systems' infrastructure. Facility descriptions including sizes, condition, and capacity are presented, along with recommendations for new water lines and service connections. In addition, recommendations are made for system improvements deemed technically appropriate to meet user level of service expectations and state standards.

Raw water from the Eel River intake diversion is pumped to a raw water storage and settling tank. Raw water then gravity flows to two fire storage tanks or to the Water Treatment Facility (WTF) as demand dictates. Treated water gravity flows to a finish water storage tank for domestic use in Scotia and the HRC mill, or to the cogeneration plant for make-up water. The components of the water system are shown on Figures 4-1 and 4-2 (fire lines not included).

4.2 System Description

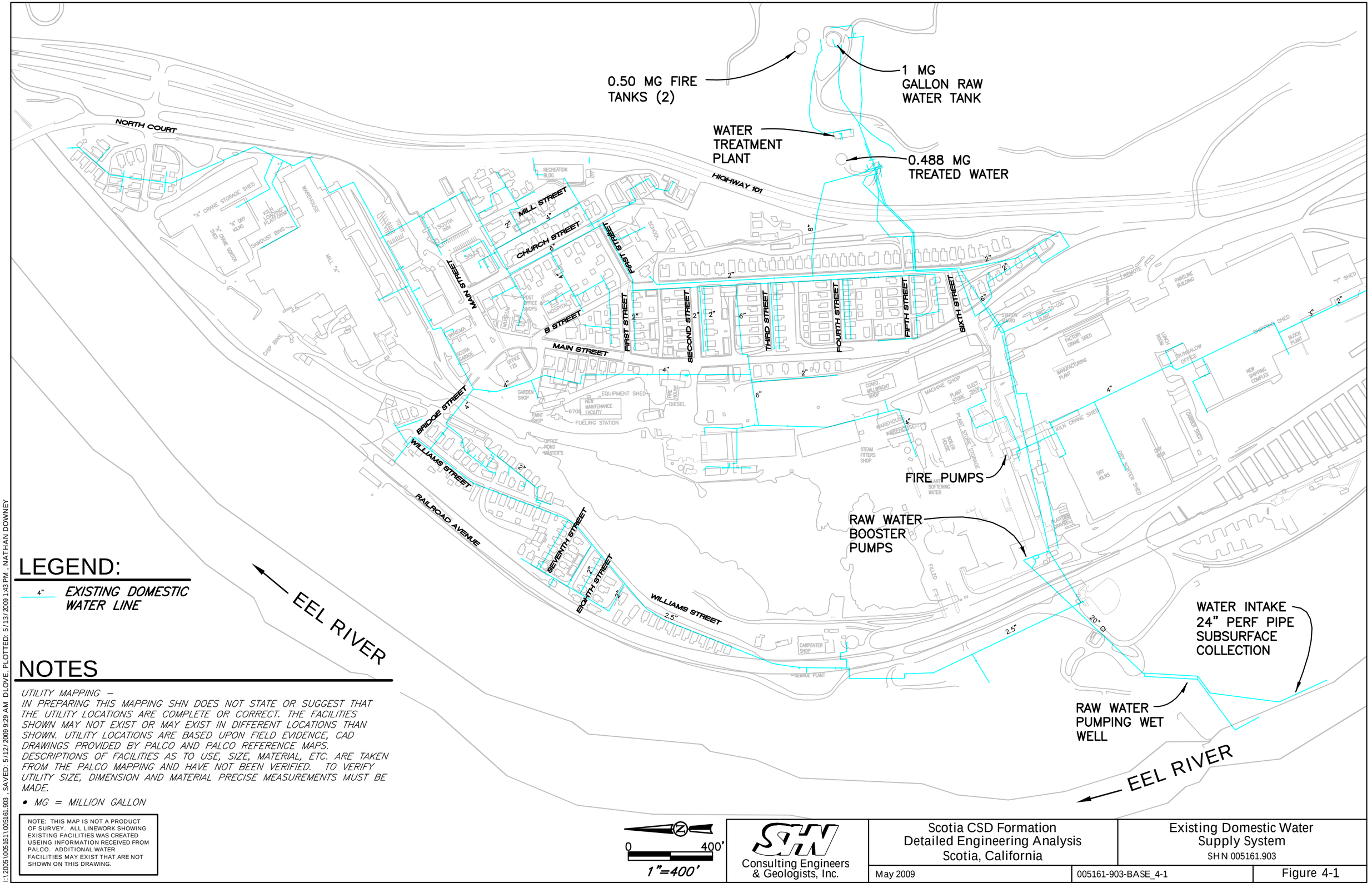
This section describes the major system components of both the domestic and fire suppression water systems in greater detail. The majority of pipe in the fire system is made of cast-iron and was installed prior to 1940. The majority of pipe in the domestic water system is steel and cast-iron and was also installed prior to 1940. Scotia's domestic water distribution system is classified as D-1 (population served 1,000 or less) by the California Department of Health Services (DHS). The treatment system is classified as T-2 (small, well performing, and operated system) by the DHS.

4.2.1 Domestic Water System

Scotia's existing domestic water system is owned, operated, and maintained by TOS. The system serves residential, commercial, and industrial customers within Scotia. There are approximately 272 residential, 15 commercial, and 20 industrial connections within the system. Water usage by residential customers is not metered. The main industrial water users in Scotia are the HRC mills and the cogeneration plant, whose usage is metered, and the Eel River brewery. Industrial customers use on average slightly more than half of all water produced at the WTF.

Raw water enters the domestic water system through an infiltration gallery constructed in 1966. The gallery consists of two, 24-inch perforated steel pipes totaling 1,100 feet in length, located in the Eel River gravel bed slightly more than 10 feet below the low river water level (see Figure 4-2). Water enters the pipes and flows by gravity to a concrete collection well, located on the river bank. The collection well currently contains two, 125-hp Byron Jackson submersible pumps, each capable of producing 1,500 gallons per minute (gpm). Both pumps were installed in 1995, and one pump runs constantly. Their operation alternates monthly. The pumps discharge into 10-inch steel pump columns followed by 12-inch CIPs. The 12-inch pipes join into a single 20-inch cast-iron water supply line.

Approximately 800 feet from the collection well, the 20-inch pipe splits into separate lines for the domestic and fire systems. The domestic line is a 12-inch CIP that reduces to two, 8-inch pipes that connect to two, 150-hp Ingersoll-Rand horizontal split case pumps, each having a 1,200 gpm



LEGEND:

4" EXISTING DOMESTIC WATER LINE

NOTES

UTILITY MAPPING –
IN PREPARING THIS MAPPING SHN DOES NOT STATE OR SUGGEST THAT THE UTILITY LOCATIONS ARE COMPLETE OR CORRECT. THE FACILITIES SHOWN MAY NOT EXIST OR MAY EXIST IN DIFFERENT LOCATIONS THAN SHOWN. UTILITY LOCATIONS ARE BASED UPON FIELD EVIDENCE, CAD DRAWINGS PROVIDED BY PALCO AND PALCO REFERENCE MAPS. DESCRIPTIONS OF FACILITIES AS TO USE, SIZE, MATERIAL, ETC. ARE TAKEN FROM THE PALCO MAPPING AND HAVE NOT BEEN VERIFIED. TO VERIFY UTILITY SIZE, DIMENSION AND MATERIAL PRECISE MEASUREMENTS MUST BE MADE.

- MG = MILLION GALLON

NOTE: THIS MAP IS NOT A PRODUCT OF SURVEY. ALL LINEWORK SHOWING EXISTING FACILITIES WAS CREATED USEING INFORMATION RECEIVED FROM PALCO. ADDITIONAL WATER FACILITIES MAY EXIST THAT ARE NOT SHOWN ON THIS DRAWING.

N

0 400'

1"=400'

Consulting Engineers & Geologists, Inc.

Scotia CSD Formation
Detailed Engineering Analysis
Scotia, California

Existing Domestic Water Supply System
SHN 005161.903

May 2009 | 005161-903-BASE_4-1 | Figure 4-1

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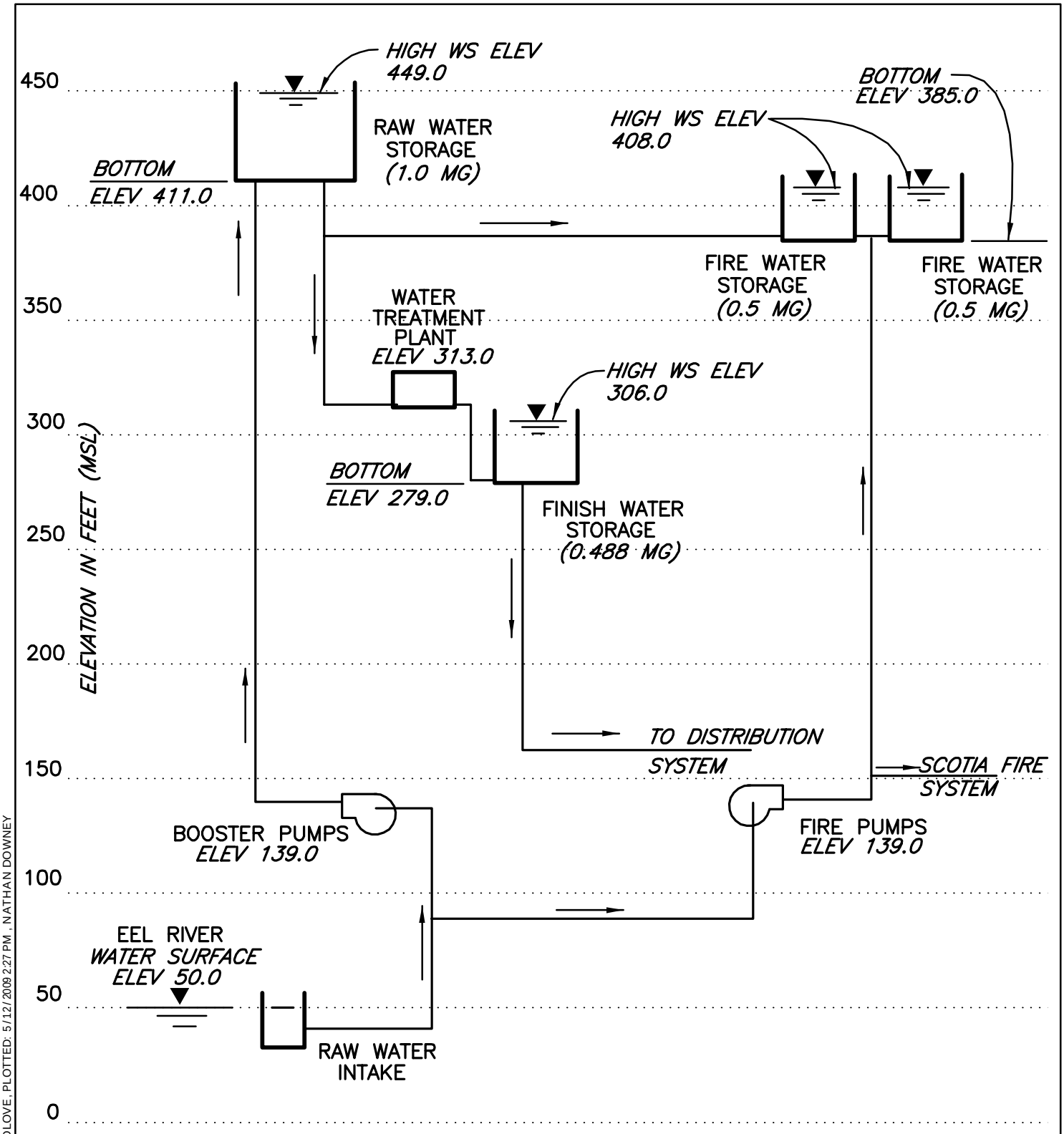

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Consulting Engineers & Geologists, Inc.	Scotia CSD Formation Detailed Engineering Analysis Scotia, California	Existing Scotia Water and Fire System Hydraulic Profile SHN 005161.903
	May 2009 | 005161-903-flow-dia_4-2	Figure 4-2

pumping capacity. These pumps were originally installed in the 1940s and have since been rebuilt. One pump was rebuilt in 1994, and the other was rebuilt in 2004 (SHN, August 10, 2006). The domestic booster pumps rotate every cycle of operation.

The domestic booster pump outlet piping tees and discharges into a recently installed, aboveground 8-inch PVC pipe, which transitions to an underground 12-inch transite (asbestos cement) pipe installed in the 1970s. This pipe conveys water to the WTF where coagulant is injected directly into the pipe upstream of an in-line mixer. A 12-inch steel pipe transports water from the WTF to a 1-MG tank. The 1.0-MG raw water storage tank also serves as a clarifier/settling tank where coagulated materials can settle out of the raw water prior to filtration. The tank was constructed in 1966 and sits at a bottom tank elevation of approximately 411 feet. It requires annual cleaning to remove settled materials. The water level in the tank controls the operation of the domestic booster pumps.

Water flows by gravity from the 1.0-MG raw water storage tank to the WTF at an elevation of approximately 313 feet through 10-inch steel outlet pipes located approximately 17 feet above the tank bottom elevation (a lower outlet exists for emergency situations). The treatment train consists of two pressure filters, flow meter, chlorinator, and a fluoridation system, which is currently off-line. The treatment facility is in overall good condition and is well maintained. The WTF currently operates at approximately 800 gpm for about 8 hours per day. In the winter, raw water turbidity ranges between 300 to 400 Nephelometric Turbidity Units (NTU); in the summer, the turbidity drops to about 1 NTU. Treated water leaving the WTF has 0.05 to 0.1 NTU year-round. Further discussion of the WTF can be found under "Chapter 5: Water Treatment" of this document.

The treated, filtered water then flows through a 10-inch steel pipe to a 0.488-MG finished water storage tank of welded steel construction, which supplies the domestic system of Scotia with excellent quality water. This tank was constructed in 1990 and sits at a bottom tank elevation of about 279 feet. An altitude valve is in place between the finished water storage tank and the 1.0-MG raw water storage tank. When the water level drops to a depth of approximately 18.5 feet in the finished water storage tank, the altitude valve opens, filling the finished water storage tank. The altitude valve closes after the tank fills to about 27 feet (W&K, September 6, 2006).

The raw water and finish water storage tanks appear structurally sound, with no evidence of leaks, cracks, split seams, or foundation problems. The vents on those two tanks appear to be adequately screened. There are no trees or roots in near proximity of either of the tanks. The exterior finish on the raw water storage tank appears to be in good condition. The exterior paint on the finished water storage tank shows significant surface oxidation and some staining associated with algal growth from water ponding and overflowing the rooftop. All hatch covers appear to be watertight.

The altitude valve associated with the finish water storage tank is functioning properly; however, the exterior shows some rust. All access points and valve boxes are adequately secured. Connections to the foundation could not be observed; however, considering the age of the tank, it is unlikely that there are provisions for significant earthquake resistance.

A base map of the existing domestic water distribution system is presented in Figure 4-1. The entire system is in a single pressure zone served by the domestic water storage tank with a base elevation of 279 feet and an overflow elevation of approximately 306 feet. Based on the estimated overflow, elevation service pressures range from a low of approximately 50 pounds per square inch (psi) to a high of 100 psi. Pressure and service are reportedly adequate throughout the distribution system.

The majority of the distribution system was installed between the 1930s and 1940s. Current mapping provided by TOS and compiled by SHN has limited descriptions of the distribution facilities with respect to use, size, and material. Table 4-1 presents an inventory of estimated lengths of pipe in the existing domestic water system.

Table 4-1
Inventory of Existing Domestic Water Distribution System
TOS Detailed Engineering Analysis

Diameter (inches)	Material	Year of Installation	Pipe Length (feet)[1]
1	PVC[2]	1970s to Present	975
1.5	Galvanized Iron	1930s-1940s	225
2	Steel/Galvanized Iron	1930s-1940s	13,450
2.5	Cast Iron	1930s-1940s	4,050
3	Cast Iron	1930s-1940s	300
4	Cast Iron	1930s-1940s	9,080
6	Cast Iron	1930s-1940s	4,275
8	Cast Iron	1930s-1940s	1,320
Unknown	Unknown	1930s-1940s	3,345
Total	---	---	**37,020**

1. All estimates are approximate and based on best available information.
2. PVC: Polyvinyl Chloride

Amounts of unknown sized pipe are attributable to the lack of pipe sizing information on the maps made available to SHN. All pipes labeled with diameter sizes were accounted for in the estimates. More than half of the pipe is less than 2 inches in diameter and the majority of this pipe is steel. All of the pipe greater than 4 inches in diameter is cast–iron installed before 1940. This early cast iron pipe is more brittle than ductile cast-iron pipe, and is subject to catastrophic failure or breaking as the pipe ages.

A large proportion of the water system is 2-inch unlooped pipe. The unlooped nature of the system is a concern because there is potential for flow reversals and water hammer, which may contribute to breakage or leaks in pipe connections.

The domestic water system can also be used to back-up the fire suppression water system in the case of insufficient fire flows, by opening gate valves in the 1.0-MG storage tank's outlet piping, which directs water to the two 0.5-MG fire storage tanks. The overflow from the 1.0-MG tank is also directed to the fire tanks.

The 1.0-MG tank can also be filled by a creek located behind the tank under emergency situations.

W&K staff performed a survey of the domestic water distribution system's isolation valves in June 2006 (W&K, September 6, 2006). Survey results indicate most valves within the system:

a) are leaking, as evidenced by standing water in several valve-boxes;
b) turn, but do not actuate the gates; or
c) begin to leak when actuated.

4.2.2 Fire Suppression Water System

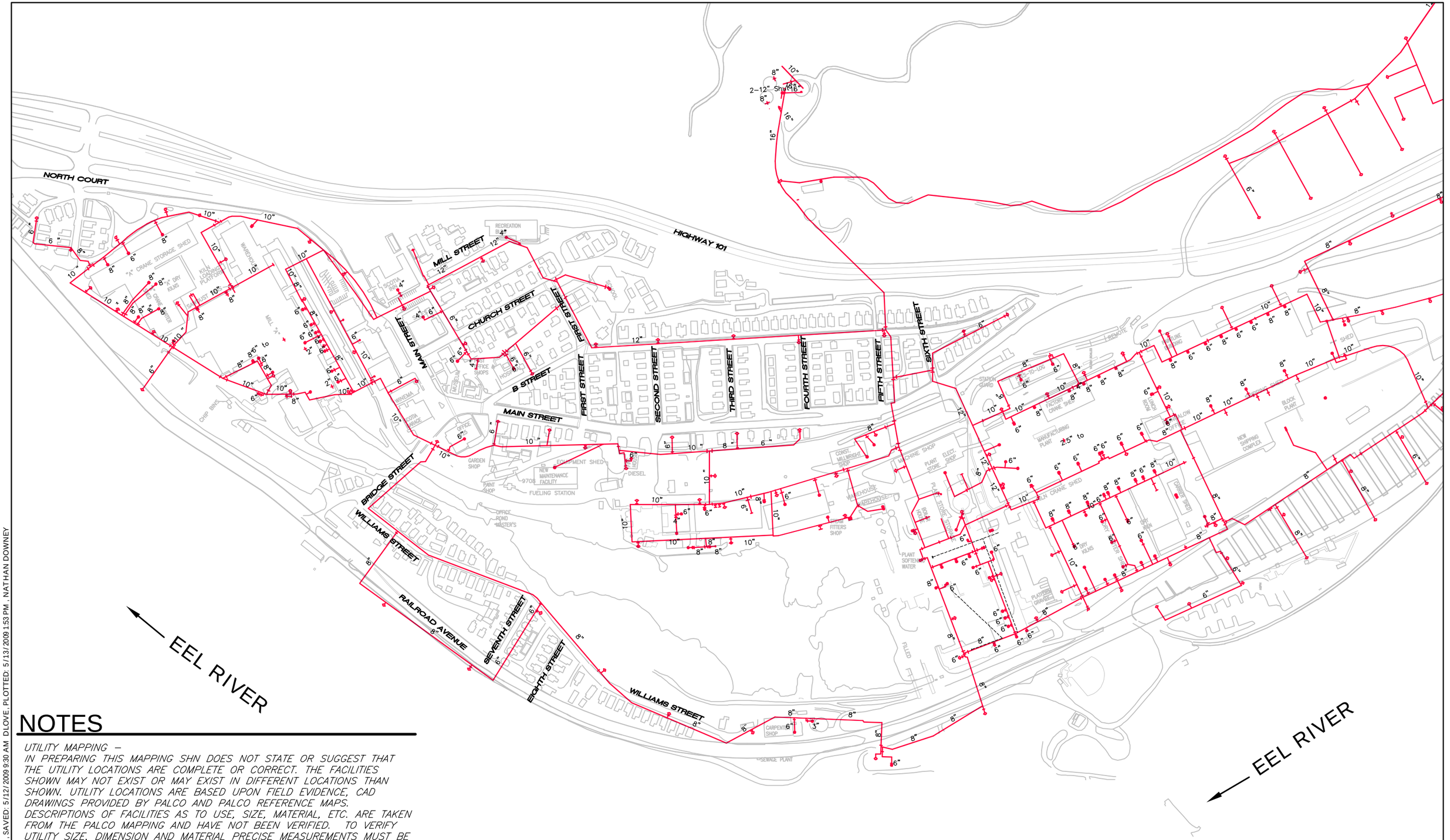
TOS's fire suppression water system splits from the domestic water system and the 20-inch cast iron pipe coming from the collection well. Water is boosted at a pump station, consisting of two horizontal split case Fairbanks Morse pumps. The first pump is 150 hp and is rated at 1,000 gpm, and the second pump is 75 hp and rated at 500 gpm. Both pumps were installed in the 1950s and have been rebuilt since then; however, the dates of the last rebuilds are unknown. However, seals were replaced in early 2006 (W&K, September 6, 2006).

Water is boosted from the fire pumps' elevation of approximately 139 feet to supply water to the cogeneration plant and to two 0.5-MG fire suppression water storage tanks with a bottom tank elevation of about 385 feet through a 16-inch cast iron fire main installed in the 1930s. The fire suppression water storage tanks are showing their age. The exterior finish is oxidized and shows staining from minor leaks. The open top structures have allowed some algal and other vegetation growth to occur within the inside top of the tanks. There appears to be some significant rust scale formed in the upper inside rim of the tanks. Connections to the foundation could not be observed; however, considering the age of the tank, it is unlikely that there are provisions for significant earthquake resistance. TOS is currently evaluating options and establishing a plan to repair or replace the tanks within the next five years. The fire suppression water storage tank upgrade/replacement will take place as part of necessary maintenance, independent of the CSD formation project, and is not part of this proposal.

The 500-gpm booster pump runs constantly during winter months, and the 1,000-gpm booster pump runs constantly during summer months (W&K, September 6, 2006). The constant demand is due to the practice of keeping the fire tanks topped off and in overflow condition, and total system demands.

Fire flow from the 0.5-MG raw water storage tanks enters the fire distribution system through the same pipe that feeds the tanks from the booster pumps. A base map of the fire system (as provided by TOS) is presented in Figure 4-3. The fire system consists of mainly cast iron pipe varying in size from 4 inch to 16 inch. The system contains 146 fire hydrants, of which 100 are located on the HRC mill site, and 124 sprinkler riser systems. Of the total number of fire hydrants in Scotia, 129 are of a wet barrel type and the remaining are dry barrel hydrants. The majority of the dry barrel hydrants are located in residential areas, and industrial areas are outfitted with mainly wet barrel hydrants. Fire flow tests are performed regularly on the HRC mill's hydrants; they are monitored by the Insurance Service Office.

Two backup fire booster pumps are in place--one electric and one diesel. The electric pump is capable of pumping 2,000 gpm at 120 psi, and the diesel driven pump is capable of pumping 1,500 gpm at 102 psi (SHN, August 10, 2006). Both pumps intake raw water from the log pond and pump directly into the fire system in case of insufficient volumes in the fire suppression water storage tanks.



NOTES

UTILITY MAPPING –
IN PREPARING THIS MAPPING SHN DOES NOT STATE OR SUGGEST THAT THE UTILITY LOCATIONS ARE COMPLETE OR CORRECT. THE FACILITIES SHOWN MAY NOT EXIST OR MAY EXIST IN DIFFERENT LOCATIONS THAN SHOWN. UTILITY LOCATIONS ARE BASED UPON FIELD EVIDENCE, CAD DRAWINGS PROVIDED BY PALCO AND PALCO REFERENCE MAPS. DESCRIPTIONS OF FACILITIES AS TO USE, SIZE, MATERIAL, ETC. ARE TAKEN FROM THE PALCO MAPPING AND HAVE NOT BEEN VERIFIED. TO VERIFY UTILITY SIZE, DIMENSION AND MATERIAL PRECISE MEASUREMENTS MUST BE MADE.

NOTE: THIS MAP IS NOT A PRODUCT OF SURVEY. ALL LINEWORK SHOWING EXISTING FACILITIES WAS CREATED USEING INFORMATION RECEIVED FROM PALCO. ADDITIONAL WATER FACILITIES MAY EXIST THAT ARE NOT SHOWN ON THIS DRAWING.

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1"=400'

Consulting Engineers & Geologists, Inc.

Scotia CSD Formation
Detailed Engineering Service
Scotia, California

Existing Fire Protection Lines

SHN 005161.903

May 2009 | 005161-903-BASE_4-3 | Figure 4-3

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Table 4-2 presents an inventory of estimated pipe sizes and lengths in the fire system.

Table 4-2
Inventory of Existing Fire Suppression Water Distribution System
TOS Detailed Engineering Analysis

Diameter (inches)	Material	Year of Installation	Pipe Lengths (feet)[1]
4	Cast Iron	1930s-1940s	350
6	Cast Iron	1930s-1940s	10,340
8	Cast Iron	1930s-1940s	20,975
10	Cast Iron	1930s-1940s	16,000
12	Cast Iron	1930s-1940s	5,400
14	Cast Iron	1930s-1940s	920
16	Cast Iron	1930s-1940s	475
Unknown	Unknown	1930s-1940s	2,950
Total	--	--	**57,410**

1. All estimates are approximate and based on best available information.

Table 4-3 summarizes tank information for both the domestic water and fire systems.

Table 4-3
Summary of Tank Information in Both Domestic and Fire Systems
TOS Detailed Engineering Analysis

Tank	Type	Date Installed	# of Units	Capacity (million gallons)	Tank Height (feet)	Tank Diameter (feet)	Bottom Elevation (feet)[1]	Max. Water Level Elevation (feet)[1]
Raw Water	Welded Steel	1966	1	1.000	40	70	411	449
Finished Water	Welded Steel	1990	1	0.488	28	55	279	306
Fire Suppression Water	Riveted Steel	1940	2	0.5000	24	60	385	408

1. All elevations are approximate and based on best available information; referenced to North American Vertical Datum, 1988

4.3 Demand and Capacity

This section summarizes background data, and addresses demand and capacity issues associated with TOS's domestic and fire suppression water systems.

4.3.1 Water Demand/Usage

The domestic water system is only partially metered; therefore, total demand for treated water is estimated based on daily water production as metered at the WTF. Treated water production (based on daily domestic water filtration reports for January 2005 through May 2006) was 405,350 gpd (PALCO, 2006).

Although the residences served by the domestic water system are not metered, usage at the HRC mills and (more recently) the cogeneration plant has been metered. The average rate of treated water supply to the sawmill, planing mill, and cogeneration plant for the period from April through August 2006 was 150,700 gpd. Assuming an average residential use of 100 gallons per capita per day (gpcd) and 2.48 Persons Per Household (PPH)[2], this usage represents an estimated 608 EDUs.

The remaining unmetered treated water, approximately 260,825 gpd, serves an estimated 247 occupied households[3] and 15 commercial connections, and includes unaccounted for water in the form of leaks and/or unknown service connections. If it is assumed that actual residential usage is approximately 248 gpd/EDU and that the 15 commercial connections represent approximately 30 EDUs, the expected water use is only 68,700 gpd and approximately 192,000 gpd is unaccounted for. Even if residential usage is higher than assumed due to lack of metering and no incentive for residents to conserve water, the percentage of treated water that is not accounted for is still very high. Unaccounted water may include:

- Additional unmetered industrial service connections
- Unmetered public facilities, parks, and schools
- Loss due to leakage
- WTF losses (backwashes)

System loss due to leakage is believed to be a significant cause of unaccounted water. The water system was installed in the 1930s and 1940s; much of it is brittle cast-iron pipe.

4.3.2 Fire System Demands

In addition to filling the two, 0.5-MG fire suppression water tanks located on the hill above Scotia, the fire system also supplies raw water to the cogeneration power plant. A new meter was installed at the cogeneration power plant in April 2006, and the current estimate of raw water use at the plant totals 354,000 gpd, or approximately 246 gpm averaged over a 24-hour period. This represents a baseline demand for the fire system. The system has more than adequate capacity to meet minimum fire flow and duration requirements of 1,500 gpm for 5 hours in residential, commercial, and industrial areas of Scotia in addition to supplying the cogeneration plant.

4.4 Regulatory Criteria

As they were for the wastewater collection system, two references were used to establish baseline standards for water distribution systems in order to determine what improvements would be proposed for Scotia's water systems during initial CSD formation, and subsequent capital improvements planning (for upgrading system components to area municipal standards). The Cities of Rio Dell and Fortuna have standard improvement specifications, herein referred to as the "City Standards," which were used to determine potential CSD requirements and specifications for water distribution systems, including materials, installation, and design criteria (for new construction).

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2 The California Department of Finance report on city/county population and housing estimates for 2006 estimates 2.48 PPH in unincorporated areas of Humboldt County.

3 SHN's August 21, 2006 "Response to July 28, 2006, Review Comments on the "PALCO Scotia Wastewater Treatment Facility Assessment of Conditions Technical Memorandum." TOS Staff estimates that of the 272 homes in Scotia approximately 5 are unoccupied.

For placement of new sewer lines, Title 22 CCR Division 4, Chapter 16, Article 5 describes the minimum separation requirements for water mains and sewer mains. This chapter, also called the *California Water Works Standards*, states that water mains shall typically be installed at least 10 feet horizontally from and 1-foot higher than sanitary sewers located parallel to sewer mains, and 1 foot higher than sanitary sewers crossing the water main. Separation distances are measured from the nearest edges of the facilities. Variations of the separation distances can be decreased to 4 feet horizontally using specific pipe materials and a greater pressure class rating.

The City Standards met all California Waterworks Standards, and in some cases called for more stringent requirements. Some City Standards and specifications for new construction or service modification, stand out with particular importance in the potential formation of a Scotia CSD. These include:

- The City Standards state a minimum pipe size of 6-inch diameter for distribution facilities. Four-inch pipe is acceptable, upon approval by the "CSD Engineer," if the main is serving culs-de-sac or courts serving less than seven connections or other specific conditions.
- The distribution facilities, wherever possible, will be in grid form for pressure equalization.
- Water mains will have sufficient valving to prevent the shutdown of transmission mains or the removal from service of more than 500 lineal feet of pipe.
- Fire hydrants will have a maximum normal spacing of 500 feet in residential areas and 300 feet in commercial areas. Not more than one hydrant is allowed on a 6-inch main between intersecting lines, and not more than two hydrants are allowed on an 8-inch main between intersecting lines.
- A residual service pressure of 15 to 20 psig will be available to residents during fire flow demand incidents.

4.5 Proposed Improvements

This section discusses phased improvements proposed to bring Scotia's water systems up to conditions that are similar to local city, or larger local CSD standards.

The proposed CSD combines elements of existing fire and domestic water systems into a single system owned, operated, and maintained by the CSD that meets domestic demands and provides fire protection for the proposed service areas (not including industrial areas). HRC would retain ownership of the components of the fire system serving the HRC industrial areas.

There will be pressure/flow issues to mitigate for servicing the existing commercial area fire flows with the reduced pressure availability from the lower finish water storage tank. The fire system design will contain a system hydraulic model, which will be used to assist in determining the pressure/flow characteristics.

This alternative allows HRC to retain ownership and autonomy of its fire system and allows the CSD to incorporate useful elements of both systems into a single, combined system, which will be easier and less expensive to operate and maintain. The following section discusses the preferred alternative further.

4.5.1 The Proposed Alternative

The proposed alternative involves the CSD combining several elements of Scotia's existing domestic and fire suppression water systems currently serving residential and commercial areas into a single distribution system. Portions of both systems will either be abandoned or taken over and upgraded by the CSD, while HRC will retain ownership and responsibility for sections serving HRC's industrial properties. System modifications will be phased to allow for CSD formation and an affordable utility rate that will address future utility infrastructure capital improvement plan needs.

The domestic water distribution system, for lines 3-inches in diameter and smaller, will be replaced. Proposed upgrades include the rerouting of certain existing distribution lines to avoid proposed property and easement/access issues for system maintenance and operation. SHN proposes that TOS replace, relocate, or construct new larger distribution mains to allow appropriate hydraulic service to the users. Distribution system components for first phase construction will include:

- all new services to residences with meters, and
- verified serviceable or installation of new services and meters to commercial and industrial users.

Replacement of the 3-inch and smaller diameter lines will generally upgrade the system to local standards of similar municipalities, which require a minimum line size of 4-inches or larger. Modifications to the distribution system will also include construction of facilities to provide a combination potable domestic and fire suppression water system. SHN proposes that line sizes through portions of the commercial district be 10-inch diameter and those for distribution to the North Court area be 8-inch diameter. Figure 4-4 shows the proposed Scotia combined water system layout. The existing industrial fire suppression water distribution system would continue to be owned and operated by HRC, with appropriate easement access negotiated with the CSD for operation of the intake facility and for raw water to be acquired and independently pumped (by CSD-operated pumps) to the existing 1-MG raw water storage tank (and then diverted to the existing raw water fire tanks and the WTF where water is subsequently treated and stored in the existing 0.488-MG tank). Portions of the existing PALCO-built fire suppression water distribution system would be incorporated into the new domestic water system. A reduced pressure backflow preventer will be placed on the fire system after the line split and before the booster pumps. HRC's potable water needs will be served and metered by the CSD through multiple connections to Scotia's combined water system. HRC's fire suppression water usage will be metered prior to the fire booster pumps. It is assumed that the CSD will take over the existing domestic Scotia fire distribution system in "as-is" condition, with no additional work required of TOS. New Scotia domestic system construction, incorporating modifications to accommodate becoming a combined potable/fire suppression water system, will allow the Scotia and HRC fire systems to work independently of each other, yet have supply redundancy in emergency situations. Potable water for HRC mill uses will be provided by the CSD. Table 4-4 presents a cost estimate for the initial phase combination domestic/fire suppression water system.

Final design of the conceptually proposed system improvements presented will require a more in-depth analysis of the systems. At that time, TOS, with potential Scotia CSD representatives, will ultimately make adjustments to the conceptual design presented in this document.

TIE (E) 8" DOMESTIC
TO (E) 12" FIRE

DISCONNECT FROM (E)
HRC INDUSTRIAL
FIRE SYSTEM

TIE TO (E) MILL "A"
DOMESTIC, 2 PLCS

DISCONNECT FROM (E)
HRC INDUSTRIAL
FIRE SYSTEM

DISCONNECT FROM (E)
HRC INDUSTRIAL
FIRE SYSTEM

EEL RIVER

EEL RIVER

LEGEND:

- DOMESTIC LINE TO BE INCORPORATED INTO CSD SYSTEM
- PROPOSED NEW DOMESTIC LINE
- FIRE LINE TO BE INCORPORATED INTO CSD SYSTEM
- EASEMENT REQUIRED FOR CSD LINES
- Ⓜ NEW METER TO SERVE HRC

NOTE: THIS MAP IS NOT A PRODUCT OF SURVEY. ALL LINEWORK SHOWING EXISTING FACILITIES WAS CREATED USING INFORMATION RECEIVED FROM PALCO. ADDITIONAL WATER FACILITIES MAY EXIST THAT ARE NOT SHOWN ON THIS DRAWING.

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1"=400'

REV 1/28/08

Consulting Engineers & Geologists, Inc.

Scota CSD Formation
Detailed Engineering Analysis
Scotia, California

Proposed Domestic and
Fire Suppression Water System
005161.903

May 2009 | 005161-903-FIRE-WATR | Figure 4-4

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Table 4-4
Estimated Costs of Water Distribution System Upgrade (Revised 2/24/2009)
TOS Detailed Engineering Analysis

Item (Unit Type)	Unit(s)	Quantity	Unit Cost	Total Cost
Mobilization/Demobilization	LS[1]	1	$40,000	$40,000
Demo/Abandonment	EA[2]	1	$48,000	$48,000
Miscellaneous Excavation and Backfill[3]	CY[4]	2,000	$10	$20,000
Total new 6-inch Line[3,5]	LF[6]	4,640	$60	$278,400
Total new 8-inch Line[3,5]	LF	4,300	$75	$322,500
Total new 10-inch Line[3,5]	LF	2,190	$95	$208,050
Air Release Valves	EA	3	$4,100	$12,300
6-inch In-Line Gate Valves	EA	25	$1,100	$27,500
8-inch In-Line Gate Valves	EA	29	$1,450	$42,050
10-inch In-Line Gate Valves	EA	23	$2,200	$50,600
Hydrants[5]	EA	37	$6,000	$222,000
Residential Service[5,7]	EA	272	$2,000	$544,000
Commercial Service[5,7]	EA	26	$5,000	$130,000
Industrial Service[5,7,8]	EA	3	$21,000	$63,000
Sheeting and Shoring	EA	1	$27,000	$27,000
Water Distribution System Construction Costs Subtotal				**$2,035,400**
Engineering[9] (20%)				$407,080
Contingency (20%)				$407,080
Total Water Distribution System Upgrade Cost, Call:				**$2,850,000**

1. LS: Lump Sum
2. EA: Each
3. Assumes HRC provides gravel material at no cost.
4. CY: Cubic Yards
5. Assumes trench paving with overlays in paved roadways.
6. LF: Linear Foot
7. Service to include connection at building.
8. Includes industrial meter, backflow device.
9. Engineering includes design, permitting, and construction management for the project.

Additionally, several operational and system configuration modifications that are planned and will be implemented include, but are not limited to the following:

1. Install a new 10-inch minimum line parallel to the existing industrial fire transmission main from the 488,000-gallon domestic tank to Scotia for intertie at B Street and Fifth Street. Abandon the existing 8-inch transmission line from the 488,000-gallon domestic tank, or retain as a redundant and emergency service transmission main (existing line goes under proposed private residence).
2. Loop distribution mains in the North Court and Williams Street neighborhoods for service redundancy and hydraulic efficiency.

3. Provide special attention to the integration and separation of the existing industrial fire system during the initial construction phase, to identify potential service problems or potential configuration incompatibilities.

Upon CSD acquisition of the water distribution system, additional annual costs will be incurred through regular O&M requirements associated with the system. Additional annual costs will include labor, power, equipment, and parts. Additional staff will be required to ensure proper O&M of the system.

More details regarding estimated O&M costs will be provided under separate cover, in a rate study.

4.5.2 Issues of Operation

This section lists the performance limiting factors that were identified for the CSD formation during the course of this study. Below each issue of operation is a recommendation in *Italics* that may reduce or eliminate the issue. No priority is given to issues and recommended solutions.

Issue 1: The existing intake facilities provide raw water for both the existing fire and domestic water systems. Although the CSD would assume ownership, operation, and maintenance of the raw water intake facilities, both the CSD and HRC will be contributing to wear and tear on these facilities.

Recommendation 1: *A rate analysis must be performed to determine an appropriate rate the CSD could charge per unit of water that would recoup HRC's proportion of operation and maintenance costs associated with HRC's use of the infiltration gallery, collection well, raw water pumps, and piping to the meter located prior to the fire booster pumps.*

Issue 2: TOS currently has a License for Diversion and Use of Water from the Eel River as outlined in Application A005504, Permit 003027, License 006373 from the Division of Water Rights. TOS has a license to remove up to 7.1 cubic feet per second from the Eel River. Presently, TOS will retain the water rights.

Recommendation 2: *In the Watershed Unit 1 Permitting Section of the SWRCB, Division of Water Rights (DWR), stated that a license can easily be transferred between parties by filing a Notice of Assignment with the Division of Water Rights (W&K, September 6, 2006). The assignment of the right, title, and interest in the application, permit, and license is all or none. Therefore, the CSD and HRC must reach agreement concerning the share of water that HRC is entitled to and to which the CSD is committed to providing.*

Because TOS's existing license has a purpose of use of industrial and domestic, the CSD could file a Petition for Change to change the purpose of use from domestic to municipal, which allows more flexibility in providing water for commercial and outdoor landscaping water uses. Proper environmental documentation, such as a California Environmental Quality

Act (CEQA) Negative Declaration, must accompany the petition in addition to a $1,000 fee for the SWRCB and an $850 fee for the California Department of Fish and Game (CDFG).

Issue 3: Scotia's existing domestic water system consists mainly of 2-inch steel pipe, which does not meet current City Standards for minimum pipe diameter in distribution systems. As discussed in Section 4.4 of this report, the City Standards require a minimum pipe size of 6-inch diameter for distribution facilities. However, 4-inch pipe can be used to serve culs-de-sac and courts serving less than seven homes, or other conditions, upon approval by the "CSD Engineer."

Recommendation 3: *The majority of the 2-inch steel pipe in the current domestic water distribution system was installed around the 1930s. Additionally, considerable losses are believed to be occurring in the system. Significant losses are probably occurring at the junctions of the 2-inch steel pipes and copper service lines, as no dielectric unions were used and considerable galvanic corrosion has likely occurred at these locations (W&K, 2006d). TOS proposes to replace 3-inch diameter and smaller pipe within the CSD service areas.*

Issue 4: The CSD will have to monitor HRC's water use in both the domestic and fire suppression water systems.

Recommendation 4: *HRC will install a flow meter prior to the fire booster pumps to monitor raw water use. Additionally, HRC will install flow meters at all points of connection between Scotia's proposed distribution system and HRC's industrial system.*

Issue 5: TOS's emergency, back-up fire booster pumps, pump water from the log pond directly into the existing fire system at a location downstream of the main fire booster pumps. There exists the potential for contamination due to this cross-connection (the 20-inch cast iron pipe from the collection well splits to the fire booster pumps and to the domestic booster pumps) between the domestic water distribution system and TOS's emergency fire suppression water storage in the case of a loss of pressure.

Recommendation 5: *TOS will investigate the cross-contamination issue and will install appropriate backflow prevention devices, if not installed already, with the proposed new meter on the fire system line, where the intake pipe from the collection well splits into the fire and domestic water systems.*

Issue 6: Portions of the existing fire and domestic water systems are located on existing residential and commercial properties, which will become private property if TOS sells these properties. In some cases, pipes may even be located under existing buildings and/or homes. This

will create issues for serviceability and maintenance because the CSD will not have access to these areas through rights-of-way or easements.

Recommendation 6: *Any pipes located on private property, other than service laterals from existing or proposed transmission mains, shall be abandoned and replaced with new mains in the CSD right-of-way.*

Issue 7: The CSD will own, operate, and maintain piping from the fire booster pumps to the fire suppression water storage tanks and the outlet piping from the existing tanks to the proposed fire suppression water system on HRC industrial properties.

Recommendation 7: *HRC must obtain an encroachment permit from the CSD to access HRC infrastructure in the public right-of-way in case of maintenance requirements.*

Issue 8: The CSD will own, operate, and maintain piping infrastructure from the raw water intake to the domestic booster pumps and from the pumps to the 1.0-MG raw water storage tank, raw water fire tanks, WTF, and 0.488-MG potable water tank. Sections of this piping and the domestic booster pump are located on private properties/industrial areas owned by HRC.

Recommendation 8: *The CSD must obtain an easement from HRC to access the infrastructure located on private properties for access and maintenance. Another option might involve relocation of the pumps along with some piping re-alignment; however, this might also require resizing of the pumps depending on the elevation of the relocation site.*

Issue 9: The CSD will have no ability to meter water usage in the residential or commercial areas of Scotia; no water meters exist in these areas.

Recommendation 9: *Install meters at every residential and commercial service connection in the domestic water system. Monitoring water use will also facilitate identification of leaks.*

Issue 10: Most service lines in Scotia are copper pipe and are connected to steel pipes in the distribution system without dielectric couplings. Significant corrosion has likely occurred at the steel end of these unions as a result of galvanic corrosion over the years (W&K, September 6, 2006).

Recommendation 10: *Replace all copper service lines with polyethylene or other approved material.*

Issue 11: The pumps currently located in the collection well and domestic water booster station are 2.4 kilovolts (kV), 3 phase power. All existing power lines will be abandoned and removed; PG&E will be installing new power lines (most likely 1.2 kV) throughout Scotia.

Recommendation 11:	*The pump motors must be replaced with motors that are compatible with the new power source. An alternative to this would be purchasing transformers that could convert the voltage from 1.2 kV to 2.4 kV.*
Issue 12:	The majority of fire hydrants in Scotia's residential and commercial areas are of a dry barrel type with 2½-inch outlets. Broken and new fire hydrants are being replaced by the Scotia Fire Department with wet barrel hydrants having a 4½-inch outlet to accommodate the pumper fire trucks.
Recommendation 12:	*Replace all dry barrel fire hydrants within proposed CSD areas with new, wet barrel hydrants (as requested by the Scotia Fire Department). This would be completed as phased modification and system rehabilitation is planned and constructed.*

4.5.3 WaterCAD Hydraulic Model

A hydraulic model of the combined water distribution system under the former annexation alternative was developed by W&K (W&K, October 11, 2006a) using the Haestad Methods WaterCAD v7.0 water distribution modeling and management software. The proposed CSD water system and the former annexation alternative water system are very similar. The primary difference is the water line sizes in the North Court area. The model was used to simulate both the existing fire system and proposed, combined distribution system. The model was developed out of concern that fire flows would be negatively impacted by dropping the fire flow storage from the two 0.5-MG fire suppression water storage tanks to the 0.488-MG finished water storage tank (an approximate 106 foot drop) and also by separating the existing fire system in various locations so HRC can retain an independent fire system. Fire flow test data obtained in the field with HRC (then-PALCO) staff was used to calibrate a hydraulic model of the existing fire system. The model was calibrated by altering the C-factor of the cast-iron piping network. Calibrated values varied between 75 and 110, which are within the range of expected values for aged cast-iron pipe. The model's outputted available fire flows at a minimum 20 pounds per square inch gauge (psig) matched what was calculated from pressures and flows measured in the field within an acceptable tolerance. Additionally, the model revealed that the W&K proposed distribution system (similar to SHN's proposed distribution system) will provide a minimum of 1,500 gpm for a 4-hour duration throughout the proposed CSD service area.

An updated hydraulic model of the new, proposed system will need to be developed by modifying the calibrated model of the existing system. Such a model will be completed during design of the proposed system upgrades.

5.0 Water Treatment

5.1 Introduction

The Scotia WTF, constructed in 1966, consistently supplies the domestic water system with high-quality water. The facility is located off a gravel access road on the hillside east of U.S. Highway 101 (Figure 5-1). This chapter describes the WTF's general condition, operation, and performance, and presents recommendations regarding required improvements.

This section also includes an analysis of water demands and capacity. The WTF supplies current domestic water usage and commercial and industrial demands for treated water, while operating at less than 100% of its capacity. Based on an analysis of the theoretical capacity of the individual treatment system components, the treatment system is currently operating at approximately 30% of capacity.

5.2 Description of Existing Systems

The treatment system is well maintained and in good condition. Operation of the system is simplified in that the two in-line sand filters operate on the hydraulic head provided by the 1.0-MG raw water tank (Figure 5-1). Pretreatment of the raw water consists of adding an anionic polymer prior to the raw water storage. The pretreatment system serves to reduce high raw water turbidities to treatable levels. Treated water is consistently of a high quality.

The water treatment system consists of the following processes:

- Coagulation—coagulant addition and rapid mix (winter operation)
- Sedimentation—raw water storage tank
- Filtration—pressure filters
- Disinfection—gas chlorination

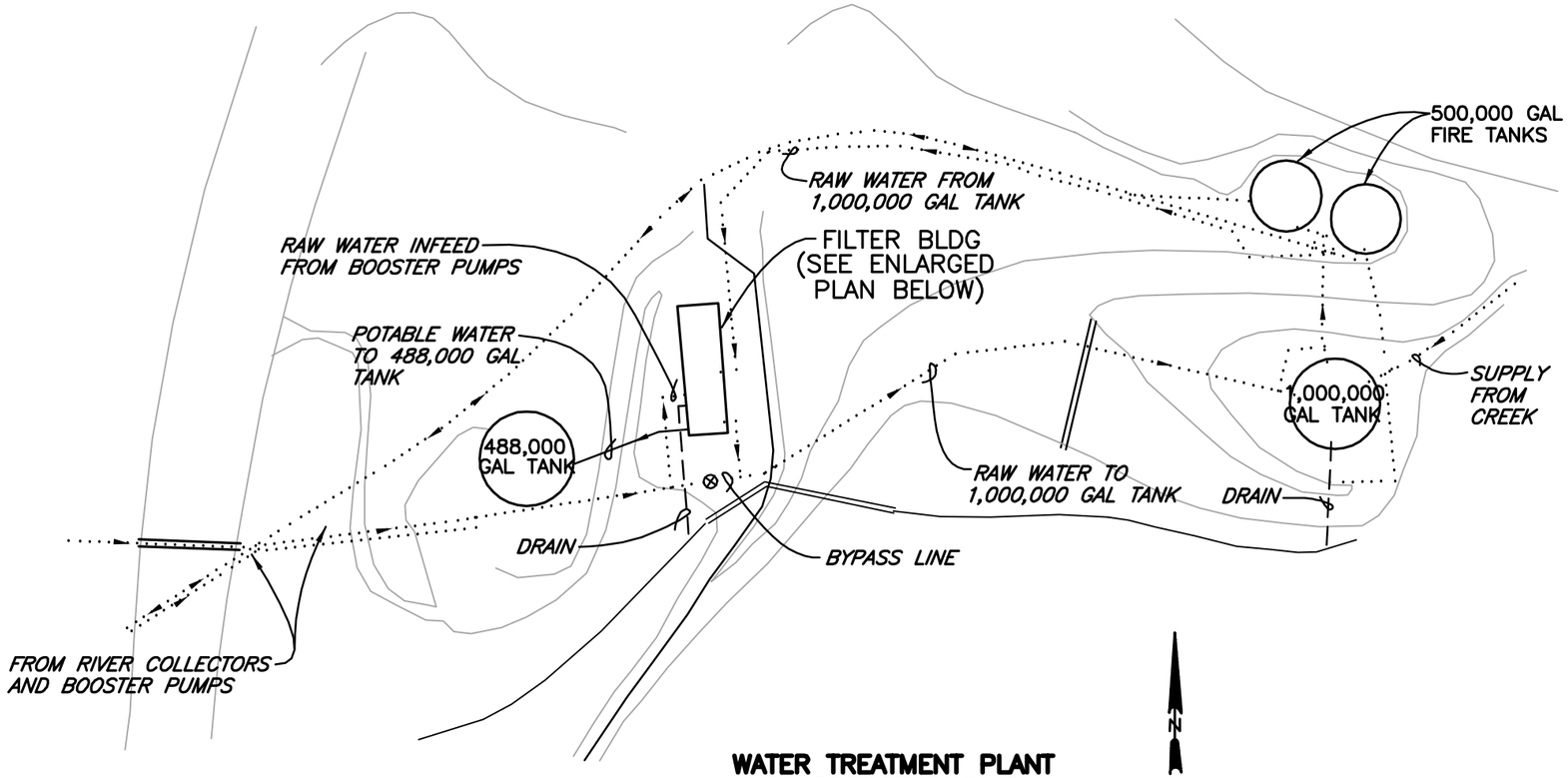
Water from the intake gallery in the Eel River is pumped to a 1.0-MG raw water storage tank by domestic booster pumps. Before discharging to the tank, the water is piped through the WTF where a flocculant is added prior to an in-line mixer. The water flows through the mixer, up to the 1.0-MG tank.

The 1.0-MG tank, which also serves as a sedimentation tank, feeds a pressure filter system at the WTF. Filtered water is disinfected and then flows to the 0.488-MG finish water storage tank. The treatment system does not require any internal pumps, operating on pressure supplied by the upper 1.0-MG tank.

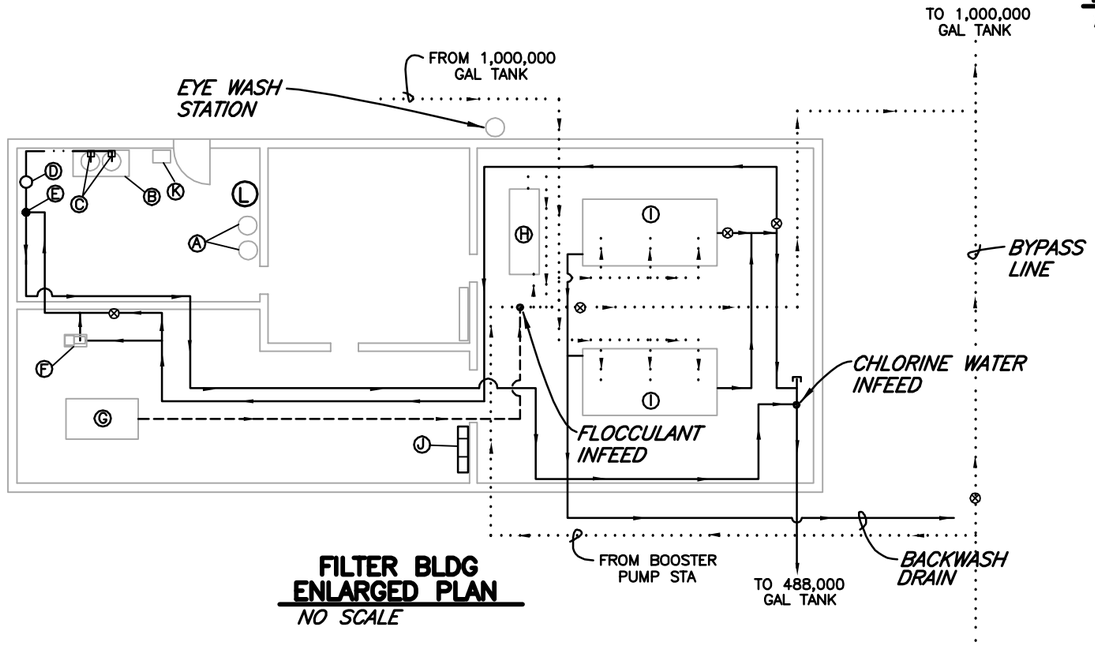
Figure 5-1 schematically illustrates the WTF and filter building. Equipment is summarized in Table 5-1. The facility is well maintained and in good condition.

FILTER BUILDING EQUIPMENT

ITEM	DESCRIPTION
Ⓐ	(2) 150 LB CHLORINE CYLINDERS (STORAGE)
Ⓑ	(2) CHLORINE CYLINDERS ON SCALE WITH REGULATORS
Ⓒ	CHLORINE FLOW METER
Ⓓ	CHLORINE ROTAMETER
Ⓔ	CHLORINE INJECTOR
Ⓕ	CHLORINE PUMP
Ⓖ	FLOCCULANT FEED TANK AND PUMP
Ⓗ	MIXING TANK
Ⓘ	SAND FILTERS WITH BACKWASH SYSTEM
Ⓙ	CHLORINE PUMP CONTROLS
Ⓚ	EXHAUST FAN WITH LOW INTAKE AND HIGH EXHAUST
Ⓛ	CHLORINE DETECTOR



WATER TREATMENT PLANT AND STORAGE TANK PLAN
1"=100'±



FILTER BLDG ENLARGED PLAN
NO SCALE

LEGEND:

- CHLORINE LINE
- CHEMICAL LINE
- RAW WATER LINE
- POTABLE WATER LINE

Consulting Engineers & Geologists, Inc.	Scotia CSD Formation Detailed Engineering Analysis Scotia, California	Water Treatment Facility 005161.903	
	May 2009	005161-903-099007-AF-2003-SVY_5-1	Figure 5-1

Table 5-1
Water Treatment Facility Equipment Assessment
TOS Detailed Engineering Analysis

Item	Description	Size	Units	Installation Date
Mixing Tank	Steel in-line baffled	1,100 gallons	1	1968
Sand Filters[1]	8-foot diameter x 30-foot long	240 square feet	2	1966
Filter Media	Sand, deactivated anthracite	NA[2]	NA	1993
Backwash Control	Head loss differential, flow meter	NA	1	1999
Turbidimeter	Hach	NA	2	1992
Flow meter	Velocity, Sparling Series 100	NA	1	2004
Flow recorder	Chart recorder Honeywell	NA	1	1966
Chlorine Detector	Wallace & Tiernan	NA	1	1996
Chlorinator	Ecometrics Series 2000	NA	2	1996
Chlorine Scale	Two 150-pound cylinders	NA	NA	1996
Flocculant Feed Tank[3]	NA	200-gallon	1	1966
Flocculant feed pump	ND[4]	ND	1	2005
Fluoride Pumps[5]	ND	ND	2	2002

1. Baffles and media replaced 1993
2. NA: Not Applicable
3. Being taken off line replaced with direct feed
4. ND: No Data
5. Not in use

5.2.1 Pre-treatment and Sedimentation Tank

The untreated or raw water is pumped to the WTF by the domestic water booster pumps. At the WTF, an anionic polymer is injected to enhance settlement during months when raw water turbidities are high. The polymer is injected directly into the pipe immediately preceding an in-line mixing tank. The mixing tank is a 1,100-gallon horizontal steel tank with internal baffles. The mixer is painted steel and appears to be in good condition.

Because of the high raw water quality and low turbidity during the summer months, there is no need for polymer addition prior to filtration. In the fall, with increased turbidity in the raw water, an anionic liquid polymer is injected directly into the line ahead of the in-line mixer.

The pre-treatment system consists of polymer addition, the mixing tank, and the large storage tank. There is no flocculation tank provided. The baffled mixing tank appears well designed for the current flow conditions. A detention time of approximately one minute is provided with one domestic water pump running and is within typical ranges for in-line mixers (30 to 60 seconds).

In the winter months, raw water turbidities from the Eel River intake can exceed 100 NTU and the polymer and large sedimentation tank are necessary to reduce turbidities prior to filtration. The 1.0-MG reservoir functions well as a sedimentation tank and consistently achieves turbidities of less than 1 NTU.

This complies with performance goals for sedimentation basins published by EPA, which state that,

> *The sedimentation process is assessed based on achieving a settled water turbidity of less than 1 NTU 95% of the time when average raw water turbidity is less than 10 NTU and less than 2 NTU when the average water turbidity exceeds 10 NTU (EPA Handbook Optimizing Water Treatment Plan Performance Using the Composite Correction Program , 1998 Ed).*

5.2.2 Filtration System

Water from the 1.0-MG tank is filtered in two horizontal cylindrical filters each 30 feet long and 8 feet in diameter, with a surface area of 240 square feet. The filters are constructed of steel with coatings on the interior and exterior to prevent corrosion. Piping is painted ductile iron with a polyethylene coating. The filters, piping, and numerous control valves are in good condition and show no evidence of corrosion. The valves that control filter operation are well maintained and have been rebuilt as the operators determine the need from inspections.

5.2.2.1 Filter Operation

The filters operate on line pressure supplied by the 1.0-MG tank. Feed rate is controlled by an electronically activated valve on the main line from the reservoir and control valves on the influent line to each filter. Each filter has four compartments. The influent to each compartment is located at the top of the tank and each feed line has a pneumatically actuated, hydraulically operated control valve. Another control valve on the backwash line feeds through the filter under-drain. During backwash, the main filter-to-waste valve is open and the filter is washed in sections from the common under-drain by closing the influent and opening the waste valve for each respective section. Backwash effluent is discharged to the drainage swale south of the WTF.

The backwash sequence can be initiated manually or automatically, based on the differential head-loss across the filter or by setting a timer for repetitive backwashing. The TOS operations staff monitors the head-loss and manually initiates backwashes as needed. During summer months, filters are backwashed bi-weekly. During winter months, the backwash frequency increases; and during periods of high turbidity, the filters may be backwashed daily.

5.2.2.2 Filter Performance

The water treatment system consistently produces high quality water. Filter effluent turbidity (which is recorded daily) indicates that average finished water turbidities in 2005 and 2006 were less than 0.06 NTU. During this period, the maximum daily turbidity recorded was 0.50 NTU and consistently low finished water turbidities were maintained even when raw water turbidity exceeded 100 NTU.

Treatment system performance is monitored by Hach turbidimeters at the WTF, which provide continuous readings of raw water turbidity and filtered water turbidity. The turbidimeters do not record on a continuous basis. Instantaneous values are recorded by operations staff on the daily filtration report.

5.2.3 Disinfection System

Filtered water is disinfected with chlorine fed from two, 150-pound cylinders. The chlorination system consists of a scale, a chlorinator with a vacuum regulator and automatic switch-over system, and an ejector system to inject chlorine gas into the solution line. Chlorine solution is injected in the filter effluent line in the filter building and disinfected treated water is then stored in the 0.488-MG finish water storage tank.

Chlorine is applied to the filtered water at an average dosage of approximately 1.29 mg/L. The finish water storage tank provides more than adequate detention time for disinfection.

The system feed rates and dosages are monitored on a daily basis to ensure that the chlorine residual is maintained throughout the system and to comply with California DHS requirements. A chlorine residual is obtained from a service in the distribution system on a daily basis. Based on the water system filtration report, the residuals average 0.3 mg/L.

5.3 Regulatory Criteria

5.3.1 Water Rights

The SWRCB DWR oversees license number 6373, permit number 3027, issued to PALCO on July 7, 1961, and transferred to TOS in 2008 as part of the bankruptcy procedures. Water is permitted to be diverted for domestic and industrial uses, at a specified diversion location.

Diversion of water (up to 4,588,500 gpd) is allowed by the permit, with no expressed annual quantity limit. Priority rights were established from June 1, 1927, and the proof of diversion was accepted by the DWR in January 15, 1959.

5.3.2 Public Water System Regulations

Drinking water regulations were established in 1974 with the signing of the Safe Drinking Water Act (SDWA).

The DHS is designated by the EPA as the primary agency to administer and enforce the requirements of the federal SDWA, including the SDWA Amendments of 1996 or the Surface Water Treatment Rule (SWTR). The statutes and regulations adopted by the State of California and the DHS to implement SDWA requirements are contained in Title 22 CCR (California regulations related to drinking water).

5.3.3 Maximum Contaminant Levels

One of the main elements of the drinking water regulations was the establishment of Maximum Contaminant Levels (MCLs) for inorganic, organic, microbiological, and radionuclide contaminants and turbidity. An MCL is the maximum allowable level of a contaminant in water delivered to the users of a public water system. Concentrations above the MCL for a contaminant are considered violations.

The TOS water system is in compliance with all federal and state regulations and as a condition of its operating permit, prepares a consumer confidence report that includes the levels of any detected

contaminants subject to an MCL, unregulated chemicals for which monitoring is required as defined by Title 22 CFR Chapter 17, Article 2, Section 65550, disinfection byproducts or microbial contaminants for which monitoring is required by 40 CFR, and sodium and hardness.

The water system is required to monitor for total coliform twice a month. Between March 2005 and March 2007, all samples collected tested "absent" for the presence of coliform bacteria.

5.3.4 Surface Water Treatment Rule

The SWTR established that surface water must be treated using filtration and disinfection. Title 22 Chapter 17, Article 2, Section 64652 (a) defines the treatment requirements as follows:

> *Each supplier using an approved surface water shall provide multi-barrier treatment that meets the requirements of this chapter and reliably ensures at least:*
>
> *(1) a total of 99.9% reduction of Giardia cysts through filtration and disinfection;*
>
> (2) *a total of 99.99% reduction or viruses through filtration and disinfection.*

5.3.5 Performance Standards

Performance standards for turbidity are defined by Title 22 CFR Chapter 17, Article 2, Section 64653 (c):

> *Conventional filtration, direct filtration, or diatomaceous earth filtration shall comply with the following performance standards for each treatment plant:*
>
> *(1) The turbidity level of the filtered water shall be equal to or less than 0.5 NTU [Nephelometric Turbidity Units] in 95% of the measurements taken each month and shall not exceed 5.0 NTU at any time.*
>
> *(2) For those suppliers using a grab sampling monitoring program the turbidity level of the filtered water shall not exceed 1.0 NTU in more than two samples taken consecutively while the plant is in operation. For those suppliers using a continuous monitoring program the turbidity level of the filtered water shall not exceed 1.0 NTU for more than eight consecutive hours while the plant is in operation.*

Performance standards for disinfection are defined by Title 22 CFR Chapter 17, Article 2, Section 64653 (b):

> *Disinfection treatment shall comply with the following performance standards:*
>
> *(1) Water delivered to the distribution system shall not contain a disinfectant residual of less than 0.2 mg/L for more than four hours in any 24 hour period.*
>
> *(2) The residual disinfectant concentrations of samples collected from the distribution system shall be detectable in at least 95% of the samples taken each month, during each and every two consecutive months that the system serves water to the public.*

The TOS Scotia water system complies with all required performance standards. Performance of the treatment system is discussed in detail in Section 5.4

5.3.6 Monitoring

Monitoring requirements for turbidity are defined in CFR, Title 22, Chapter 17, Article 3, Section 64655. The water supplier is required to monitor the turbidity level of the raw water supply by taking and analyzing daily grab samples. To determine compliance with the performance standards for filtered water turbidity, the water system operator is required to obtain samples of the combined filter effluent, prior to clearwell storage, at least once every four hours that the system is in operation or to monitor the turbidity measurements on a continuous basis.

At the WTF, the turbidity of the raw water is measured on a continuous basis by two turbidimeters. However, the turbidimeters do not record the data on a continuous basis, so the operators must take grab samples as required to be in compliance.

Each water supplier is required to develop and conduct a monitoring program to measure the parameters that affect the performance of the disinfection process. The requirements for this monitoring program are defined in CFR, Title 22, Chapter 17, Article 3, Section 64656**.** Suppliers serving 500 to 1,000 people may collect and analyze grab samples of disinfectant residual twice each day, provided that any time the residual disinfectant falls below 0.2 mg/L, the supplier shall take a grab sample every four hours until the residual concentration is equal to or greater than 0.2 mg/L. According to the operations supervisor, an approved daily monitoring program is in place and the chlorine residual is monitored on a daily basis at various points in the distribution system.

5.4 Demand and Capacity

5.4.1 Water Demand/Usage

Treated water production based on daily Domestic Water Filtration Reports for January 2005 through May 2006 was 405,350 gpd as summarized in Table 5-2. Additional water demand/usage information can be found in "Chapter 4: Water Distribution," Section 4.3.

Table 5-2 Domestic Water Production TOS Detailed Engineering Analysis			
Date	**Total Usage**		**Max Day (gpd)**
	(gal per month)	**(gpd)[1]**	
January 2005	13,411,000	432,613	596,000
February 2005	12,860,000	459,286	571,000
March 2005	13,953,000	450,097	471,000
April 2005	13,768,000	458,933	461,000
May 2005	13,387,500	431,855	443,000
June 2005	11,931,000	397,700	504,000
July 2005	13,806,000	445,355	562,000
August 2005	13,224,000	426,581	529,000
September 2005	11,433,000	381,100	416,000
October 2005	10,830,000	349,355	450,000
November 2005	10,511,000	350,367	388,000
December 2005	11,007,000	355,065	422,000
January 2006	11,668,000	376,387	601,000
February 2006	10,566,000	377,357	446,000
March 2006	12,752,000	411,355	498,000
April 2006	12,382,000	412,733	482,000
May 2006	11,621,000	374,871	489,000
Average	**12,300,600**	**405,350**	**489,900**
Maximum	**13,953,000**	**459,286**	**601,000**
1. gpd: gallons per day			

5.4.2 Capacity

Sedimentation Capacity. Design criteria published by the EPA (*EPA Handbook: Optimizing Water Treatment Plant Performance*, 1998 Edition) for sedimentation tanks states that the maximum recommended SOR for a sedimentation basin greater then 14 feet in depth is 0.7 gallons per minute per square foot (gpm/SF). The 1.0-MG storage tank has a diameter of 70 feet and an area of 3,847 SF. Based on the recommended overflow rate, the tank has a maximum capacity of 2,693 gpm. This would provide 6 hours of detention time. Currently, the peak instantaneous flow to the reservoir is equal to 1,200 gpm, the capacity of a single domestic water booster pump.

Filter Capacity. The filters run 6 to 8 hours per day and process an average of approximately 400,000 gpd of treated water. The surface loading rate under current conditions is approximately 1.8 gpm/SF. Article 5 of the Title 22 CCR relating to drinking water stipulates that for pressure filters, filtration rates shall not exceed 3 gpm/SF for dual media filters. Estimated filter capacities and current and maximum loading rates are summarized in Table 5-3.

Table 5-3 Capacity of Filtration System TOS Detailed Engineering Analysis		
Online Hours	**Current Loading at 2 gpm/SF[1] (gpd)[2]**	**Capacity at 3 gpd/SF[3] (gpd)**
8[4]	414,720	622,080
12[4]	622,080	933,120
24[5]	1,244,160	1,451,520

1. gpm/SF: gallons per minute per Square Foot
2. gpd/SF: gallons per day per Square Foot
3. gpd: gallons per day
4. Assumes backwash for 10% of hours online
5. Capacity based on run time of 70%

CT Capacity. The EPA has published guidelines for determining the CT value (chlorine concentration over time) required to achieve required levels of disinfection. The CT value is equal to the chlorine concentration in mg/L (C) times the actual time (T) that water is in contact with the disinfectant. The limiting CT value is taken as the value that achieves the required reduction (in base-10 logarithm orders, or log) assuming minimum temperature and maximum pH.

Disinfection is the final barrier in the WTF and is responsible for removing any microbial pathogens that pass through previous processes. The SWTR requires that the treatment system (including disinfection) provides a minimum of 99.9%, 3-log removal and/or removal of *Giardia lamblia* cysts and at least 99.99%, 4-log removal and or removal of viruses. Because the expected log reduction capacity of a conventional filtration system is 2.5 log removal for *Giardia* cysts and 2.0 log removal for viruses, the disinfection system would only be required to provide the remaining 0.5 log and 2.0 log reductions to comply with the federal SDWR (EPA Handbook 1998 Edition). However, it is considered good practice to require that the disinfection system provides at least 1.0 log removal for *Giardia lamblia* cysts, and that value has been used to determine CT value required for disinfection at the Scotia WTF.

Based on an average residual of 0.3 mg/L, a pH of 7.5, and a temperature of 15 degrees Centigrade, the required CT value for a 1-log reduction of *Giardia* cysts is 28 CT units and the required CT value for a 2-log removal of viruses is 2.0. The requirement for *Giardia* is limiting. Based on a CT of 28 and an average residual of 0.3 mg/L, the required detention time is 93 minutes.

Available contact time is calculated based on the effective volume in the finish water storage tank and in the distribution lines up to the first service. To determine the effective volume, it is necessary to apply a reduction factor that accounts for the effects of short-circuiting in the unbaffled tank. In this analysis, a factor of 0.3 was used (based on published EPA guidelines [1989, EPA]). The 0.488-MG domestic water tank has an effective volume of 146,000 gallons and at current average feed rates, provides a detention time well in excess of the 93 minutes required.

The capacity of the finish water tank to provide adequate contact time for disinfection at future flow rates was calculated to be 1,569 gpm (146,000 gallons/93 minutes).

Excess Capacity. The treatment system is not currently running at 100% of its capacity. The capacity of the treatment system is estimated to be is 1.45 MGD based on the capacity of the filtration system (Table 5-4). Based on the average daily water production (Table 5-2), the system is operating at approximately 30% capacity.

Table 5-4
Capacity of Water Treatment Facility
TOS Detailed Engineering Analysis

Treatment Systems[1]	Limiting Criteria		Theoretical Capacity		
			gpm[2]	cfs[3]	MGD[4]
Sedimentation tank	0.7 gpm/SF[5]	6-8 hours	2,693	6.0	3.8
Filtration	3 gpm/SF	---	1,440	3.2	1.45[1]
Disinfection[6]	93 minutes Detention		1,569	3.49	2.26

1. Assumes 24 hour run time with 30% allowance for backwash and downtime
2. gpm: gallons per minute
3. cfs: cubic feet per second
4. MGD: Million Gallons per Day
5. SF: Square Foot
6. Based on volume of domestic storage tank times 0.3, does not include distribution system volume

5.5 Improvements

The Scotia WTF was constructed in 1966 and has been well maintained since. The WTF is currently in compliance with current state and federal regulations and provides high-quality drinking water. There are no immediate issues of concern regarding the ability of the WTF to remain in compliance and provide an adequate supply of treated water to domestic system users.

There are, however, some deficiencies and performance limiting factors that have been identified (SHN, August 10, 2006). The recommended capital improvements associated with these "issues of concern" have been categorized as those considered immediate needs and those that are recommended for operational reliability during the 20-year planning period. These capital improvements and associated costs are described in Table 5-5.

5.5.1 Proposed Improvements

Required capital improvements identified as a Priority 1 include a seismic retrofit for the 1.0-MG raw water storage and finish water storage tanks, new turbidimeters, and a remote alarm system.

5.5.1.1 Turbidimeters

The existing turbidimeters on the raw water and finished water monitor do not record turbidity. Installing turbidimeters that have continuous monitoring capability is considered a priority for operation and compliance.

Table 5-5 Estimated Costs, Water Treatment and Storage Priority 1 Upgrade (Rev. 2/24/2009) TOS Detailed Engineering Analysis				
Item (Unit Type)	**Unit(s)**	**Quantity**	**Unit Cost**	**Total Cost**
Mobilization/Demobilization	LS[1]	1	$30,000	$30,000
New Turbidimeters	LS	1	$10,000	$10,000
Seismic Retrofit of 0.488-MG Tank	LS	1	$150,000	$150,000
Remote Alarm System	LS	1	$10,000	$10,000
Tele-meeting	LS	1	$50,000	$50,000
Seismic Retrofit of 1.0-MG Tank	LS	1	$225,000	$225,000
Improvements to Chlorination System	LS	1	$20,000	$20,000
Turbidity / Flow Meters Indv. Filters	LS	1	$25,000	$25,000
Backwash Recovery System	LS	1	$30,000	$30,000
Water Treatment and Storage System Priority 1 Upgrade Cost Subtotal				**$550,000**
Engineering[2] (20%)				$110,000
Contingency (20%)				$110,000
Total Water Treatment and Storage System Priority 1 Upgrade Cost, Call:				**$770,000**

1. LS: Lump Sum
2. Engineering includes design, permitting, and construction management for the project.

5.5.1.2 Seismic Retrofit

The 1.0-MG raw water storage tank and 0.488-MG finish water storage tank are inadequately tied to the foundation to resist loads imposed by the design earthquake. It is recommended that a new reinforced concrete foundation collar be installed around the raw water tank, and that a series of tie-down saddles be welded to the bottom of the tank with hold-down bolts extending into the foundation. Similarly, the 0.488-MG tank seismic retrofit will also be included in the CSD's priority improvements.

5.5.1.3 Alarm System

According to the operator, there are no alarms for system malfunctions or equipment failures at the treatment facility. The chlorine detector provides a local alarm to notify system operators that chlorine-gas has been detected and that self-contained breathing apparatus must be employed before entering the area. Because this alarm is not transmitted to on-call personnel, the problem cannot be addressed immediately.

Equipment failures that potentially effect water treatment or personnel safety must be monitored. Examples of equipment alarms that would provide warning of water system malfunction include valve failure, failure of the polymer pump, chlorine system malfunction (for example, loss of vacuum), chlorine gas detention, and low reservoir level. A remote alarm system is proposed as a Priority 1 improvement. An inexpensive auto-dialer system can be used to warn water system personnel of WTF emergencies that require immediate response.

5.5.2 Issues of Operation

This section lists the performance limiting factors that were identified for the CSD formation Below each problem is a recommendation in *Italics* that may reduce or eliminate the problem.

Issue 1: There is no central location where the storage tank levels are monitored. Monitoring of reservoir levels would simplify tracking of water volumes in the system, and when combined with pump and flow meter data, would help to identify major leaks.

Recommendation 1: *Assess existing telemetry system and upgrade to provide monitoring capability.*

Issue 2: There is no Supervisory Control and Data Acquisition (SCADA) system or other means of continuously monitoring water quality and flows at the WTF, and all readings and measurements are done manually on a daily basis by the individual operators.

Recommendation 2: *Install a SCADA system that monitors the WTF and water storage facilities, controls the treatment process, records water quality and production on a continuous basis, and sounds alarms and/or shuts down the treatment system in the event of an equipment malfunction. The SCADA system will provide continuous information on pump operation, water tank levels, water quality and flow rates, chlorine doses and residuals, coagulant doses, and plant operation including backwash cycles, as well as other operational monitoring and controls. The system will also provide a computerized interface to allow operators to easily control the facility processes, and alarms and shut-downs for system malfunctions and equipment failures.*

Issue 3: The gas chlorination system has not been assessed for compliance with the *California Fire Code* (California Building Standards Commission, 2007) and Article 80 of the *Uniform Fire Code* (NFPA, 2006).

Recommendation 3: *Have system inspected by the Fire Marshal to determine compliance with Article 80 of the Uniform Fire Code (NFPA, 2006), which requires facilities using 150-pound cylinders not equipped with scrubber systems to have the following controls:*

- *Approved containment vessels or containment systems*
- *Protected valve outlets*
- *Gas detection system*
- *Approved automatic--closing fail-safe valve*

Switching to hypochlorite is considered as an alternative to upgrading the existing gas chlorination system.

Issue 4: The WTF does not monitor flow or effluent turbidity on each of the pressure filters. While the EPA's Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) will not require public water

suppliers with two or less filters to monitor individual filter effluent turbidity, it has strengthened combined filter effluent turbidity performance requirements to ensure 2-log removal of Cryptosporidium cysts.

Recommendation 4: *Install flow meters and turbidimeters on the outlets of each pressure filter and begin monitoring individual filter performance.*

Issue 5: Filter backwash water is currently discharged into a drainage swale. If this drainage swale is deemed hydraulically connected to any surface water by the RWQCB, the RWQCB may issue and enforce a NPDES permit regulating this discharge.

Recommendation 5: *Install backwash water recovery system and covered drying bed to dewater solids. Alternatively, the backwash could be discharged to a constructed settling basin in the swale, with periodic sediment removal to the wastewater sludge recycling area.*

5.5.3 Opinion of Probable Cost

Estimated cost for the capital improvements discussed as issues of concern are itemized in Table 5-6. A more thorough evaluation of the existing systems will be required prior to design of the proposed capital improvements; therefore, these cost estimates are preliminary.

Table 5-6
Estimated Cost of Water Treatment and Storage Secondary Needs (Rev. 2/24/2009)
TOS Detailed Engineering Analysis

Item (Unit Type)	Unit(s)	Quantity	Unit Cost	Total Cost
Improvements to Reservoir Telemetry	LS[1]	1	$50,000	$65,000
SCADA[2] System	LS	1	$100,000	$130,000
Water Treatment and Storage Secondary Needs Subtotal				**$195,000**
Engineering[3] (20%)				$39,000
Contingency (20%)				$39,000
Total Water Treatment and Storage Secondary Needs Cost, Call[4]:				**$273,000**

1. LS: Lump Sum
2. SCADA: Supervisory Control and Data Acquisition
3. Engineering includes design, permitting, and construction management for the project.
4. Not included in initial capital improvement program

6.0 Stormwater Collection System

6.1 Introduction

This chapter summarizes the stormwater collection system for the town of Scotia and provides an infrastructure assessment for the proposed formation of a Scotia CSD. In this chapter, sizes and condition of the existing collection system are described. Recommendations are also made for the installation of new storm drains and drainage inlets proposed to reconstruct identified failing segments of the existing system and relocation of specific segments into proposed CSD-accessible corridors.

6.2 Existing Storm Drain System

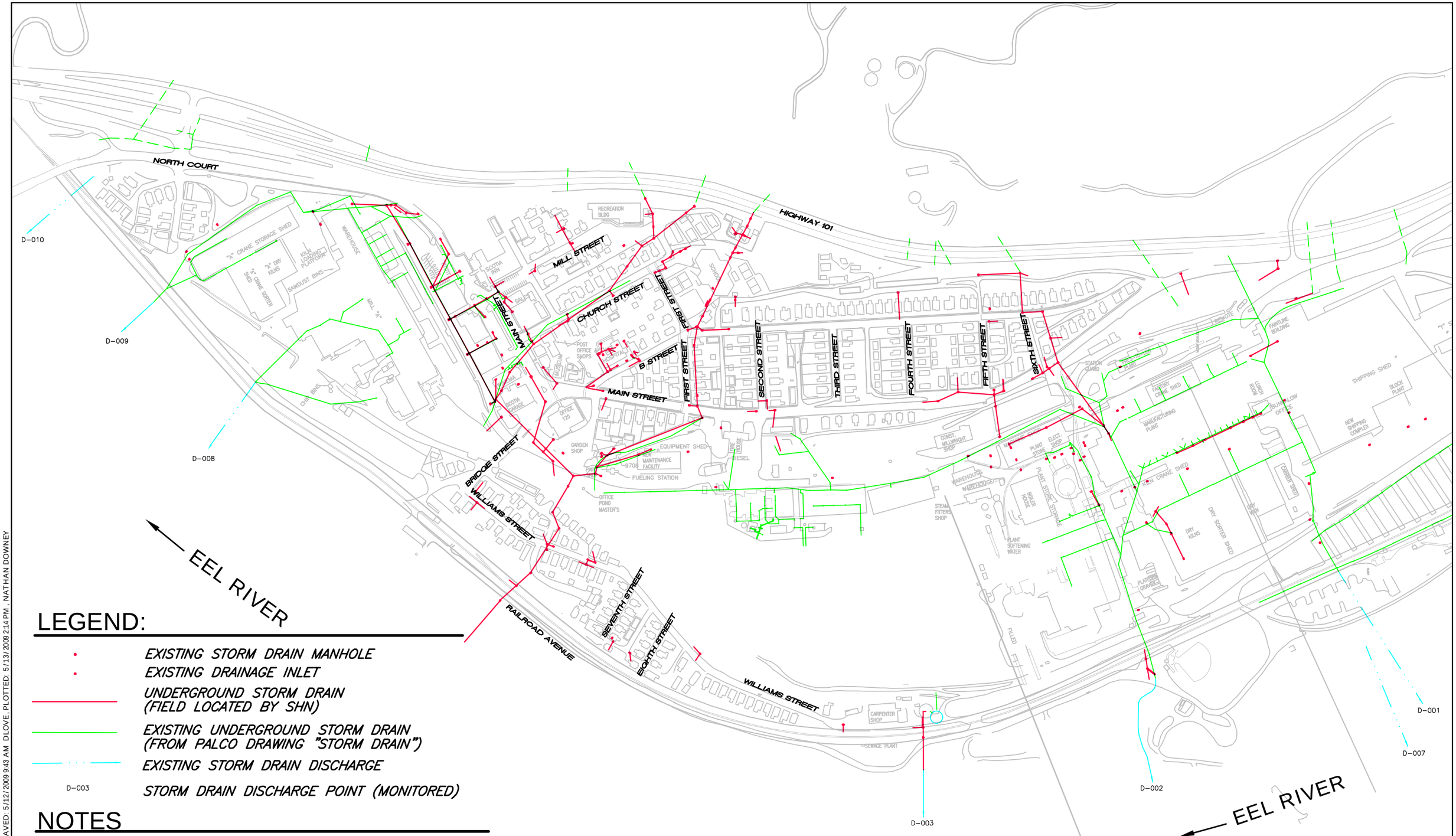
This section describes the existing stormwater collection system, including commercial and residential area laterals, mains, manholes, and drainage inlets. Included is a discussion of Scotia's stormwater collection system, the 2006 CCTV inspection, and the current condition of the system. This information and mapping of the existing system is derived from the work contracted by PALCO in the summer of 2006 (SHN, September 2006).

6.2.1 Stormwater System Background

Scotia's stormwater drain system serves an area of approximately two square miles. The existing system consists of approximately 1.5 miles of gravity storm mains, and is shown in Figure 6-1. The collection system has inputs in the proposed municipal (residential and commercial) areas to be assumed by the CSD and several inputs in the HRC mill industrial area that are to be retained by HRC. The Highway 101 drainage is also conveyed by the Scotia stormwater system. The collection system was constructed by PALCO, who also owned, operated, and maintained the system. TOS now owns, operates, and maintains the system. The collection system consists of three main trunk lines that eventually cross under the industrial areas referred to as the "Log Pond," "Mill A," and "Mill B" industrial areas. Drainage from the Mill A and Mill B industrial areas also flows into the storm drain system. The main municipal storm drain lines discharge into the Eel River at discharge points 002, 003, 009, and one unnamed point as indicated in TOS stormwater documents (Figure 6-1).

The only known documentation describing when the system was constructed is a set of as-built drawings prepared by W&K Consulting Engineers dated October 20, 1992. The only area of detail on these drawings is the shopping area, around the PALCO office, post office, and theater. The main 36-inch line connecting to the line under Church Street is also shown. This area was damaged by a fire following an earthquake in 1992, and was subsequently rebuilt. There is no available documentation describing when the other portions of the system were constructed, so the exact age of the various components of the storm drain system is unknown.

In the past, the sewer collection system functioned as a combined sanitary sewer and stormwater collection system. However, an effort has been made to remove the stormwater connections to the sanitary sewer system, and all known stormwater connections have been separated. Smoke test studies have been conducted to help identify and disconnect stormwater inflow piping. Additional smoke testing may be performed in the future, as a part of TOS's effort to comply with NPDES permit requirements.



LEGEND:

- EXISTING STORM DRAIN MANHOLE
- EXISTING DRAINAGE INLET
- UNDERGROUND STORM DRAIN (FIELD LOCATED BY SHN)
- EXISTING UNDERGROUND STORM DRAIN (FROM PALCO DRAWING "STORM DRAIN")
- EXISTING STORM DRAIN DISCHARGE
- D-003 STORM DRAIN DISCHARGE POINT (MONITORED)

NOTES

UTILITY MAPPING –
IN PREPARING THIS MAPPING SHN DOES NOT STATE OR SUGGEST THAT THE UTILITY LOCATIONS ARE COMPLETE OR CORRECT. THE FACILITIES SHOWN MAY NOT EXIST OR MAY EXIST IN DIFFERENT LOCATIONS THAN SHOWN. UTILITY LOCATIONS ARE BASED UPON FIELD EVIDENCE, CAD DRAWINGS PROVIDED BY PALCO AND PALCO REFERENCE MAPS. DESCRIPTIONS OF FACILITIES AS TO USE, SIZE, MATERIAL, ETC. ARE TAKEN FROM THE PALCO MAPPING AND HAVE NOT BEEN VERIFIED. TO VERIFY UTILITY SIZE, DIMENSION AND MATERIAL PRECISE MEASUREMENTS MUST BE MADE.

N

0 400'

1"=400'

SHN Consulting Engineers & Geologists, Inc.

Scotia CSD Formation
Detailed Engineering Analysis
Scotia, California

Existing Stormwater System

SHN 005161.903

May 2009 | 005161-903-PROP-SS-IMPROV_6-1.dwg | Figure 6-1

I:\2005\005161\005161.903 , SAVED: 5/12/2009 9:43 AM DLOVE, PLOTTED: 5/13/2009 2:14 PM , NATHAN DOWNEY

6.2.2 CCTV Inspection

PALCO and SHN investigated the condition of portions of the storm drains in Scotia using CCTV cameras during the summer of 2006. Only lines that are equal to or larger than 12 inches in diameter and camera-accessible were inspected. When necessary the storm drains and drainage inlets were cleaned prior to the CCTV inspection to remove debris and obstructions. Flows in the storm drains were low and acceptable for CCTV inspection. The inspection was conducted one manhole or drainage inlet section at a time, using a self propelled camera specifically designed for pipeline inspection. The inspection work was also used for exploratory mapping of the system. An inspection log identifying and detailing pipe system defects and their locations was made for each pipe run. The CCTV inspection report includes DVDs of the inspection video that can be analyzed later to help prioritize which lines require replacement or repair. Figure 6-1 shows the existing layout of the Scotia storm drainage system, as provided by TOS. Confirmation of the complete layout has not been concluded.

6.2.3 Historic Maintenance of the System

TOS staff responsible for maintaining the stormwater collection system indicated that there has been limited routine maintenance performed on the system and that, in most cases, storm drains and laterals have been worked on only when emergency repairs were needed. The condition of many drainage inlets and pipes that were blocked with sediment confirms this. The lack of routine maintenance on stormwater facilities in Scotia also aggravates the impeded flow condition of interconnected Scotia and TOS industrial stormwater systems. Some of these areas were also cleaned in conjunction with the 2006 CCTV inspection completed by PALCO.

6.2.4 Stormwater System Piping Materials

The existing stormwater collection system materials include:

- Polyvinyl chloride (PVC)
- Concrete
- Reinforced concrete pipe (RCP)
- Vitrified clay pipe (VCP)
- Corrugated metal pipe (CMP)
- Corrugated plastic pipe (CPP)
- Iron pipe
- High-density polyethylene (HDPE) pipe
- Steel pipe

Larger diameter sections of the system are primarily constructed of RCP ranging from 12 inches to 36 inches in diameter. Smaller lateral lines (4-, 6-, and 8-inch diameter) were found to be a variety of vitrified clay, steel, and iron pipe. The segments of PVC pipe in the system were installed primarily as repairs made during the last 10 years. A few short sections of the storm drains are constructed of CMP.

6.2.5 Collection System Condition

Based on observations from the CCTV inspection, the newer RCP drainage pipe appears to be fairly well constructed. There were obvious signs of leakage or infiltration, and there is some root intrusion.

There are a few sections of CMP used for road crossings within Scotia. Field observations and the CCTV work revealed that most CMP sections are moderately to severely corroded.

6.2.6 Storm Drain Laterals

Laterals refer to that portion of the storm drain system that serves an individual building or residence that is located within a right-of-way or easement or is located on private property. Existing drainage laterals for individual private residences are primarily 4-, 6- or 8-inch VCP, steel, or iron.

These smaller laterals are not clearly mapped, as many of the inlets are located on residential property connecting to roof drains or other drainage structures. Where possible, location and direction of the laterals were determined by locating an existing connecting drainage inlet. Ideally, the only portion of the collection system on private property would be the laterals, which would drain to the gutter and not connect directly to the storm drain.

6.2.7 Horizontal System Alignment

In general, the storm drain mains in Scotia are functionally well laid out and the town has a good deal of vertical fall that conveys water effectively to the discharge points. However, most of the lines were constructed without consideration of the town being subdivided, as currently proposed. Therefore, many stormwater mains are located behind houses and in other areas that could become private property under the proposed subdivision. In some cases, storm drain mains and manholes are located under buildings, buried, or in other inaccessible areas. The lines that are not in proposed public right-of-ways will be very difficult for the CSD to access and maintain. Ideally, the only portion of the collection system on private property would be the laterals, which would drain through the sidewalk to the gutter or into a manhole.

Any portion of a storm drain main alignment under a building is unacceptable because these lines would be very difficult to access if repairs were required and the pipes can be damaged during any foundation work on the buildings.

6.2.8 Storm Drain Manholes and Drainage Inlets

Storm drain manholes and Drainage Inlets (DIs) in Scotia are primarily non-standard structures. Most existing manholes are rectangular, cast-in-place concrete structures with rectangular 3/8-inch thick steel covers. The storm drain manholes do not have standard manhole rings and are not sealed to prevent infiltration. Manhole dimensions range from 1.6 feet x 1.6 feet to 4 feet x 4 feet, with the typical dimension being around 3 feet x 3 feet. Most of the cast-in-place manholes have fabricated steel steps that are heavily deteriorated. The manhole depths range from 2 feet to 16 feet deep. There are only four standard round storm drain manholes with cast iron lids (SD-1, 7, -8, and -9). Few of the DI grates are standard and many have irregular grate depressions and provide little traction.

6.2.9 Manhole Locations

It is common practice in storm drain design and construction to locate manholes at street intersections. The manholes in Scotia are frequently located in streets, but not typically at intersections. Some manholes are located in yards, on sidewalks, under fences, and under buildings. Several manholes were found during the CCTV inspection that had been paved over or were otherwise covered with soil so that they were no longer accessible from the surface. Intervals between stormwater manholes in Scotia vary from less than 50 feet to more than 800 feet. There does not appear to be a typical design interval. Manholes were placed at locations where the lines change direction or at junctions with other lines. The standard for manholes is that they are generally placed at a maximum of 500 feet apart and wherever the line changes direction or at the junction of two or more lines.

6.3 Demand and Capacity

Analysis of hydrologic conditions was not conducted as part of this preliminary study. A complete analysis of stormwater flows for those segments of the storm drain that will be replaced is required to verify pipe sizing and capacity and assist in the final design of improvements. Drainage area of contributing watersheds, land use including increases in impervious areas due to development, and rainfall records will be included in any future analysis of stormwater flows. Generally, a minimum diameter of 12 inches is used for ease of operation and maintenance.

Requiring new lines to be appropriately sized and conducting proper maintenance of clogged lines will improve flow capacity.

6.4 Regulatory Criteria

This section summarizes the regulatory permits and design criteria that are required for the operation of a municipal stormwater collection system to a standard that meets federal and state requirements.

The Federal Storm Water Phase II Rule (Phase II Rule) requires regulated small Municipal Separate Storm Sewer Systems (MS4s) to obtain coverage under an NPDES permit to discharge stormwater to waters of the U.S. The Phase II Rule is the follow-up to the EPA Phase I NPDES Program, promulgated in 1990 as part of the Clean Water Act (CWA). The federal regulations allow two permitting options for stormwater discharges from regulated MS4s, individual permit coverage or coverage under a statewide general permit. In 2003, the SWRCB elected to adopt a statewide general permit for Small MS4s (General Municipal Permit) in order to efficiently regulate numerous stormwater discharges under a single permit. The RWQCB is the regulatory agency that provides Phase II NPDES permit oversight authority in the local area.

The General Municipal Permit currently regulates discharges of stormwater from "regulated Small MS4s." A "regulated Small MS4" is defined as a Small MS4 that discharges to a water of the U.S. or to another MS4 regulated by an NPDES permit, and which is designated in one of the following ways:

1. automatically designated by EPA pursuant to 40 CFR Section 122.32(a)(1) because it is located within an urbanized area defined by the Bureau of the Census; or

2. traditional Small MS4s that serve cities, counties, and unincorporated areas that are designated by the SWRCB or the RWQCB after consideration of the following factors:

    a. High population density
    b. High growth or growth potential
    c. Significant contributor of pollutants to an interconnected permitted MS4
    d. Discharge to sensitive water bodies
    e. Significant contributor of pollutants to waters of the U.S.

The SWRCB designated a number of Small MS4s according to the above criteria through Attachment 2 of the General Municipal Permit. The General Municipal Permit in effect, served as notice to those Small MS4s on Attachment 2 of the General Municipal Permit that they were designated as regulated Small MS4s by the SWRCB at the time of permit adoption. Currently, of the Small MS4s defined by federal regulations, only "regulated Small MS4s" must obtain a permit. Non-traditional Small MS4s, or other Small MS4s, which are designated by the RWQCB or the SWRCB after adoption of the General Permit must apply for coverage under the General Permit within 180 days of designation unless a later date is provided in the designation letter.

6.4.1 Regulatory Background

Discharges of stormwater to the Eel River from the Scotia lumber mill and the town of Scotia were previously covered under Waste Discharge Requirements Order No. 99-59, NPDES Permit No. CA0006017. The previous NPDES permit expired on August 26, 2004, and a new NPDES permit was issued for wastewater discharges from the Scotia Mill and town of Scotia on June 30, 2006.

During the NPDES permit renewal process for the Scotia mill and town of Scotia, it was determined that industrial stormwater discharges from the mill operations would be best regulated under the *General Industrial Permit for Storm Water Discharges Associated with Industrial Activity* (WQ Order No. 97-03-DWQ). A notice of intent to comply with the Industrial Storm Water Permit was submitted to the SWRCB on March 23, 2005, for coverage starting during the 2005-2006 stormwater monitoring season.

During the NPDES permit renewal process, it was also determined that stormwater discharges from the town of Scotia were not required to be covered under an NPDES permit because the town of Scotia is not currently designated as a regulated Small MS4 by the SWRCB or the RWQCB. The town of Scotia was not listed on Attachment 2 of the General Municipal Permit or designated by the RWQCB or SWRCB after adoption of the General Permit; consequently the Phase II regulations of the Municipal Storm Water Permitting Program do not currently apply. However, water quality standards for the Eel River do exist, and the Lower Eel River Hydrologic Area is included on the CWA Section 303(d) list for impairment due to sedimentation/siltation and temperature. Therefore, the Scotia CSD may wish to implement a stormwater management program in the town of Scotia that sets forth general Best Management Practices (BMPs) for residential and commercial activities to prevent the discharge of polluted stormwater from the municipal storm drain system to the Eel River.

The following sections summarize the regulatory permits and design criteria that are required for the operation of a municipal stormwater collection system to a standard that would meet existing federal and state requirements. At some point in the future, if the SWRCB or the RWQCB choose to designate the Scotia CSD as a regulated Small MS4, then the CSD would be required to obtain coverage under the General Municipal Permit and comply with the general permit requirements.

6.4.2 General Permit Requirements

The General Permit requires regulated Small MS4s to develop and implement a Stormwater Management Program (SWMP) designed to reduce the discharge of pollutants to the Maximum Extent Practicable (MEP) and to protect water quality. Upon approval of SWMP by the RWQCB or its Executive Officer, the permittee obtains coverage under the General Permit.

6.4.3 Stormwater Management Requirements

In accordance with General Municipal Permit conditions, the CSD would maintain, implement, and enforce an effective SWMP designed to reduce the discharge of pollutants and protect the quality of receiving waters. The SWMP is intended to serve as a framework for identification, assignment and implementation of control measures and BMPs. The SWMP must describe BMPs and measurable goals that fulfill the requirements in the following six program areas (Minimum Control Measures):

1. Public Education on Stormwater Impacts
2. Public Involvement and Participation
3. Illicit Discharge Detection and Elimination
4. Construction Site Water Runoff Control
5. Post Construction Stormwater Management
6. Pollution Prevention and Good Housekeeping for Municipal Operations

The BMPs must be designed to reduce discharge of pollutants to the MEP. The CSD would also prepare and submit an annual report on the progress and implementation of the SWMP to the RWQCB.

6.4.4 Industrial Activity

In the case of industrial facilities, an Industrial Permit is required for discharges of stormwater associated with industrial activities. The Industrial Permit requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP). In areas where municipal and industrial coverage overlaps, the programs may reference each other.

In Scotia, the HRC-owned Mill A and Mill B sites house the major industrial development. The stormwater discharge permits for these areas will remain the responsibility of HRC and is not covered herein.

6.4.5 Monitoring and Evaluation Reporting

The RWQCB requires that an annual report be submitted that summarizes the previous fiscal year's stormwater management activities and the results of those activities. The first report would be due after the CSD has been designated as a "Regulated Small MS4" and obtained official coverage

under the Phase II program. Subsequent annual reports that summarize the activities performed July 1st of the preceding year through June 30th of the current year would be due on September 15th of each year.

The CSD would also need to periodically document activities that take place during the fiscal year, regularly determine if measurable goals were achieved, and assess the success or failure of the selected BMPs. If, upon evaluation of the SWMP, improved controls were identified as necessary, the CSD would revise its mix of BMPs to provide for a more effective program. The CSD would also have to provide justification for such changes in the annual report or in a memorandum to the RWQCB.

6.4.6 Stormwater Sampling

Sampling of the stormwater discharge may be required for compliance with the General Municipal Permit. Often, annual volunteer sampling can be considered public involvement and participation under the General Permit. The common times to conduct stormwater sampling are during dry weather to establish baseline conditions and identify infiltration, after the first significant rainfall event of the season to establish the "first flush" conditions, and periodically during wet weather under the direction of the RWQCB.

Sampling locations are best suited to locations at the most upstream and downstream portions of the system to quantify water quality conditions entering and leaving the municipal area. For Scotia, the upstream locations are primarily the inputs from Highway 101 drainage as water leaves the California Department of Transportation (Caltrans) right-of-way. These locations are shown on Figure 6-2 with the following identification numbers:

Upstream Locations

- SD 11 (Caltrans under drain behind Recreation Building)
- SD 3.3 (Caltrans under drain on Mill Street)
- 200 (Proposed new manhole at Caltrans under drain end of Mill Street)
- SD 34 (Caltrans drainage ditch on Fifth Street Alley)
- SD 33 (Caltrans under drain on Fifth Street Alley)

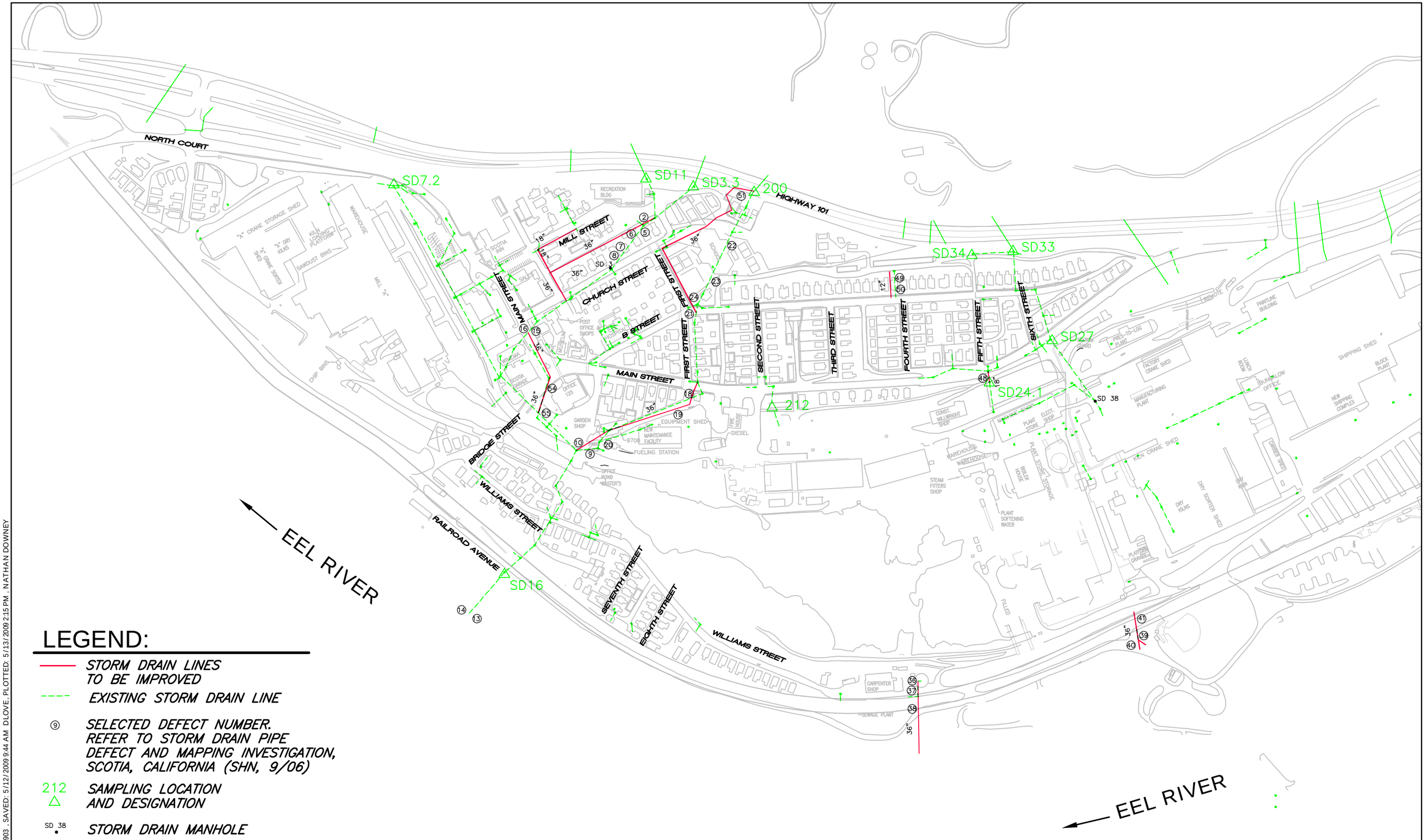
The downstream locations in Scotia discharge to the Eel River or into the industrial area that will be retained by HRC.

Downstream Locations

- SD 7.2 (Input to Mill A)
- SD 16 (Manhole at discharge to Eel River)
- 212 (Proposed new manhole at Main and Second Streets at input to Mill B)
- SD 24.1 (Manhole at Main and Fifth Streets at input to Mill B)
- SD 27/SD 38 (Drainage Inlet [DI]/Manhole at Main and Sixth Streets at input to Mill B)

6.4.7 Common Abbreviations and Acronyms Used in Stormwater Regulation

BMPs: Best Management Practices. Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from stormwater runoff. These include



LEGEND:

- STORM DRAIN LINES TO BE IMPROVED
- EXISTING STORM DRAIN LINE
- ⑨ SELECTED DEFECT NUMBER. REFER TO STORM DRAIN PIPE DEFECT AND MAPPING INVESTIGATION, SCOTIA, CALIFORNIA (SHN, 9/06)
- 212 △ SAMPLING LOCATION AND DESIGNATION
- SD 38 • STORM DRAIN MANHOLE

NOTE: THIS MAP IS NOT A PRODUCT OF SURVEY. ALL LINEWORK SHOWING EXISTING FACILITIES WAS CREATED USEING INFORMATION RECEIVED FROM PALCO AND/OR THE 2006 CCTV INSPECTION. ADDITIONAL STORMWATER FACILITIES MAY EXIST THAT ARE NOT SHOWN ON THIS DRAWING.

0 400'

1"=400'

SHN Consulting Engineers & Geologists, Inc.

Scotia CSD Formation Detailed Engineering Analysis Scotia, California		Stormwater System Improvements SHN 005161.903
May 2009	005161-903-SS-IMPROV_6-2	Figure 6-2

I:\2005\005161\005161.903 , SAVED: 5/12/2009 9:44 AM DLOVE, PLOTTED: 5/13/2009 2:15 PM , NATHAN DOWNEY

schedules of activities, prohibitions of practices and maintenance procedures, and other management practices. BMPs also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

CFR: Code of Federal Regulations

CWA: Clean Water Act contains a number of provisions to restore and maintain the quality of the nation's water resources. One of these provisions is Section 303(d), which establishes the total maximum daily load program.

NOI: Notice of Intent to be covered by a general permit.

MEP: Maximum Extent Practical is the performance standard specified in Section 402(p) of the Clean Water Act.

MS4s: Municipal Separate Storm Sewer System. A conveyance or system of conveyance, roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, storm drains):

- owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage districts, or a designated and approved management agency under section 208 of the Clean Water Act that discharges to waters of the United States;
- designed or used for collecting or conveying stormwater;
- which is not a combined sewer; and
- which is not part of a publicly-owned treatment works.

NPDES: National Pollution Discharge Elimination System. The national program for issuing, modifying, revoking and reissuing, terminating, monitoring, and enforcing permits and imposing and enforcing pretreatment requirements, under Sections 307, 402, 318, and 405 of the Clean Water Act. The CWA prohibits discharge of pollutants into waters of the United States unless a special permit is issued by EPA, or a state where delegated.

RWQCB: Regional Water Quality Control Board. Governing body in charge of implementing NPDES permits.

North Coast Regional Water Quality Control Board
5550 Skylane Boulevard, Suite A
Santa Rosa, CA 95403
Phone: 707-576-2220
FAX: 707-523-0135

6.4.8 Stormwater Design Standards

As they were for the wastewater collection and water distribution systems, two references were used to establish baseline standards for stormwater systems in order to determine what improvements would be proposed for Scotia's systems during initial CSD formation, and subsequent capital improvements planning (for upgrading system components to area municipal standards). Local (Fortuna/Rio Dell) City Standard Improvement Specifications, referred to as the "City Standards," provide details and specifications for the installation of stormwater collection facilities. The City Standards were created in the 1960s, and although much of the materials for storm drain construction called out in the details are outdated, the designs are still compatible with modern construction practices.

The City Standards reference Caltrans Standard Specifications and Plans and are presumed to refer to the most current version (Caltrans, 2006).

For closed conduits, the following criteria are recommended for stormwater improvement or new construction projects:

- Minimum capacity of a 25-year storm
- Preferred minimum slope of 2%, minimum allowable slope of 0.5% per circumstances to meet a self-cleaning velocity of 2.5 feet per second (ft/s)
- Manholes placed at a maximum of 500 feet apart, at junctions and at changes in diameter
- Minimum pipe cover of 2 feet in roadways
- Minimum pipe diameter of 12 inches for ease of maintenance and operation
- Storm drains sized to convey design storm without surcharging
- Modifications shall not increase downstream surcharging or backwater effects
- Closed conduits shall be located within the public right-of-way or drainage easement

6.5 Proposed Improvements

This section summarizes the proposed improvements that are intended to bring the stormwater collection system to a standard that would minimize material failures and reduce operation and maintenance, both initially and in a phased long-term program by the CSD. Proposed improvements are shown on Figure 6-2. Estimated improvement costs are presented in Table 6-1.

Table 6-1
Estimated Cost of Stormwater System Improvements (Revised 2/24/2009)
TOS Detailed Engineering Analysis

Item (Unit Type)	Unit(s)	Quantity	Unit Cost	Total Cost
Mobilization/Demobilization	LS[1]	1	$40,000	$40,000
Demo/Abandonment	LS	1	$100,000	$100,000
Storm Sewer Type, Corrugated HDPE[2,3,4]				
12-inch	LF[5]	65	$80	$5,200
18-inch	LF	370	$90	$33,300
36-inch	LF	3,140	$165	$518,100
New Manhole	EA[6]	32	$5,000	$160,000
New Drain Inlet	EA	45	$3,000	$135,000
Drain Inlet Connection	EA	750	$70	$52,500
Misc. Line Repair	LS	1	$50,000	$50,000
Shoring	LS	1	$50,000	$50,000
Storm Drain Distribution Cost Subtotal				**$1,144,100**
Engineering[7] (20%)				$228,820
Contingency (20%)				$228,820
Total Storm Drain Distribution Cost, Call:				**$1,602,000**

1. LS: Lump Sum
2. Assumes that HRC provides gravel material at no cost
3. HDPE: High-density polyethylene
4. Assumes temporary paving; final paving in road overlay is accounted for in Chapter 7.
5. LF: Linear foot
6. EA: Each
7. Engineering includes design, permitting, and construction management for the project.

Taking into consideration the location of the main lines, and information gathered from visual and CCTV inspections, a preliminary upgrade cost estimate has been prepared. The cost estimate is based upon:

- replacement of immediately needed portions of the existing system, and
- the installation of new and replacement drain inlets and manholes in the residential and commercial areas (HRC will repair existing drain inlets and manholes on their industrial property).

Costs assume that the community of Scotia is currently built out and portions of the existing storm drain lines (including approximately 300+ lineal feet of storm drain line under 12 inches in diameter) function properly and will not immediately require upgrades in line sizing.

Upon CSD formation and assumption of responsibility for the stormwater collection system, additional annual costs will be incurred through regular O&M requirements associated with the system. Annual costs to the CSD will include labor, equipment, and parts. Additional staff will be required to ensure proper O&M of the system.

6.5.1 Storm Drain Mains

The decision to replace existing drainage piping can be made based on their location, diameter, and condition. As stated previously, capacity was not analyzed for this report; however, for final design, capacity will be verified.

- Pipes that are not well aligned and are not accessible in the public right-of-way will be properly decommissioned, and drainage pipes will be realigned to within the street right-of-way.
- Pipe that is less than 12 inches in diameter will be identified and replaced with larger diameter pipe as demand capacity and O&M issues dictate.
- Pipe that is in poor condition will be replaced and pipe material that is in moderate condition will be considered on a site-by-site basis for replacement.

6.5.2 Storm Drain Manholes

Storm drain manholes that are in serviceable condition will be retrofitted with manhole rings and standard cast iron manhole lids. Manhole steps will need to be removed. Substandard manholes will require replacement with modern manhole structures. Manholes located on private property, under buildings, and in otherwise inaccessible or unacceptable locations will require relocation to within the street right-of-way, or to a location that will allow access to the manhole for inspection and maintenance.

Additional manholes will be constructed as capital improvement projects, so that the intervals between manholes are no greater than 500 feet.

6.5.3 Stormwater Drainage Inlets

Most of the existing DIs were not built to current standard of practice and many are in poor condition. Where appropriate, DIs will be replaced with standard structures that include proper curb height, gutter depressions, and grate dimensions. In locations that require a new or replacement DI and the existing pipe is in usable condition, the pipe will be cut and joined to the new DI following standard construction practices. Initially, unsafe or deteriorated manholes and DIs will be identified and replaced during the CSD formation and start-up process.

6.5.4 Improvements to Paving, Curbs, and Gutters

Many alleys in Scotia are unpaved. It was noted in the field study (SHN, September 2006) that nearly all DIs located along gravel roads contained varying amounts of gravel and sediments. In addition to regular maintenance, paving of some alleys, especially ones that exceed 8% slope will reduce clogging of storm drains.

A cursory field walk and mapping of surface drainage conditions was conducted as part of this study. In some locations drainage can be improved more cost effectively with the addition of new curbs and gutters. In areas where it appears that drainage from streets drains to proposed private property, it is proposed that drainage swales, new curbs and gutters, or similar drainage

conveyance will be constructed during the proposed utility infrastructure repairs and modifications. Areas not afforded such modification will need to be identified and drainage mitigation may need to be included in future capital improvement programs.

A detailed study of surface drainage and roadway improvements will be conducted prior to final design of significant stormwater collection system modifications.

6.5.5 Private Inputs to CSD System

Many of the existing small diameter laterals initiate on private property. Areas including the hospital, school, shopping center, and TOS and HRC offices have roof drains connected to the main stormwater drainage lines. Inputs to the CSD drainage system that are located on private property will become the responsibility of the private property owner. Private lines will enter the CSD system through surface drainage whenever possible and not tie directly into a drainage inlet, stormwater manhole, or pipeline. In cases where the existing drainage inlets and associated piping will be relinquished to private property, the system will be modified so that these laterals discharge to the surface before entering the CSD system. This is most practical for small pipes that can be relocated through a sidewalk and into the gutter before entering a CSD-owned DI. In areas where larger diameter pipes originate on private property and drain to the stormwater collection system below ground, a new junction manhole or DI will be installed.

6.5.6 Utility Easements and Maintenance

Any stormwater mains not located in a proposed CSD right-of-way and proposed to remain on private property will require a new drainage easement for access and maintenance with a minimum width of 15 feet.

6.5.7 Issues of Operation

This section discusses the performance-limiting factors and recommended work to improve, repair, or bring the stormwater collection system into conformance with current standards of practice. A report prepared by SHN (September 2006) mapped the existing system and provided an examination of existing conditions. This report summarized the condition of pipes greater than 12 inches in diameter and provided a catalog of defects identified by the CCTV pipeline inspection described above.

Fifty-seven defects were identified and ranked from severe to minor. Defects are identified by a defect ID number in *Storm Drain Pipe Defect and Mapping Investigation, Scotia, California* (SHN, September 2006).

The majority of defects were classified as:

- leaks and voids in pipe connections;
- cracking, broken, or collapsed pipe; or
- obstructions and corrosion.

Recommendations presented in this memo address defects as identified by SHN and alignment issues identified from mapping and field reconnaissance. This list is not presented in any priority.

Many, but not all, of the defects cited are shown in Figure 6-2. For complete defect descriptions and location information, see the SHN 2006 *Storm Drain Pipe Defect and Mapping Investigation, Scotia, California* report (SHN, September 2006).

Issue 1:	Poor drainage in Mill Street area.
Recommendation 1:	*Install approximately seven new drainage inlets on Mill Street and the adjacent alley and 181 feet of new curb and gutter along the east side of Main Street. Install a new 18-inch line down Main Street to SDMH1. If the parking area for the Scotia Inn on Mill Street is relinquished to private property, the new line will be aligned in the street to avoid the parking area.*
Issue 2:	Main line from the SD 11 underdrain from Highway 101 behind the Recreation Building has manholes located under buildings and alignment down the Church Street Alley is located under residences and in backyards. Cracking and visible voids were identified with approximately 30 feet of broken pipe. Defects 1, 2, 3, 4, 5, 6, 7, and 8 (SHN, September 2006).
Recommendation 2:	*Realign from under building to new manholes with 36-inch pipe. Continue new alignment down Church Street and connect to SD 3 with new drainage inlets as shown in Figure 6-2. Abandon line in alley.*
Issue 3:	Main line located under Winema Theater building, which is proposed to be private. Abandoned electrical conduit is located in the pipe, is currently sagging in the pipe, and may create an a obstruction that could accumulate debris. Defects 15, 16, 17, and 54 (SHN, September 2006).
Recommendation 3:	*Abandon line as private from SD 28 to SD28.3 and remove electrical conduit. Realign new 36-inch main line to new manhole along Main and Bridge Streets to provide maintenance access and connect to Main and B Street drainage.*
Issue 4:	Main line from Highway 101 drainage at SD 21 is located under the school and is in poor condition. Defects 51, 22, and 23 (SHN, September 2006).
Recommendation 4:	*Realign new 36-inch pipe to the Church Street Main, by means of a new manhole to new manhole SD 3.3 to another new manhole. The existing invert of this line is approximately 12 to 15 feet deep and will require a new connection in the reverse direction from SD 21 to the new manhole upstream of SD 3.3. There is relatively continuous flow in this line that is suspected to be from overflow of the water tanks located uphill. Routing this main line into the new Church Street main may require increasing size of all downstream connections. The existing line under the school will be abandoned to private as it likely provides drainage for the school.*

Issue 5:	The Main line located under First Street is the continuation of the line under the school and is in poor condition. Survey work indicates sections of broken and deformed pipe and a 146-foot section beginning to collapse. Defects 9, 18, 19, 20, 21, and 24 (SHN, September 2006).
Recommendation 5:	*Replace pipe and install new 36-inch line with new DIs down First Street beginning at SD 19. In order to accommodate property lines, the new pipe will be installed in the alley connecting SD 22 to SD 1. This would require four new manholes and a new drainage easement in the alley. An alternate route may be available by connecting SD 22 to a new manhole at Second and Main to avoid the new line and easement in the alley. Also, slipline storm drain under log pond, uncover and upgrade manhole SD 14.2.*
Issue 6:	Industrial areas draining to municipal line behind HRC Paint Shop. Defect 20 (SHN, September 2006).
Recommendation 6:	*Abandon drainage inputs in the alley and at the truck wash or relinquish to private. At SD 12.1, disconnect industrial drainage from the municipal line and realign to the Log Pond or to the Mill B drainage system.*
Issue 7:	Drainage along the eastern edge of Scotia from the Highway 101 underdrains collects in a drainage ditch at SD 33 and SD 39. From here, pipes are located under proposed private property, draining to B Street. This section of pipe is worn through in places and shows cracking and deterioration. Defects 27, 28, 25, 26, 49, and 50 (SHN, September 2006).
Recommendation 7:	*Realign SD 33, SD 34, and SD 39 to a new manhole and down Fifth Street to B Street to a new drainage inlet. Consider approximately 200 feet of new curb and gutter along western edge of B Street between Fifth and Sixth Streets.*
Issue 8:	Williams Street drainage is undersized and in poor condition.
Recommendation 8:	*Install new DIs and pipe to provide drainage with discharge to Railroad right-of-way along Eel River and to 54-inch main between SD 14 and SD 15.*
Issue 9:	Industrial outflow from Mill B runs through the Scotia park and ball field. Pipes and manholes are deteriorated and in poor condition. Defect 39 (SHN, September 2006).
Recommendation 9:	*Replace or repair pipeline from the railroad tracks to the outfall.*
Issue 10:	Outfall pipe from SD16 is primarily RCP, with the last 20 feet being CMP slipped over the end of the RCP. Some RCP joint separation is assumed due to the loosely consolidated alluvial deposit movement. Erosion is evident along riverbank and bluff next to sewage treatment ponds. Defects 13 and 14 (SHN, September 2006).

Recommendation 10:	*Recheck pipeline in 3 to 5 years. Future capital improvements will be to replace a portion of pipe and install rock slope protection for energy dissipation and erosion control.*
Issue 11:	Defects in storm drain located on private property. Defects 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 40, 41, and 47 (SHN, September 2006).
Recommendation 11:	*Located in industrial areas and not addressed in this MSR.*
Issue 12:	Defects in storm drain located on private property. Defects 45, 52, 55, 56, and 57 (SHN, September 2006).
Recommendation 12:	*Located in proposed private property and not addressed in this MSR.*

7.0 Roads

7.1 Introduction

The following document describes the existing road system in Scotia. An inventory of the existing roadway system in Scotia was completed by the combined efforts of PALCO/TOS, SHN, W&K, and LACO Associates (LACO) to assess the conditions. The inventory included functional classification, geometry of roads, ownership clarification, pavement condition, maintenance responsibilities, and finally demand and capacity of the system. In addition, this section presents recommendations for system improvements necessary to meet current user expectations as the town transitions to a CSD under the jurisdiction of Humboldt County.

7.2 Description of Existing System and Services

There are approximately 5.61 miles of road in Scotia. This road system serves approximately 280 residences, eight commercial establishments, a post office, museum, library, two churches, an elementary school, and the Scotia Volunteer Fire Station. TOS and HRC also use the Scotia road system. Table 7-1 summarizes various aspects of the roadway facilities and includes extensions of 7th and 8th Streets.

7.2.1 Functional Classification

Functional classification refers to a system of grouping different classes of roadways based on the varying degrees of accessibility and the volume of traffic movement on the roadway. The highest functioning class is an access-controlled highway with large volumes and the lowest is local roads with unlimited access and small volumes of traffic.

The County of Humboldt has adopted the Federal Highway Administration classification system for describing roadways and the three classifications that apply to Scotia are: Arterial, Minor Collector, and Local Roads.

The Humboldt County 2006 Regional Transportation Plan Update defines these functional classifications as follows:

1. **Arterials:** Constitute routes whose design is expected to provide for high overall travel speeds, with minimum interference to through movement and with trip length and travel density characteristics indicative of substantial statewide or interstate travel.
2. **Collectors:** Provide service to smaller communities within the county and link the locally important traffic generators with the arterial system.
3. **Local Roads:** Travel over relatively short distances and serve primarily to provide access to adjacent lands not directly accessed by arterial or collector roadways.

Table 7-1
Ownership and Maintenance Responsibilities of Roads
TOS Detailed Engineering Analysis

Road Surface	Road Name	Functional Classification	Length (feet)	Width Range (feet)	Current Owner	Currently Maintained By	Post-CSD Jurisdiction
Paved	Main Street	Collector	9,319	23.0 – 39.0	Hum Co.	Hum Co.	Hum. Co.
	B Street	Local	2,579	18.4 – 43.3	TOS	Hum Co.	Hum. Co.
	Church Street	Local	1,497	10.7 – 39.9	TOS	Hum Co.	Hum. Co.
	North Court	Local	321	21.3 – 30.1	TOS	Hum Co.	Hum. Co.
	North Court B	Local	153	19.0 – 23.5	TOS	Hum Co.	Hum. Co.
	Mill Street	Local	610	23 – 33	TOS	Hum Co.	Hum. Co.
	Eddy Street	Local	521	22.0 – 28.5	TOS	Hum Co.	Hum. Co.
	1st Street	Local	596	29.1 – 44.5	TOS	Hum Co.	Hum. Co.
	2nd Street	Local	338	31.8 – 32.2	TOS	Hum Co.	Hum. Co.
	3rd Street	Local	435	13.8 – 31.8	TOS	Hum Co.	Hum. Co.
	4th Street	Local	398	21.9 – 32.4	TOS	Hum Co.	Hum. Co.
	5th Street	Local	323	31.0 – 31.4	TOS	Hum Co.	Hum. Co.
	6th Street	Local	216	31.5 – 39.4	TOS	Hum Co.	Hum. Co.
	Bridge Street	Local	40	22.3 – 30.0	TOS	Hum Co.	Hum. Co.
	Williams Street	Local	3,552	13.4 – 37.8	TOS	Hum Co.	Hum. Co.
	7th Street	Local	356	23.2 – 24.5	TOS	TOS	Hum. Co.
	8th Street	Local	335	24.6 – 27.8	TOS	TOS	Hum. Co.
	Mill Lane (prev. Unnamed 1)	Local	171	7.2 – 31.7	TOS	TOS	Hum. Co.
	School Ln (prev Unnamed 3)	Local	666	18.8 – 30.7	TOS	TOS	Hum. Co.
Unpaved	Pond Ave	Local	604	18.5 – 22.0	TOS	TOS	Hum. Co.
	Water Road (prev Unnamed 2)	Local	5,280	13.0 – 32.0	TOS	TOS	Hum. Co.
	Playground Ln (prev Unnamed 4)	Local	413	30 (undefined)	TOS	TOS	Hum. Co.
	Outlet Ln. (prev unnamed 5)	Local	200	19.0 – 23.2	TOS	TOS	Hum. Co.
	All alleys in town	NA[1] (joint access driveways)	NA	NA	TOS	TOS	Individual property owners

1. NA: Not Applicable
Source: Winzler & Kelly Consulting engineers October 11, 2006d Final Road Standards Technical Memorandum

U.S. Highway 101 just to the north of the town of Scotia is the largest major arterial in the region and is owned and maintained by the State of California. Main Street, which connects to Route 101 on both the far northern and far southern ends of Scotia, is the only collector roadway in Scotia and is owned and maintained by Humboldt County. All other roads in Scotia are local roads that feed into Main Street and are currently owned by TOS.

7.2.2 Roadways

There are 20 paved roads with a total length of 4.38 miles and 4 unpaved roads with a total length of 1.23 miles in the Scotia road system. There are also several alleyways present in the road system. Mill and School Lanes, which were previously considered alleys, have been upgraded to a road

classification. They were upgraded to a road classification because a road classification is described as providing exclusive access to homes or other facilities, while alleys are considered a secondary access and are not necessary for access to homes or other facilities.

Main Street is the primary roadway in Scotia and, as presented above, the County classifies it as a Collector. The remaining roads are classified as Local Roads, all of which feed into Main Street. Excluding Main Street, the paved roads in town are primarily or exclusively for access to single-family detached residential homes. Paved roads serve 96% of the town's residential homes and 100% of commercial and industrial sites in town. B Street is the major residential corridor, providing direct access to 61 residential homes and indirect access to 72 residential homes through connections with 1st through 6th Streets. Nearly 50% of residences in Scotia can be accessed using B Street or roads connecting directly to B Street. Williams Street is the second largest residential corridor, providing direct access to 42 homes and indirect access to 38 residential homes through connections with 7th Street, 8th Street, Exit Lane, and Outlet Lane.

Nearly 30% of residences can be accessed using Williams Street or connecting roads. The remaining 20% of residences are found in the Church Street area and in the North Court neighborhood.

7.2.3 Surface Condition and Structural Analysis of Paved Roads

W&K prepared the "City of Rio Dell-Scotia Annexation: Final Road Standards Technical Memorandum," October 11, 2006, that included a surface condition and structural analysis of the paved roads. W&K retained LACO to conduct borings and pavement evaluations at various locations. They stated that Main, Church, Williams, and 3rd Streets are the only roadways that are in "good condition throughout their entire lengths." However, the surface condition of the remaining paved roads "are in generally fair to poor condition." Throughout the years, the maintenance of the Local Roads has consisted of placement of overlays resulting in an uneven surface. There is a minor quantity of potholes and grade depression throughout the roadway system in Scotia.

LACO completed a borings at different road locations throughout Scotia. The work was conducted to identify structural components of roadway and underlying subgrade. Table 7-2 summarizes the findings. A copy of the boring location map is not included herein.

Caltrans uses R-value testing to determine the adequacy of subgrade soils for road construction and pavement section design. The R-value and project Traffic Index (TI, a traffic volume and vehicle mixture number) are used to determine design pavement section. R-value testing was performed by LACO on bulk samples of native soils, and R-values were found to be between 10 and 11 at 300 psi of exudation pressure. The values found in Scotia are low but acceptable for roadways and may need to be retested when a reconstruction project is proposed.

Table 7-2
Existing Road Conditions and Boring Observations
TOS Detailed Engineering Analysis

Boring	Asphalt (inches)	Base (inches)	Sub-base (inches)	Subgrade Soil Type[1]	Notes
B-1	0 – 3	3 – 22	none	CL	--
B-2	0 – 9	none	none	--	Old concrete road encountered at 9 inches
B-3	0 – 1	1 – 5	5 – 17	ML	Encountered utilities in boring
B-4	0 – 2	2 – 7	none	ML	--
B-5	0 – 5	5 – 12	12 – 42+	--	Sub-base material consists of >2.5 feet of fill
B-6	0 – 2.25	2.25 – 16	16 – 22	SM	Base material includes old asphalt (7 – 16 inches); Sub-base material consists of native fill
B-7	0 – 1.75	1.75 – 7.75	7.75 – 22	CL	--
B-8	0 – 2.5	2.5 – 14	14 – 24	CL/ML	--
B-9	0 – 1	1 – 4	4 – 20	SM	--
B-10	0 – 7.5	none	none	--	Old concrete road encountered at 7.5 inches

1. Based on the Unified Soil Classification System
Source: Winzler & Kelly Consulting Engineers October 11, 2006d Final Road Standards Technical Memorandum

7.2.4 Unpaved Roads

Table 7-1 lists four unpaved roads in Scotia. Currently, three of the four unpaved roads are not named, two of which are considered alleys. W&K named the unnamed roads in their memorandum: Water Road, Playground Lane, and Outlet Lane. The naming convention will be carried on here for lucidity; Scotia and the CSD will select their own street names as the roads are dedicated to the County. The unpaved roads have gravel surfaces, and similar to several of the paved roads, are generally in need of maintenance. Potholes and grade depressions are common.

The first unpaved road is Pond Avenue, a residential road serving 17 single-family detached homes, 10 of which are served exclusively by this road. Pond Avenue ranges from 18.5 to 22 feet in width. The second unpaved road is Water Road, the previously unnamed road leading from Main Street to the water storage facilities east of Route 101. The third and fourth unpaved roads, Playground Lane and Outlet Lane, connect to Williams Street providing exclusive access to homes, and have been classified as Local Roads.

7.2.5 Alleys

Seventeen alleys are located within Scotia. Alleys are defined as secondary access roads that do not provide exclusive access to more than one home. In other words, alleys are joint-access driveways. Any alley that currently does provide exclusive access to more than one home does not fall into the definition of an alley and is, therefore, to be upgraded in status to a Local Road. This is necessary because these particular cases provide exclusive ingress and/or egress access to homes. Table 7-3 is based upon the W&K memorandum and outlines those alleys or portions of alleys that require such an upgrade. Excluding those examples that require an upgrade in status, alleys are joint-access driveways to be owned by the properties that benefit from them. At the time of subdivision of Scotia, lot lines are to be drawn to the center of each alley in order to divide them by the adjacent homes. Joint-access reciprocal easements that run with the land will be included, and are to include maintenance agreements.

Table 7-3
Alleys to be Upgraded to the Status of Local Roads
TOS Detailed Engineering Analysis

	Name	Connections	Length (feet)	Width (feet)	Services Provided
Paved	Unnamed 1:	Mill Lane Mill St. to end	171	27.2 – 31.7	Exclusive access to 4 SFDHs[1]. Secondary access to 2 SFDHs.
	Unnamed 2: Extension of Church Street	Church St.; Rec. Center Parking Lot to end	716	10.7 – 34.4	Exclusive access to 5 SFDHs.
	Unnamed 3: School Lane	B St. to Alley	666	18.8 – 30.7	Exclusive access to Murphy Elementary School facilities and maintenance buildings. Secondary access to 15 SFDHs.
Unpaved	Unnamed 4: Playground Lane	Williams St. to end	413	30 undefined	Exclusive access to 2 undeveloped lots (w/small playground) and 2 SFDHs. Secondary access to 8 homes.
	Unnamed 5: Outlet Lane	7th and 8th Sts. to Williams St.	200	19.0 – 23.2	Exclusive egress access for 12 SFDHs on 7th Street. Secondary egress access for 9 SFDHs on 8th Street. Secondary access to 10 SFDHs.
	Unnamed 6: Extension of 7th Street	7th to Outlet Lane	101	20	Exclusive egress access for 12 SFDHs on 7th Street. Exclusive access to 1 SFDH.
	Unnamed 7: Extension of 8th Street	8th to Outlet Lane	80	20	Exclusive egress access for 9 SFDHs on 8th Street. Exclusive access to 1 SFDH.
	Unnamed 8: Exit Lane	8th to Williams St.	115	19	Exclusive egress access for 9 SFDHs on 8th Street. Exclusive access to 1 SFDH.

1. SFDH: Single Family Detached Homes

7.2.6 Current Maintenance Responsibilities

Currently, Humboldt County maintains 73% of the roads in Scotia and 93% of paved roads. TOS maintains the remainder of the roads and all of the alleys. Humboldt County provided W&K expenditures for maintenance of the roads in Scotia for the past eight years. According to that information and adjusted to 2005 dollars, Humboldt County has spent an average of $4,064.28 per year to maintain the roadway system in Scotia. Maintenance activities during those eight years included:

- sign maintenance and replacement;
- pavement legend marking;
- grader patching;
- road cleaning and sweeping;
- culvert and drop-inlet cleaning and repair;
- roadside delineation and guide-marker installation;
- bush and tree clearing and other vegetation management;
- shoulder, gutter, and ditch cleaning;
- pothole patching;

- chip sealing;
- channel cleaning;
- road sanding; and
- spills clean-up.

Following the creation of the CSD, the County would maintain all of the roads in Scotia.

7.2.7 Prioritization of Roads

Table 7-4 outlines the prioritization of the five most critical roads in Scotia. The criteria for this prioritization is as follows: (1) the degree of exclusivity the roadway's access to homes, (2) the number and type of facilities served, and (3) the quantity of daily traffic on the roadway (ITE, 1999). This hierarchy determines the importance of the roadways to the overall transportation functionality of Scotia and will be considered in funding decisions regarding road maintenance and repair.

Main Street is the most critical roadway in Scotia as 100% of residences, commercial properties, and industrial site roads are accessed by means of Main Street. Without Main Street, Scotia's vehicular transportation system would not function. The second most critical roadway is Bridge Street, as it is the exclusive access for the western portion of town. A failure of the bridge on Bridge Street would leave the residents of 95 homes stranded. Other top priorities include the primary residential corridors of B Street, Williams Street, and Church Street, which provides access to the elementary school and the recreational center. Water Road is considered a priority because it is the only access to the town's water storage facilities and must be maintained for utility maintenance purposes.

The remaining roads in town are through-roads with connections to other roads or alleys that can serve as emergency alternates. All of the remaining roads based on current development were estimated to have an Average Daily Traffic (ADT) of less than 400 vehicles. By definition from American Association of State Highway and Transportation Officials (AASHTO), these are considered very low volume roads and this factor will be considered in the maintenance and repair programming.

7.3 Demand and Capacity

SHN's traffic analysis for the Scotia rezone and subdivision in July 2005 (SHN, July 2005), which was prepared in accordance with the County of Humboldt requirements, concluded:

> *The proposed rezone and subdivision of the town of Scotia will not have an adverse affect on traffic flow. The current traffic count data and the traffic count data from Caltrans and the Humboldt County Public Works Department attest to the fact that there have been no significant changes in traffic flow from 1973 to the present. If the subdivision were to incorporate a new population of people who were employed outside the town limits of Scotia, an observable increase in traffic may occur during AM and PM peak hours at Junction 283 intersection to Highway 101. However, this slight increase would not significantly affect traffic flows in the area.*

Table 7-4 Priority Roads in Scotia TOS Detailed Engineering Analysis		
Priority	**Road**	**Services**
1	Main Street	Exclusive ingress/egress to all roads in town. Direct or indirect access to: all residences, all commercial facilities, all industrial facilities, all utilities
2	Bridge Street	Exclusive ingress/egress to Williams Street, Pond Ave, 7th Street, Exit Lane, and Outlet Lane; direct access to five residential homes; direct access to HRC industrial facility; indirect access 95 residential homes; indirect access to all commercial properties on Main Street through back alleys; indirect access to Fireman's Park, soccer field, baseball field, and river access; indirect access to WWTF
3	Williams Street	Exclusive ingress/egress to 7th Street, 8th Street, Exit Lane, and Outlet Lane; direct access to 42 homes, Fireman's Park, soccer field, baseball field, and river access; indirect access to 38 homes; direct access to WWTF
4	B Street	Direct access to 61 residential homes, direct access to dental/medical facility, indirect access 72 residential homes
5	Church Street	Direct access to 22 homes, a church, an elementary school, a child center, a post office, and a recreational health center
6	Water Road	Only access to the town's water storage facility

The recommendation of the study was to determine or develop a management entity to maintain roads not currently maintained by the County. As previously stated, it is recommended the maintenance of all roads be completed by the County.

7.4 Regulatory Criteria

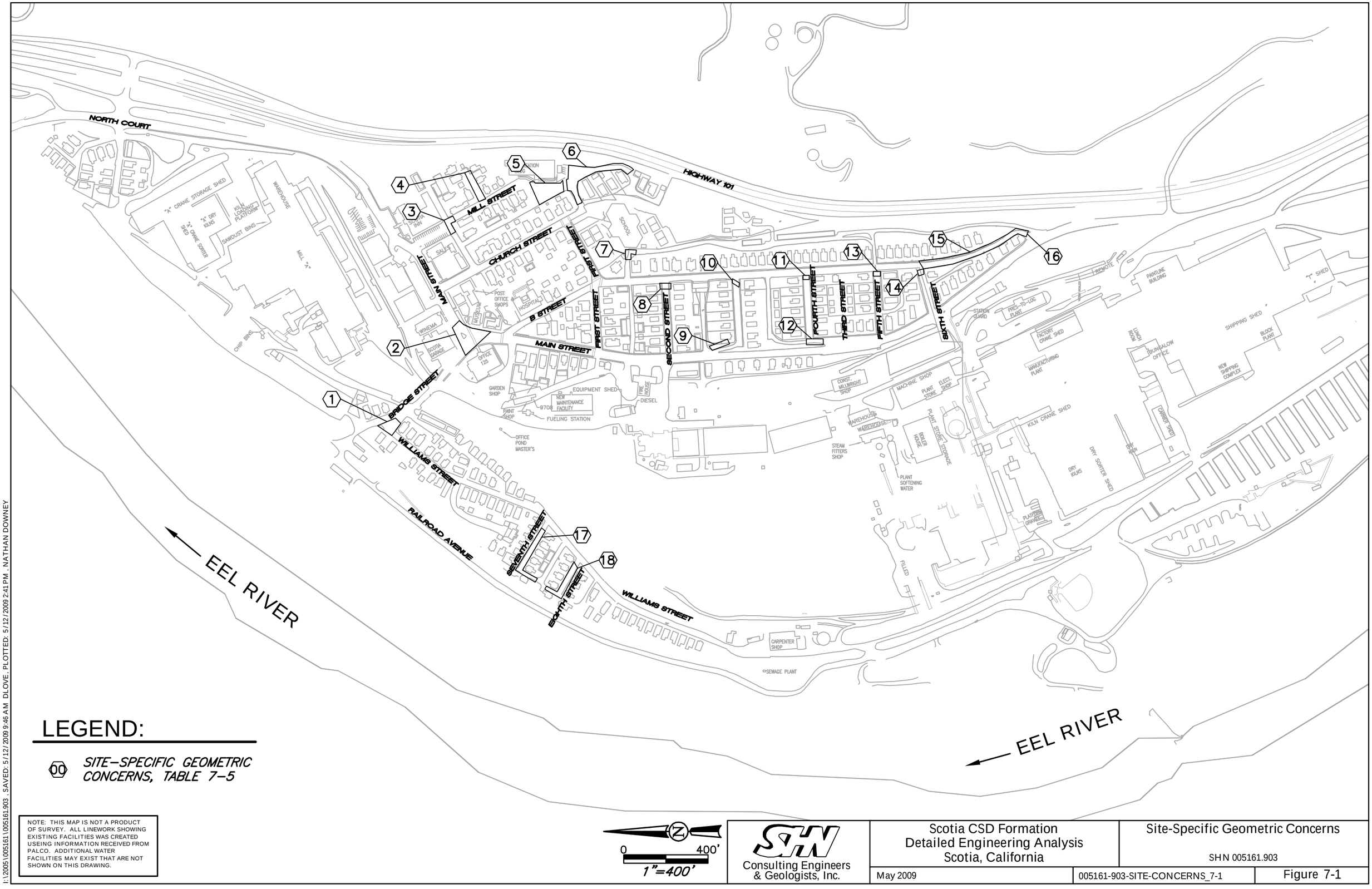
For roadway systems there are two regulatory criteria that would be reviewed for the adequacy of roadways: geometry and Level Of Service (LOS). Geometry is established by standards from AASHTO, Caltrans, and the County. LOS is based on volume and capacity analysis techniques from the Highway Capacity Manual (TRB, 2005).

7.4.1 LOS

Generally, an LOS of C is acceptable for roadways. By inspection of the volume in the 2005 traffic analysis and estimated volumes from W&K, the LOS is above C for all of the roadways and intersections in Scotia.

7.4.2 Geometry

The geometry standard varies based on when the construction was completed. AASHTO has continuously modified its standards from the 1940s through today. The general recommendation of AASHTO is a system-wide evaluation to determine site-specific safety problems that require improvements (ITE, 1999). Specific locations that have a geometric concerns or hazards are shown on Figure 7-1 and listed in Table 7-5.



LEGEND:

00 *SITE-SPECIFIC GEOMETRIC CONCERNS, TABLE 7-5*

NOTE: THIS MAP IS NOT A PRODUCT OF SURVEY. ALL LINEWORK SHOWING EXISTING FACILITIES WAS CREATED USEING INFORMATION RECEIVED FROM PALCO. ADDITIONAL WATER FACILITIES MAY EXIST THAT ARE NOT SHOWN ON THIS DRAWING.

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1"=400'

SHN Consulting Engineers & Geologists, Inc.

Scotia CSD Formation
Detailed Engineering Analysis
Scotia, California

Site-Specific Geometric Concerns

SHN 005161.903

May 2009 | 005161-903-SITE-CONCERNS_7-1 | Figure 7-1

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Table 7-5
Site-Specific Geometric Concerns
TOS Detailed Engineering Analysis

Site #	Road Name	Road Width (feet)	Site-Specific Concern or Hazard
1	Williams Street	13.4	Far northern end at junction with Bridge Street has unsafe corner; 90 degree unmarked turn presents safety hazard
2	Main Street and Bridge Street intersection	Variable	Intersection poorly defined and poorly marked; center island is constructed of wood
3	Mill Street	23	Centerline shifts at intersection with Eddy Street
4	Mill Lane	27.2	Pavement surface in poor condition
5	Parking lot at end of Mill Street for Community Center	NA[1]	Undefined end to Mill Street; undefined transition to Church Street; undefined parking locations
6	Church Street	10	Road too narrow for two-way traffic; several blind corners; obstructed sight distance
7	School Road	18.8	Undefined edges and obstructed sight triangle
8	2nd Street	32.1	East end of road lacking stop sign and pavement legend marking
9	3rd Street	31.8	West end of road has dangerous corner transitioning to Main Street; guardrail missing
10	3rd Street	31.8	East end of road lacking stop sign and pavement legend marking
11	4th Street	21.9	East end of road lacking stop sign and pavement legend marking
12	4th Street	21.9	West end of road has dangerous corner transitioning to Main Street; guardrail missing
13	5th Street	31.3	East end of road lacking stop sign and pavement legend marking
14	6th Street	33.3	East end of road lacking stop sign and pavement legend marking
15	B Street	18.4	South end is narrow
16	B Street	18.4	South end has unsafe corner
17	7th Street	23.2	Too narrow throughout entire length to include parking on both sides and accommodate traffic volume in both directions; curbside parking is required due to lack of alternate space
18	8th Street	24.6	Too narrow throughout entire length to include parking on both sides and accommodate traffic volume in both directions; curbside parking is required due to lack of alternate space
19	Pond Avenue	18.5	Unpaved gravel surface inappropriate for this road, which serves several homes.

1. NA: Not Applicable

According to AASTHO, "lanes 10 ft wide are acceptable on low-speed facilities and lanes 9 ft wide are appropriate on low-volume roads in rural and residential areas" for currently existing roads (AASHTO 2004). Narrow lane widths are a common traffic calming technique and will be useful in the residential areas of Scotia. These widths do not include parking lanes, which are typically 8 feet for each lane of parking. Therefore, the minimum travelway width for two-way traffic is 18 feet, and two-way traffic with parking on both sides would require a 34-foot width. The minimum is exceeded in several cases, though a few site-specific areas have less width available and alternatives will be considered.

According to AASHTO guidelines for very low-volume local roads, unpaved roads are generally appropriate for roadways with the functional classification of "Local," assuming that such roads are intended to operate at low speeds.

7.5 Improvements

This section recommends improvements to Scotia's roadway system to bring it up to conditions that are similar to local, city, or larger CSD standards (Figure 7-2). The improvements can be phased (based on how critical they are), and can be constructed in conjunction with other projects (that is, underground utility improvements). There also are areas of concern that should be addressed.

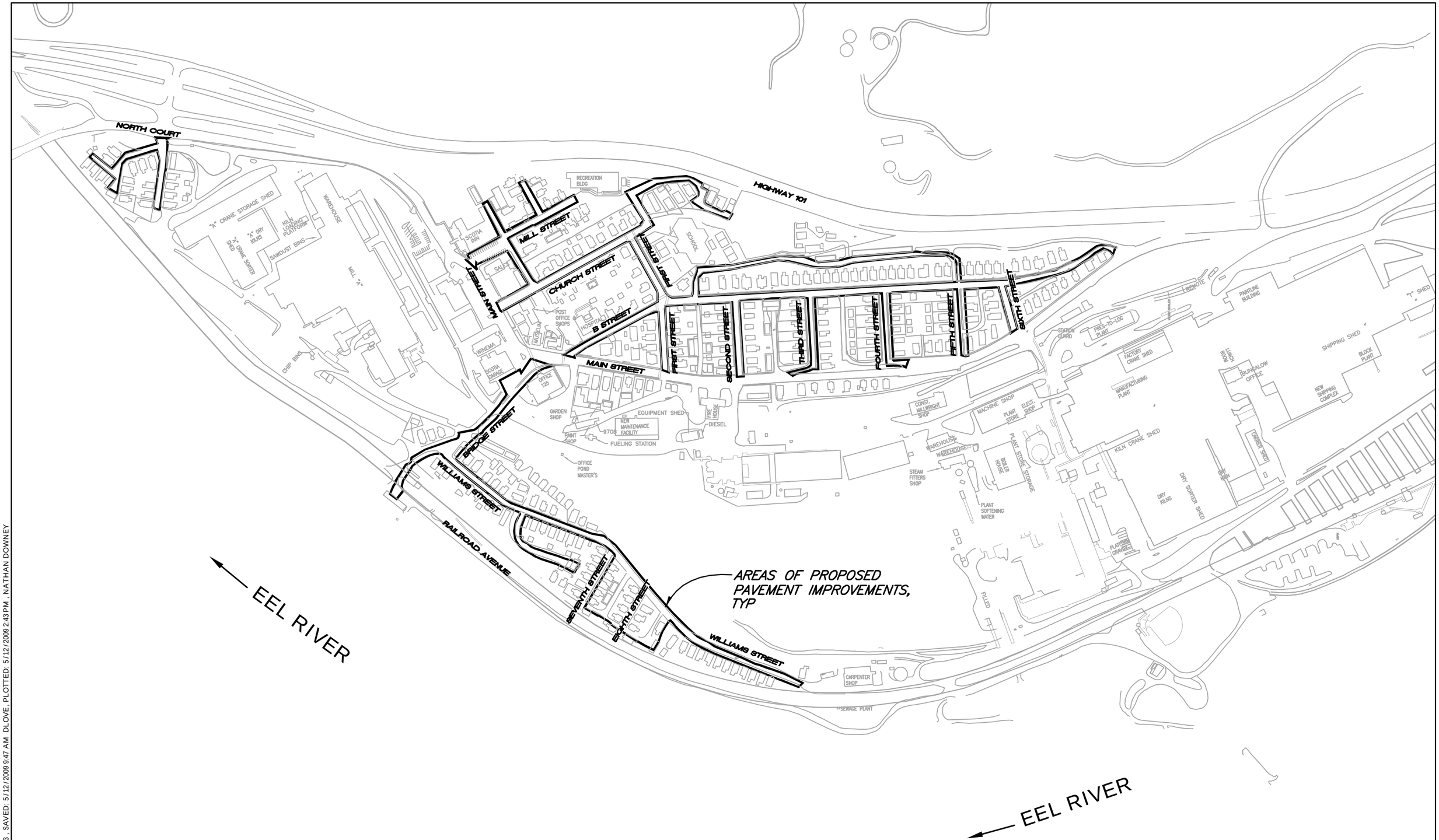
7.5.1 Proposed

The proposed alternative involves the town of Scotia operating similar to other unincorporated communities and transferring the right-of-way to the County of Humboldt. This transfer would include the County taking over maintenance of the roadway system.

There are several items that will be included in an improvement program prior to the CSD transferring the roadway system to the County:

1. Incorporating the classification system described in Table 7-1.
2. The majority of the roadway surfaces in Scotia are in fair condition, with some roadway surfaces in poor or very poor condition. The roads to be resurfaced are shown on Figure 7-2. All roads will be resurfaced with a 0.2-foot overlay of asphalt after the multiple utility upgrades and improvements are completed. The resurfacing will require installation or modification of ADA curb ramps to compliance with the current Caltrans standard. There will be some retaining wall modifications at the south end of B Street when it is resurfaced.
3. Establishing a 27-foot right-of-way for both 7th and 8th Streets.
4. Pave alleys upgraded to road status: Playground Lane, Outlet Lane, extension of 7th Street, extension of 8th Street, and Exit Lane.
5. Establishing the right-of-way to make the travel way width of both 7th and 8th Streets 27 feet.
6. The unpaved roads of Pond Avenue and Playground Lane are to be upgraded to a paved surface.

The preliminary cost estimate for the road improvements are presented in Table 7-6.



NOTE: THIS MAP IS NOT A PRODUCT OF SURVEY. ALL LINEWORK SHOWING EXISTING FACILITIES WAS CREATED USEING INFORMATION RECEIVED FROM PALCO. ADDITIONAL WATER FACILITIES MAY EXIST THAT ARE NOT SHOWN ON THIS DRAWING.

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Consulting Engineers & Geologists, Inc.

Scotia CSD Formation
Detailed Engineering Analysis
Scotia, California

Proposed Pavement Improvements

SHN 005161.903

May 2009 | 005161-903-PROP-ST-IMPV_7-2 | Figure 7-2

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Table 7-6 Estimate Cost of Road Improvements (Revised 2/24/2009) TOS Detailed Engineering Analysis				
Item (Unit Type)	**Unit(s)**	**Quantity**	**Unit Cost**	**Total Cost**
Mobilization/Demobilization	LS[1]	1	$30,000	$30,000
0.2-foot AC[2] Overlay	Tons	6,670	$100	$667,000
Preparation Work	LS	1	$334,000	$334,000
Retaining Wall Issues	Each	1	$50,000	$50,000
Safety Issues	LS	1	$200,000	$200,000
Road Improvements Cost Subtotal				**$1,281,000**
Engineering[3] (20%)				$256,200
Contingency (20%)				$256,200
Total Road Improvements Cost, Call:				**$1,793,000**

1. LS: Lump Sum
2. AC: Asphalt Concrete; assumes HRC provides gravel material at no cost
3. Engineering includes design, permitting, and construction management for the project.

7.5.2 Issues of Operation

This section lists the geometry areas of concern discussed earlier with a recommended improvement. These geometric issues could be safety concerns as Scotia develops and traffic volumes increase. The costs for recommendations are included in the above table.

Issue 1: The far northern end of Williams Street at the junction with Bridge Street has a 90 degree unmarked turn that presents a safety hazard.

Recommendation 1: *Add pavement legend marking and signage to indicate sharp turn ahead. Also, close gate to Railroad Avenue.*

Issue 2: Intersection of Main Street and Bridge Street is poorly defined and poorly marked. The center island is constructed of wood.

Recommendation 2: *Inspect, design, and modify intersection as future project.*

Issue 3: Centerline of Mill Street shifts at intersection with Eddy Street.

Recommendation 3: *Conduct further analysis to determine best solution by either altering centerline to a more continuous alignment or striping a bulb-out and installing signage.*

Issue 4: Mill Lane pavement surface in poor condition.

Recommendation 4: *Resurface road and add drainage improvements.*

Issue 5: Parking lot at end of Mill Street for Community Center is undefined. There is a vague end to Mill Street and transition to Church Street at this location.

Recommendation 5:	*Add pavement legend marking and signage; maintain fire lane through parking lot.*
Issue 6:	Church Street is too narrow for two-way traffic. Several blind corners and obstructed sight distance.
Recommendation 6:	*Add pavement legend marking and signage. Widen roadway to 20-foot width.*
Issue 7:	School Road has undefined edges and obstructed sight triangle at corner.
Recommendation 7:	*Add pavement legend marking and signage.*
Issue 8:	East end 2nd Street is lacking stop sign and pavement legend marking.
Recommendation 8:	*Add pavement legend marking and signage.*
Issue 9:	West end of 3rd Street has dangerous corner transitioning to Main Street and a guardrail missing.
Recommendation 9:	*Add pavement legend marking, install signage, and install guardrail. Consider limiting traffic to one-way out of 3rd Street on western end.*
Issue 10:	East end 3rd Street is lacking stop sign and pavement legend marking.
Recommendation 10:	*Add pavement legend marking and signage.*
Issue 11:	East end 4th Street is lacking stop sign and pavement legend marking.
Recommendation 11:	*Add pavement legend marking, striping, and signage.*
Issue 12:	West end of 4th Street has dangerous corner transitioning to Main Street and a guardrail is missing.
Recommendation 12:	*Add pavement legend marking, install signage, and install guardrail. Consider limiting traffic to one-way out of 4th Street on western end.*
Issue 13:	East end 5th Street is lacking stop sign and pavement legend marking.
Recommendation 13:	*Add pavement legend marking, striping, and signage.*
Issue 14:	East end 6th Street is lacking stop sign and pavement legend marking.
Recommendation 14:	*Add pavement legend marking, striping, and signage.*
Issue 15	South end of B Street is narrow.

Recommendation 15:	*Limit access on the south end to one-way traffic from junction with Main Street to 6th Street flowing in a northbound direction.*
Issue 16	South end of B Street has an unsafe corner.
Recommendation 16:	*Add pavement legend marking, striping, and signage.*

Areas of Concern 17, 18, and 19 are proposed improvements listed in Section 7.5.1.

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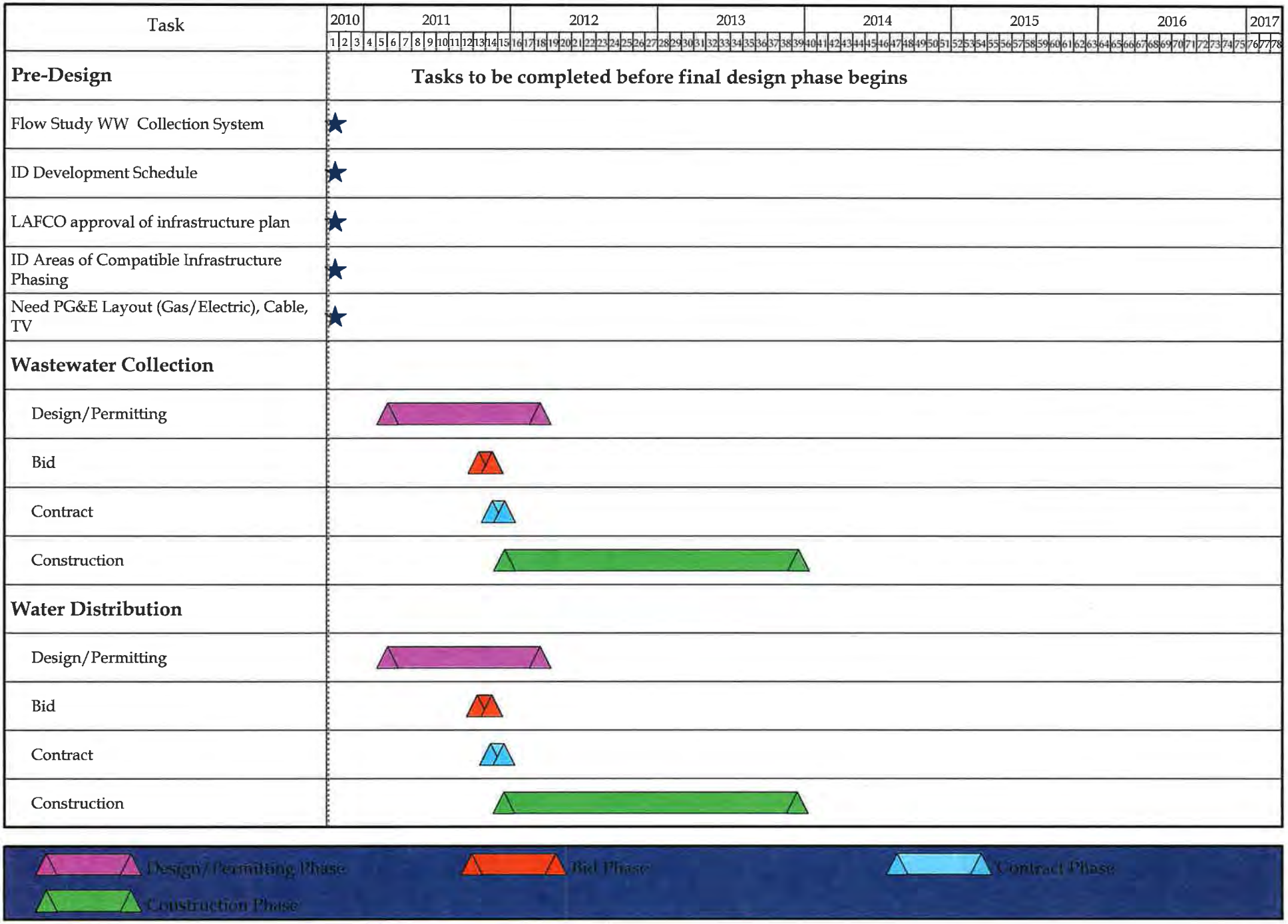
Appendix B

Schedule for Repairs to Existing Infrastructure

CSD Infrastructure Implementation Schedule



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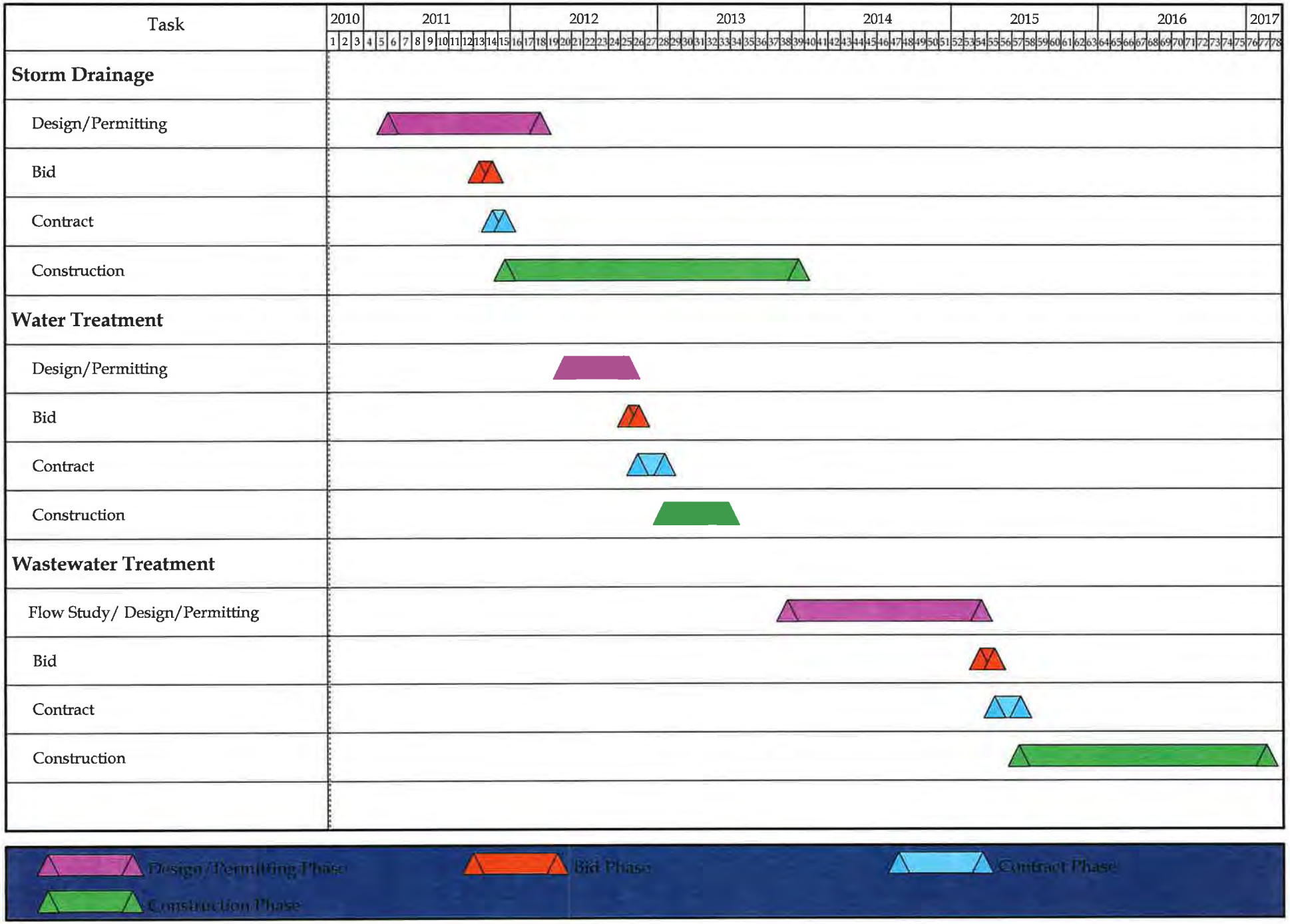
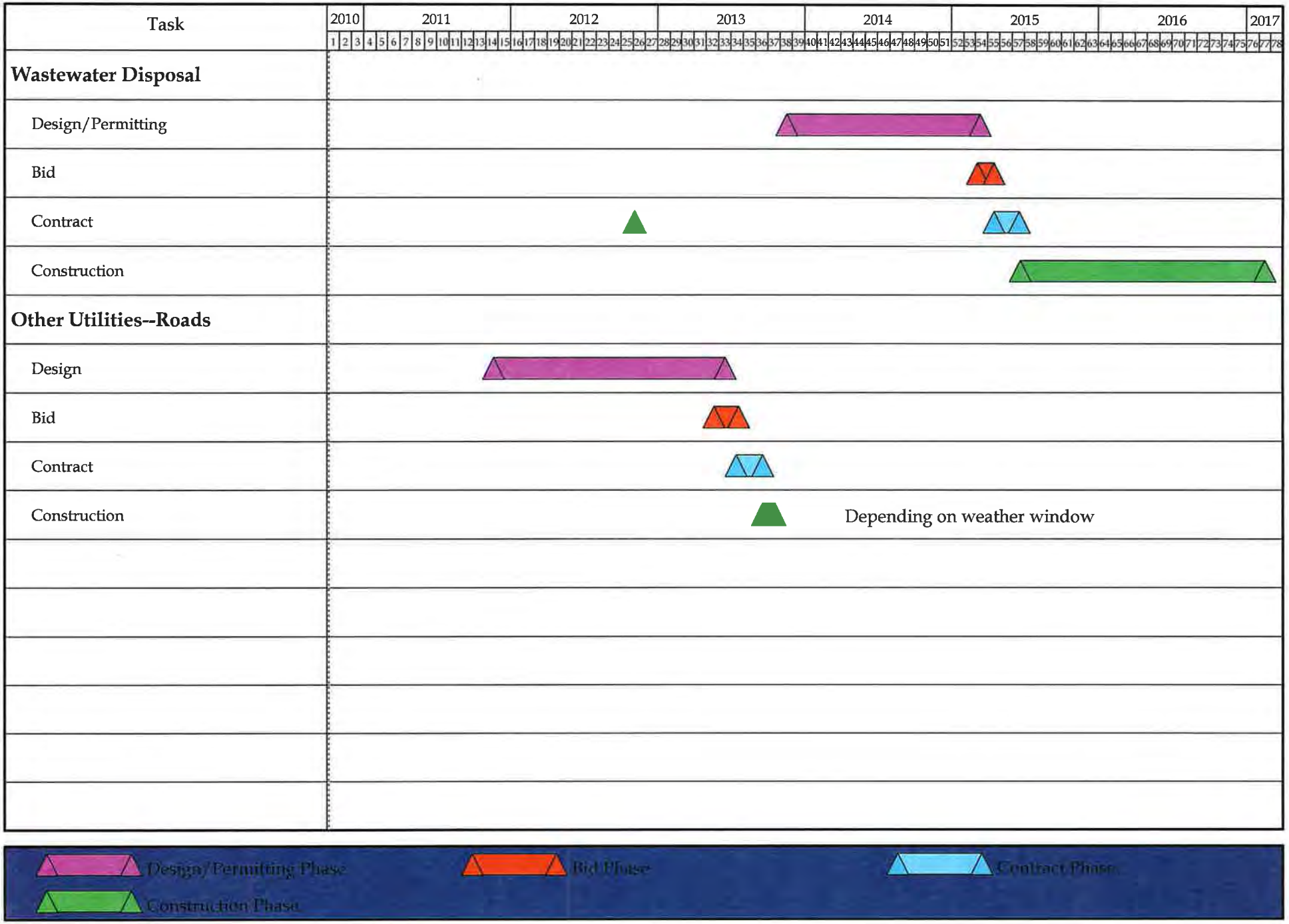
CSD Infrastructure Implementation Schedule



CSD Infrastructure Implementation Schedule



Appendix C

Financial Analysis

Town of Scotia
Community Services District
Financial Assessment

Development of the Scotia Community Services District LAFCo Application

(Appendix C to the Municipal Service Review) Revision 1

Prepared for:

Humboldt County LAFCo

October 2010

Reference: 005161.903

Town of Scotia
Community Services District
Financial Assessment

Development of the Scotia Community Services District LAFCo Application (Appendix C to the Municipal Service Review) Revision 1

Prepared for:

Humboldt County LAFCo

October 2010

QA/QC: MKF___

Executive Summary

Purpose of Study

The purpose of this study is to propose a financial plan for supporting a Community Services District (CSD) that will provide water supply, wastewater collection and treatment, road maintenance and street lighting, stormwater drainage, parks and recreation, and fire protection services to the community of Scotia. Scotia is currently a privately owned and operated town consisting of residential, commercial, and industrial uses. The owner of the community, Town of Scotia, LLC, (TOS) intends to subdivide the town, facilitate the formation of a CSD, and sell the properties. This analysis prepares a model operating budget for the proposed Scotia CSD, with consideration of revenues available to the agency and necessary operating expenditures for a viable entity.

Revenues

Revenues for financing the ongoing operations of the proposed CSD will come from an allocation of property taxes and an assessment of user fees for each of the services. Once formed, the CSD is entitled to an allocation of property taxes from a portion of those received by Humboldt County. The amount of allocation is not pre-determined and will be subject to negotiations with the County. With an 8.7% allocation, approximately $63,000 in tax revenues would be realized by the CSD by its fifth year of operation. It is also expected that the assessed value of the Scotia properties will increase as sales take place. The assessed values now in effect on the major parcels owned by the TOS do not reflect current market value, because of the limits imposed by California Proposition 13 (1978) on assessed values. As sales occur, assessed values relating to each of the purchased parcels will be based upon their current market value.

The remainder of the operating budget for the Scotia CSD (approximately 96%) will be funded through the assessment of user fees. User fees are charges established under the governing authority of the CSD (usually by ordinance and/or resolution) and levied on owners or users of parcels or pieces of real property to fund the costs of management and of operating, maintaining, and improving the associated facility. The common measure for utility fees associated with a specific service is the Equivalent Dwelling Unit (EDU). The EDU method is based on the average use of a service by a single-family residence, and all other customers are charged by the proportionate use of a particular service as compared to that of a single-family residence. Given the projected operating costs for the Scotia CSD and a worst-case tax allocation factor of 0%, the typical EDU charges for all services would be approximately $184/month by Year 5, once capital improvements have been funded.

A commonly recognized benchmark for determining the affordability of the cost for water and sewer services has been established by the U.S. Environmental Protection Agency (EPA). That benchmark is based upon the Annual Median Household Income (AMHI) of the affected area and defines the affordability range from 1.5-2.0% of the AMHI. In the case of Scotia, the AMHI for Humboldt County is used. The EPA defined benchmark for affordable water and sewer rates combined is in the range of $113 to $150 per month per EDU. The proposed operating budget projects an EDU rate for both water and sewer of approximately $121/month by Year 5 under a 0% tax allocation.

The projected EDU fees for the CSD were compared with similar providers of water and sewer services. Three water service and four sewer service providers were identified for comparison purposes. Given the comparable service providers' existing and/or projected rates, carrying them forward to a five-year horizon based upon a 2% cost of living increase and adjusting them based upon published AMHI for each provider's area, the average combined rate for water and sewer services is approximately $118/month.

Expenditures

An operating budget was prepared for the proposed CSD to model the expected expenditures for the agency. The expenditure projection addresses the standard governmental expense categories: 1) personnel services, 2) materials and services, 3) capital expenditures, and 4) debt service. All aspects of personnel, materials, and services were based upon comparisons with other local agencies along with documented cost experience over the last six months of operational costs for the community by the TOS. Also in relation to wages and benefits, an organization chart, staffing levels, and pay schedule were established to define expenditures related to personnel services further. Pay levels and benefits are comparable to other local agencies in the area.

An initial budget primarily related to Operations and Maintenance (O&M) was prepared for each service area and a combined budget for overall operation of the Scotia CSD was projected over a five-year period to include the expected schedule of capital improvement projects. The CSD's projected operating budget by Year 5 will consist of approximately $536,500 in annual costs for personnel services and $349,000 for materials and services.

A total capital improvement budget of $17,670,000 is projected for performing improvements to the infrastructure of the community as identified in the municipal service review and the supporting detailed engineering analysis. Those capital improvements are phased to occur over a five-year period at which point the CSD will have completely serviceable systems meeting levels of service expected of a public agency for the next 20 years. Revenues to offset capital expenditures are derived from a combination of short-term debt financing with repayment based upon an assessment on each property transaction, and long-term debt financing by the CSD through low-interest loans or bonds available to public agencies for water and wastewater infrastructure projects. Long-term debt financing by the CSD will account for $5 million of the total improvement costs. CSD financing of capital projects will equate to an approximate annual debt service of $200,000 per year or the equivalent of $30.22/month per EDU.

Conclusions

The overall operating budget relative to size, including revenues and expenditures, is consistent with local area agencies and experienced operating costs of the community. Due to the relatively small base of customers, the projected user fees could be perceived as being high compared to some of the larger communities in the area, particularly with cities, which have a different funding structure. However, based upon comparisons with other similar service providers, the fees appear reasonable. User fees associated with water and sewer are within the range of affordability as defined by EPA and, considering the range of services provided, the overall user fees can be considered affordable.

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Abbreviations and Acronyms

AMHI	Annual Median Household Income
CCF	100 Cubic Feet
CFD	Community Facilities District
CSD	Community Services District
EDU	Equivalent Dwelling Unit
EPA	U.S. Environmental Protection Agency
ERAF	Educational Revenue Augmentation Fund
LAFCo	Local Agency Formation Commission
MSR	Municipal Service Review
O&M	Operations and Maintenance
PALCO	Pacific Lumber Company
TAB	Tax Assessment Bond
TAF	Tax Allocation Factor
TOS	Town of Scotia, LLC

Introduction

Scotia is a privately owned town originally established for the employees of the Pacific Lumber Company (PALCO). After 120 years of operation as a "company town," the community is currently owned by the Town of Scotia, LLC (TOS), which manages and operates the properties. TOS wants to divest its community-based properties by subdividing and selling the residential, commercial, and some industrial properties within the town. To facilitate the process, formation of a Community Services District (CSD) is proposed in order to assume the provision of typical governmental services associated with a community.

This is a financial summary associated with the formation of the Scotia CSD. The financial proposal takes into consideration the provision of the following services:

- Wastewater collection, treatment, and disposal
- Water supply, treatment, storage, and distribution
- Stormwater drainage
- Streets and roadways maintenance (with street lighting)
- Parks and recreational facilities
- Fire protection

This financial analysis was initially published in May 2009 as Appendix C of the Municipal Service Review (MSR) prepared for the Local Agency Formation Commission (LAFCo) in support of the Scotia CSD formation application. The current revision reflects the changes made at the request of LAFCo staff and commissioners, as described in Addendum 1.1, issued September 8, 2010.

In preparing a proposed financial statement related to expected revenues and expenditures for the CSD, consideration was given to the current financial information provided by TOS relative to its first six months of operations; statements of the former owner (PALCO) associated with water, fire protection, wastewater, and ball park operations; comparisons of neighboring communities' operations; and experience with the financial and budgetary aspects of smaller communities and service districts.

A transition period will occur during start-up and organization of the CSD's governance and staffing, in which TOS will continue to operate and maintain the level of services for the community until they can be fully assumed by the CSD. The transition is more thoroughly discussed in the MSR prepared for LAFCo in May 2009, as well as recent correspondence in response to requests for information from LAFCo staff. This financial analysis focuses on revenues and expenses of the CSD after that transition takes place.

Revenues

Revenues for ongoing operation and maintenance activities of the CSD are projected to come primarily through two sources:

1. Taxes
2. User fees

Taxes

Based upon Humboldt County Assessor's records, the 2008 tax assessment for Scotia included two Assessors Parcels: 205-351-020 (Scotia Union School District) and 205-351-021 (Town of Scotia, LLC). The TOS parcel number is a new tax assessment number, per the County Assessor.

Land Assessment:	$ 7,629,633
Structures:	$ 41,453,231
Personal Property	$ 7,454,460
Tax Exemption	-$ 1,324,514
Total Assessment (2008):	**$ 55,212,810**

The County Tax Collector has indicated that unlike incorporated cities and counties, a CSD will not receive any sales tax, transient occupancy tax, or gas tax revenue from the County upon its formation.

TOS and the County currently maintain the primary surface roads in the Scotia area. The County and CSD would continue to do so upon formation of the Scotia CSD. If the County were to assume the maintenance and operations of all local roads, it would need to receive an approved road agreement from the Scotia CSD, which in turn would agree to pay for improvements, enabling local roads to meet existing County road standards. Only through such an agreement will the County accept all Scotia roads for maintenance purposes. However, such an agreement is not planned at this time.

The County Tax Collector has also indicated that any sharing or splitting of property tax revenues would be subject to negotiation and agreement by the governing Board of Supervisors. Presumably any such agreement would be concluded as a precondition prior to the LAFCo's approval of the CSD formation.

The current property tax split for Scotia indicates that the County's General Fund tax revenue is 35.8% of the overall revenues received from the 1% assessment rate. The negotiated portion of this is likely the only tax revenue source that the Scotia CSD would be eligible to receive. The other apportionments are for local schools, libraries, community college, county schools, and the Humboldt Bay Harbor Recreation and Conservation District. Using the current assessment rate of 1%, a total of $552,000 would be available annually for distribution to Scotia taxing agencies.

By mandate of the State of California, all local public agencies must contribute a portion of their property taxes to the Educational Revenue Augmentation Fund (ERAF). Therefore, a share of the negotiated portion of the County's tax revenues that the CSD receives will be re-allocated to the ERAF, reducing the useable revenues for the CSD's delivery of services.

A fiscal impact study was performed for the City of Rio Dell by MuniFinancial (2007) which projected tax revenues generated through various scenarios related to the town of Scotia and annexation into the neighboring City of Rio Dell. The *Rio Dell-Scotia Proposed Annexation: Fiscal Impact Study* projected sale of the existing housing units within Scotia to occur within a three-year period. The study assumed a tax allocation associated with annexation of Scotia into the City of Rio Dell of 8.7112% of the assessed value from the County General Fund. Those figures represent the average allocation rate received by other municipalities in the County.

The MuniFinancial study also assumed an increase in Scotia's overall property tax revenue (based upon that allocation) from the initial year's projected tax revenues of $49,300 to $91,600 by Year Three. MuniFinancial (2007) indicated that the rapid increase in revenues over the first few years is a result of an

increase in overall assessed values in the Scotia area that will occur as properties/homes are sold. As sales occur, assessed values relating to each of the purchased parcels will be based upon their current market value. The assessed values now in effect on the major parcels owned by the TOS do not reflect a current market value, because of the limits imposed by California Proposition 13 (1978) on assessed values.

Due to the recent and severe downturn in the economy, this financial analysis projects the sale of residential and commercial properties by TOS to take place over a five-year period, rather than the three years MuniFinancial (2007) used. This analysis also projects that property sales will start out slowly with an increase over time as the economy improves.

The average residential property assessed value is $31,400, and the average estimated resale market value of Scotia's houses ranges from $175,000 to $225,000 (MuniFinancial, 2007). The increase in assessed value from initial resale will range from $143,600 to a high of $193,600. An increase in revenue from the sale of commercial property is also projected over the initial five-year period.

The original May 2009 financial analysis assumed a Tax Allocation Factor (TAF) of 15%, representative of the wide range of services which would be provided by the proposed Scotia CSD. However, LAFCo staff asked TOS to show what the impact would be on user fees if a smaller TAF was realized with the Scotia CSD. In the September 8, 2010 comparison, we used a TAF of 8.7122% as used in MuniFinancial study (MuniFinancial, 2007). LAFCo staff also requested that SHN look at a 0% TAF in order to illustrate the impact of the TAF on the user fees. For illustrative purposes and as directed, we supply the financial information here under all three TAF scenarios but use the worst-case 0% TAF as the default assumption.

Assuming that 8.7122% of the general tax allocation was received by the Scotia CSD, $36,600 (tax allocation less ERAF deduction) would be available in the first year for local operations. This level of tax proceeds is comparable to other local service district tax allocations. In future years, the Scotia CSD would receive an increase in its tax revenues as the sale of the existing homes and commercial properties in Scotia occurs.

User Fees

The primary revenue source for the CSD will be monthly user fees. A user fee is a charge established under the governing authority of the CSD (usually by ordinance and/or resolution) and levied on owners or users of parcels or pieces of real property to fund the costs of management and of operating, maintaining, and improving the associated facility. The basis for this revenue source is a user-based system as it relates to a single-family residence, which is referred to as an Equivalent Dwelling Unit (EDU).

Typically, when establishing sanitary sewer and water rates, water meter readings are used to gauge direct use of water and as a surrogate measure of sewage generation. Single-family and multiple-family residential, commercial, industrial, and institutional users are assessed fixed fees plus flowage charges based on water meter readings for the billing period.

The basis for the estimates used in the Scotia CSD financial analysis is as follows:

A. **Water** supply, treatment, and distribution costs for commercial and industrial users were based upon existing water use. Transmission and distribution water piping for Scotia town is dependent upon the fire suppression system demand. For industrial users, water delivery records were used in determining industrial water use, and thus the treatment share of costs. Industrial

firefighting water facilities modification costs were based upon the industrial classification and the square footage of the facility footprint requiring incident response. For residential users, each single-family residential unit counted as one EDU. The number of EDUs estimated for water supply, treatment, and distribution services is 749.

B. **Wastewater** collection, treatment, and biosolids disposal cost estimates for commercial and industrial users were based upon the flows estimated from the number of workers at the site on a daily basis and standard engineering conversion factors. For residential users, each single-family residential unit counted as one EDU. The number of EDUs estimated for wastewater collection, treatment, and disposal services is 408.

C. **Roadway** modifications and maintenance costs for commercial and industrial users are based upon vehicle trip generation use estimates by employees and delivery trucks over community roads. Typical residential values of 10 trips per day were used for residential EDUs. The number of EDUs estimated for road maintenance services is 408.

D. **Fire Department** response and facilities costs are based upon the square footage of commercial and industrial users' footprint and the industrial classification. For residential users, each single-family residential unit counted as one EDU. The number of EDUs estimated for fire protection services is 1,267.

E. **Storm Water Drainage.** The cost for the shared portion (with the proposed Scotia CSD, Humboldt County, and Caltrans) for commercial and industrial users is based upon actual shared line in areas of proposed modification (as a portion of the total to be modified). For residential users, each single-family residential unit counted as one EDU. The number of EDUs estimated for storm drainage services is 408.

Projected revenues and estimated number of EDUs per service area are presented in Table 1, which includes the first year's proposed budget breakdown of revenues and expenditures.

It should be noted that the number of EDUs for each service area, represented in these financial analyses, varies a little from the EDU discussion presented in the overall wastewater facilities analysis section of the MSR prepared in support of the Scotia CSD formation (to which this financial analysis constitutes an appendix). The number of wastewater EDUs presented in the MSR is based on an analyses prepared for determining the wastewater treatment needs of the community and represents a full "build-out" scenario. The EDUs presented in this financial analysis represent an estimate of the current number of EDUs in each of the services areas.

The 10-year pro-forma budget presented in Table 2 also projects a very modest (0.5%) growth associated with the community over the next 10 years. The modest growth factor is used because residential growth is not expected, only some commercial and industrial expansion. For more discussion of the growth factor, see the MSR.

Three scenarios were evaluated for estimating the effects of available tax revenues on a projected budget for the Scotia CSD, using a TAF of 0%, 8.7122%, and 15% respectively. Table 3 shows the effects of the different tax allocation rates on projected user fees.

Table 3 indicates that at Year 5 of full operations and when the capital projects are projected to be at or near completion, the typical residential user (EDU) will be assessed fees in the range of approximately $161 to $184 per month.

Table 1

Scotia Community Services District Start-Up Budget, 0% Tax Allocation Factor

Estimated First Full Year Operating Budget after Transition

Revenues

Fund Type	Water	Wastewater	Streets & Street Lighting	Storm	Ball Park	Fire Department	Total All Services
Available Cash on Hand	$0	$0	$0	$0	$0	$0	**$0**
Interest Earnings	$0	$0	$0	$0	$0	$0	**$0**
Property Tax[1]							**$0**
TOS Initial Funding of Contingency	$40,000	$44,000	$15,000	$14,000	$5,000	$17,000	**$135,000**
TOS Start-up Funding	$20,000	$0	$0	$0	$0	$0	**$20,000**
Special Use Income					$2,000	$0	**$2,000**
User Fee Revenues Necessary to Balance Budget	$220,060	$266,560	$92,088	$85,790	$25,160	$166,266	**$855,924**
Connection Fees	$1,000	$1,000					**$2,000**
Miscellaneous	$100	$100	$100	$100	$0	$0	**$400**
Sub-Total Resources	$281,160	$311,660	$107,188	$99,890	$32,160	$183,266	**$1,015,324**
Outside Revenue Sources To Pay for Capital Expenditures							
CSD Debt Finance w/User Fee Revenues							**$0**
TOTAL CAPITAL EXPENDITURE REVENUES	$0	$0	$0	$0	$0	$0	**$0**
TOTAL RESOURCES	$281,160	$311,660	$107,188	$99,890	$32,160	$183,266	**$1,015,324**

Expenditures

Personal Services	Water	Wastewater	Streets & Street Lighting	Storm	Ball Park	Fire Dept.	Total All Services
Attorney	$5,000	$5,000	$1,000	$500		$2,000	**$13,500**
Bookkeeping	$10,000	$10,000	$5,000	$2,500	$500	$2,000	**$30,000**
Engineering	$5,000	$7,500	$2,000	$1,000		$0	**$15,500**
Operations/Maintenance Staff (Salaries & Benefits)	$102,960	$102,960	$51,480	$68,640	$17,160	$81,900	**$425,100**
TOTAL PERSONAL SERVICES	$122,960	$125,460	$59,480	$72,640	$17,660	$85,900	**$484,100**
Materials and Services							
Bond, Dues, Publications	$1,000	$1,000	$500	$250		$0	**$2,750**
General Supplies, Lab, Permitting & Monitoring	$10,000	$75,000	$5,000	$2,000	$4,500	$6,150	**$102,650**
Utilities	$200	$200	$6,720			$1,080	**$8,200**
General Maint & Repair	$10,000	$10,000	$6,000	$2,000	$1,000	$7,000	**$36,000**
Insurance	$30,000	$20,000	$5,000	$5,000	$2,000	$2,000	**$64,000**
Electrical	$50,000	$25,000	$4,488		$1,000	$0	**$80,488**
Contracted Maintenance Services	$10,000	$5,000	$2,000	$1,000		$0	**$18,000**
TOTAL MATERIALS AND SERVICES	$111,200	$136,200	$29,708	$10,250	$8,500	$16,230	**$312,088**
Annual Payment for Overhead							
Office/shop	$0	$0	$0	$0	$0	$0	**$0**
Equipment	$0	$0	$0	$0	$0	$0	**$0**
Total Overhead Payment	$0	$0	$0	$0	$0	$0	**$0**
TOTAL O&M	$234,160	$261,660	$89,188	$82,890	$26,160	$102,130	**$796,188**
Other Expenditures							
Contingency Fund	$40,000	$44,000	$15,000	$14,000	$5,000	$17,000	**$135,000**
Other Expenditures[2]						$64,136 [2]	**$64,136**
TOTAL OTHER EXPENDITURES	$40,000	$44,000	$15,000	$14,000	$5,000	$81,136	**$199,136**
TOTAL EXPENDITURES	**$281,160**	**$311,660**	**$107,188**	**$99,890**	**$32,160**	**$183,266**	**$1,015,324**
Capital Outlay							
Fire Apparatus and Personal Gear Upgrade							**$0**
Office Equipment/furnishings Start-up	$7,000	$6,000	$3,000	$3,000	$1,000		**$20,000**
Estimated Capital Outlay - System Upgrades							
Total Capital Expenditures	$7,000	$6,000	$3,000	$3,000	$1,000	$0	**$20,000**
Unexpended Fund Balance (Recommended Operating Contingency)	(operating contingency is recommended to be set at 2-months operating costs, or approx. 16% of O&M Costs This line item will not be initially funded						

Estimated Monthly User Fees Based On Revenues Needed To Operate CSD

	Water	Wastewater	Streets & Street Lighting	Storm	Ball Park	Fire Department	Total All Services
Estimated Monthly User Fees Required to Balance Revenues (O&M and Debt Finance)	$25	$56	$19	$18	$5	$11	**$134**
EDUs	731	400	400	400	400	1243	532

1. Figures obtained from Study performed by Munifinancial - Rio Dell - Scotia Proposed Annexation Fiscal Impact Studies (Draft), Worst Case Scenario figures are used.
2. Expenditure to a sinking fund to be created by CSD for Fire Equipment/Apparatus replacement

Table 2
Scotia Community Services District 10-Year Pro Forma - 0% Tax Allocation Factor
Preliminary Economic Study for Formation of Scotia Community Services District

Revenues

Operational Year	1	2	3	4	5	6	7	8	9	10
Available Cash on Hand	$ -	$ -	$ 3,877,000	$ 2,217,000	$ 426,000	$ (0)	$ -	$ -	$ -	$ -
Interest Earnings	$ -	$ -	$ 38,770	$ 22,170	$ 4,260	$ 1,800	$ 1,300	$ 1,300	$ 1,300	$ 1,300
Property Taxes	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TOS Start-up Funding	$ 20,000									
TOS Initial Funding of Contingency	$ 135,000									
Special Use Income	$ 2,000	$ 3,000	$ 3,000	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500	$ 3,500
User Fee Revenues Necessary to Balance Budget	$ 855,924	$ 1,066,555	$ 1,050,008	$ 1,093,498	$ 1,134,984	$ 1,167,728	$ 1,198,040	$ 1,228,802	$ 1,255,338	$ 1,282,669
Transfer From Researve Fund for Capital Exp.	$ -	$ -	$ -	$ -	$ -	$ 23,000	$ 150,000	$ 20,000	$ 20,000	
Connection Fees	$ 2,000	$ 6,000	$ 6,000	$ 6,000	$ 6,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
CSD Debt Finance w/User Fee Revenues	$ -	$ 5,000,000	$ -	$ -	$ -					
Miscellaneous	$ 400	$ 400	$ 400	$ 400	$ 400	$ 400	$ 400	$ 400	$ 400	$ 400
TOTAL RESOURCES	$ 1,015,324	$ 6,075,955	$ 4,975,178	$ 3,342,568	$ 1,575,144	$ 1,198,428	$ 1,355,240	$ 1,256,002	$ 1,282,538	$ 1,289,869

Expenditures

Operational Year	1	2	3	4	5	6	7	8	9	10
Personal Services										
Attorney	$ 13,500	$ 13,500	$ 13,500	$ 15,000	$ 15,000	$ 15,000	$ 16,500	$ 16,500	$ 16,500	$ 16,500
Bookkeeping	$ 30,000	$ 30,000	$ 30,000	$ 33,000	$ 33,000	$ 33,000	$ 36,300	$ 36,300	$ 36,300	$ 36,300
Engineering	$ 15,500	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000
Operations/Maintenance Staff (Wages & Benefits)	$ 425,100	$ 437,853	$ 450,989	$ 464,518	$ 478,454	$ 492,807	$ 507,592	$ 522,819	$ 538,504	$ 554,659
TOTAL PERSONAL SERVICES	$ 484,100	$ 491,353	$ 504,489	$ 522,518	$ 536,454	$ 550,807	$ 570,392	$ 585,619	$ 601,304	$ 617,459
Materials and Services										
Bond, Dues, Publications	$ 2,750	$ 2,833	$ 2,917	$ 3,005	$ 3,095	$ 3,188	$ 3,284	$ 3,382	$ 3,484	$ 3,588
Supplies	$ 102,650	$ 105,730	$ 108,901	$ 112,168	$ 115,533	$ 118,999	$ 122,569	$ 126,247	$ 130,034	$ 133,935
Utilities	$ 8,200	$ 8,446	$ 8,699	$ 8,960	$ 9,229	$ 9,506	$ 9,791	$ 10,085	$ 10,388	$ 10,699
General Maint & Repair	$ 36,000	$ 37,080	$ 38,192	$ 39,338	$ 40,518	$ 41,734	$ 42,986	$ 44,275	$ 45,604	$ 46,972
Insurance	$ 64,000	$ 65,920	$ 67,898	$ 69,935	$ 72,033	$ 74,194	$ 76,419	$ 78,712	$ 81,073	$ 83,505
Electrical	$ 80,488	$ 82,903	$ 85,390	$ 87,951	$ 90,590	$ 93,308	$ 96,107	$ 98,990	$ 101,960	$ 105,019
Contracted Maintenance Services	$ 18,000	$ 18,000	$ 18,000	$ 18,000	$ 18,000	$ 20,000	$ 20,000	$ 25,000	$ 25,000	$ 25,000
TOTAL MATERIALS AND SERVICES	$ 312,088	$ 320,911	$ 329,998	$ 339,358	$ 348,999	$ 360,929	$ 371,156	$ 386,691	$ 397,542	$ 408,718
Annual Payment for Overhead										
Office/shop	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Overhead Payment	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TOTAL O&M	$ 796,188	$ 812,264	$ 834,487	$ 861,876	$ 885,452	$ 911,736	$ 941,548	$ 972,311	$ 998,846	$ 1,026,177
Capital Outlay										
Estimated Capital Outlay Total	$ 20,000	$ 1,123,000	$ 1,660,000	$ 1,791,000	$ 426,000	$ 23,000	$ 150,000	$ 20,000	$ 20,000	$ -
TOTAL CAPITAL OUTLAY	$ 20,000	$ 1,123,000	$ 1,660,000	$ 1,791,000	$ 426,000	$ 23,000	$ 150,000	$ 20,000	$ 20,000	$ -
Other Expenditures[1]	$ 64,136	$ 64,136	$ 64,136	$ 64,136	$ 64,136	$ 64,136	$ 64,136	$ 64,136	$ 64,136	$ 64,136
Transfer to Contingency Fund	$ 135,000									
Debt Financed by CSD										
Water Loan ($2,734,000)		$ 113,864	$ 113,864	$ 113,864	$ 113,864	$ 113,864	$ 113,864	$ 113,864	$ 113,864	$ 113,864
Wastewater Loan ($2,266,000)		$ 85,692	$ 85,692	$ 85,692	$ 85,692	$ 85,692	$ 85,692	$ 85,692	$ 85,692	$ 85,692
Total Debt ($5,000,000)		$ 199,556	$ 199,556	$ 199,556	$ 199,556	$ 199,556	$ 199,556	$ 199,556	$ 199,556	$ 199,556
TOTAL EXPENDITURES	$ 1,015,324	$ 2,198,955	$ 2,758,178	$ 2,916,568	$ 1,575,144	$ 1,198,428	$ 1,355,240	$ 1,256,002	$ 1,282,538	$ 1,289,869
Unexpended Fund Balance	$ -	$ 3,877,000	$ 2,217,000	$ 426,000	$ -	$ -	$ -	$ -	$ -	$ -
Contingency Fund	$ 135,000	$ 135,000	$ 135,000	$ 135,000	$ 135,000	$ 135,000	$ 135,000	$ 135,000	$ 135,000	$ 135,000
Transfer to Capital Reserve Fund		$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000	$ 80,000
Transfer to Operating funds for Capital Exp.	$ -	$ -	$ -	$ -	$ -	$ 23,000	$ 150,000	$ 20,000	$ 20,000	$ -
Cumulative Reserve		$ 80,000	$ 160,000	$ 240,000	$ 320,000	$ 377,000	$ 307,000	$ 367,000	$ 427,000	$ 507,000
Monthly EDU Fee for Balanced Budget w/o Reserve	$ 134	$ 165	$ 161	$ 167	$ 171	$ 177	$ 181	$ 186	$ 189	$ 192
Monthly EDU Fee for Balanced Budget and Reserve	$ 134	$ 179	$ 176	$ 182	$ 184	$ 192	$ 196	$ 200	$ 203	$ 206

Table 3
Scotia Community Services District, Projected Property Tax Revenue and User Fee Scenarios
Preliminary Economic Study for Formation of Scotia Community Services District

Operational Year	1	2	3	4	5
0% Tax Allocation Factor					
Calculated Monthly EDU[1] Fees to Balance Budget w/o reserves	$134	$165	$161	$167	$171
Calculated Monthly EDU Fees to Balance Budget with reserves		$179	$176	$182	$184
8.7122% Tax Allocation Factor[2]					
Estimated Tax Revenues	$36,612	$42,493	$51,315	$60,137	$63,077
Calculated Monthly EDU Fees to Balance Budget w/o reserves	$125	$156	$151	$155	$158
Calculated Monthly EDU Fees to Balance Budget with reserves		$170	$165	$170	$175
15% Tax Allocation Factor*					
Estimated Tax Revenues	$63,036	$73,162	$88,350	$103,539	$108,602
Calculated Monthly EDU Fees to Balance Budget w/o reserves	$120	$149	$143	$146	$151
Calculated Monthly EDU Fees to Balance Budget with reserves		$164	$158	$161	$165

1. EDU: Equivalent Dwelling Unit
2. Tax Allocation represents net revenue to CSD after Educational Revenue Augmentation Fund (ERAF) deduction
Source: Table 3, SHN, September 2010

Affordability

A commonly accepted benchmark that is used for measuring affordability when considering wastewater and water user fees has been established by the U.S. Environmental Protection Agency (EPA). The EPA benchmark sets the level of affordability so that the average residential rates should not exceed 1.5 to 2.0% of the Annual Median Household Income (AMHI).

For addressing affordability of the projected rates with the AMHI, data is not available for Scotia. The most recent published AMHI by the U.S. Census Bureau for Humboldt County is $38,987 (2007). Carrying that figure forward to present day with a conservatively assumed 2% annual cost of living increase, the AMHI would be $40,562. The range of monthly user fees associated with that AMHI (at the levels suggested by EPA) would be from $56.31 to $75.00/month for water or sewer ($113 to $150/month for both) in Year 5 (see page 11).

The proposed Scotia CSD will also be providing road maintenance and street lighting, storm water drainage, parks and recreation, and fire protection services in addition to water and wastewater services. The estimated breakdown of the monthly user fees related to the various service areas for the Scotia CSD, (projected for Year 5 of operation) are shown in Table 4.

Table 4
Estimated Scotia Community Services District User Fees Without Reserve by Service, Year 5[1]
Preliminary Economic Study for Formation of Scotia Community Services District

			15% TAF[2]		8.7122% TAF		0% TAF	
	EDUs[3]	Debt Service[4]	O&M[5]	Total[6]	O&M	Total	O&M	Total
Water Supply	747	$12.72	$28.97	$41.69	$28.97	$41.69	$28.97	$41.69
Wastewater Treatment	408	$17.50	$59.23	$76.74	$59.23	$76.74	$59.23	$76.74
Street Lighting/Road Maintenance[7]	408	$0.00	$0.00	$0.00	$7.24	$7.24	$20.12	$20.12
Stormwater Drainage	408	$0.00	$18.92	$18.92	$18.92	$18.92	$18.92	$18.92
Parks and Recreation	408	$0.00	$6.10	$6.10	$6.10	$6.10	$6.10	$6.10
Fire Protection	1267	$0.00	$7.52	$7.52	$7.52	$7.52	$7.52	$7.52
		$30.22	$120.74	$150.97	$127.98	$158.21	$140.87	$171.09

1. Revised Table 4 user fees are based upon calculations using the projected number of EDUs in each service area as opposed to the original table, which used a weighted average.

2. TAF: Tax Allocation Factor
3. EDU: Equivalent Dwelling Unit
4. Debt Service assumes low-interest loans
5. O&M: Operations and Maintenance
6. Total does not include EDU fees associated with reserve/replacement fund
7. Property tax allocation used as revenue in Street lighting/roads service area to offset costs; therefore, primary impact of offering TAF is reflected as such in this table.

Source: Table 4, SHN, September 2010

Table 4 does not include the reserve/replacement fund, which will be determined by the CSD Board once in operation. However, it is estimated at $12 to $17/month. The combined value for water and wastewater services ($123.10 by Year 5) falls within the EPA affordability range of $113 to $150/month.

Note that a 15% TAF will cover just about exactly the estimated costs for road maintenance and street lighting services; therefore, as a matter of convenience, the additional user fees needed in response to variations in TAF were all applied to Street Lighting/Road Maintenance expenditures in Table 4 for computation purposes. In the practical implementation, the Scotia CSD could choose any other scheme to distribute the difference among user fees (with the caveat that the debt service for water and wastewater loans and bonds can only be applied to these services); however, the net change in total user fees would remain constant.

It is common for communities or districts to perform comparative analyses of user fees with neighboring service providers upon addressing user fee changes. For this assessment, a comparative analysis was performed to help address the issue of affordability. When performing any comparative analysis, it is important that the comparisons be made between service providers with similar service and demographic characteristics. The comparative analyses for this report included consideration of type of service provided, customer base (population and/or EDUs served), AMHI, and the state and condition of infrastructure relative to the service provided.

It is uncommon for communities or districts to fund road maintenance and street lighting, stormwater drainage, parks and recreation, or fire protection services through an EDU-based user fee system. For that reason, the comparative analyses were performed **only** for the water and wastewater services areas. In relation to customer base, the analyses included communities or districts with populations of up to 1,800, or approximately 700 EDUs. AMHI data from the U.S. Census Bureau was acquired. The Census Bureau has county and city data for AMHI from the 1999 census, and in some cases has estimated the AMHI for certain areas for up to the year 2007. Where applicable, the jurisdictional user fee identified for a service area was adjusted based upon the proportional difference between the Humboldt County AMHI ($38,987 for 2007), and the comparative jurisdiction.

One of the more sensitive comparison criteria is associated with the given condition of a service provider's infrastructure in relation to the existing or projected user fee. Research reveals that a majority of communities and districts that can be used as comparison points need substantial improvements to their infrastructure and current user fees do not reflect the future impacts of such improvements. In contrast, once all of the capital improvements have been completed for the proposed Scotia CSD, its infrastructure will be in good shape with no major expenditures anticipated for the next 20 years.

Given the parameters outlined above, few jurisdictions could be identified for accurate comparisons. The following presents the results of the comparative analyses:

City of Trinidad

Population: 323

2007 AMHI: $40,000

Service Provided: Water (Wastewater treatment is provided through small decentralized on-site systems in this community.)

EDU fee (based upon Scotia defined EDU water use): $52.65/month–effective July 1, 2009

EDU fee adjusted by AMHI: $51.32/month.

Condition of Infrastructure: New storage tank scheduled in near future, other major projects not identified

City of Ferndale

Population: 1,437

1999 AMHI: $37,955

Services Provided: Wastewater collection, treatment, and disposal (Water provided by Riverside CSD)

EDU Fee: $66.02/month–effective July 1, 2008

EDU fee adjusted by AMHI: $54.32/month.

Condition of Infrastructure: 9 million dollars in upgrades identified in *California–2008/2009 Project Priority List for State Revolving Loan Fund Program* (State Water Resources Control Board, 2009).

City of Loyalton

Population: 888

1999 AMHI: $34,063

Services Provided: Water and wastewater

EDU Fees:

	Year			
	2009	**2010**	**2011**	**2012**
Wastewater	$ 62.50	$ 75.00	$ 76.50	$ 78.03
Water	$ 35.03	$ 35.73	$ 36.45	$ 37.17

EDU fees adjusted by AMHI:

	Year			
	2009	**2010**	**2011**	**2012**
Wastewater	$ 57.29	$ 68.75	$ 70.13	$ 71.53
Water	$ 32.11	$ 32.75	$ 33.41	$ 34.08

Condition of Infrastructure: Just completed major water system upgrade, have wastewater treatment plant expansion planned at cost of approximately 4.5 million dollars.

City of Plymouth

Population: 1,074

1999 AMHI: $37,262

Services Provided: Water and wastewater

EDU Fees:

	Year	
	2009	**2010**
Wastewater	$ 62.50	$ 75.00
Water	$ 70.57	$ 74.10

EDU fees adjusted by AMHI:

	Year	
	2009	**2010**
Wastewater	$ 59.14	$ 62.10
Water	$ 57.70	$ 66.96

Condition of Infrastructure: The City has performed recent updates of facilities plans for both water and wastewater and user fees reflect needed capital improvements for upgrades.

Willow Creek Community Services District
Population: 1,743
2007 AMHI: $38,987
Service Provided: Water
EDU fee (based upon Scotia defined EDU water use): $43.67/month–effective January 1, 2009
EDU fee adjusted by AMHI: $43.67/month.
Condition of Infrastructure: Upgrades to Treatment System recently completed

To refine the comparative analyses further, the above EDU fees (adjusted by AMHI) are projected forward to the fiscal year of 2013/2014 when all capital expenditures are projected to be completed for the Scotia CSD. The adjusted EDU fees were increased annually at a cost of living increase rate of 2%, from the respective jurisdictions adopted fee schedule. Table 5 presents those projections and an estimated average of each of the service area fees.

Table 5
Water and Wastewater User Fees in Comparable Communities

Water

	2008/09	2009/10	2101/11	2011/12	2012/13	2013/14
City of Trinidad		$ 51.32	$ 52.35	$ 53.39	$ 54.46	$ 55.55
City of Ferndale						
City of Plymouth		$ 57.70	$ 66.96	$ 68.30	$ 69.67	$ 71.06
City of Loyalton		$ 32.11	$ 32.75	$ 33.41	$ 34.08	$ 34.76
Willow Creek CSD[1]		$ 43.67	$ 44.54	$ 45.43	$ 46.34	$ 47.27
					Average	$ 52.16

Wastewater

	2008/09	2009/10	2101/11	2011/12	2012/13	2013/14
City of Trinidad						
City of Ferndale	$ 54.32	$ 55.40	$ 56.51	$ 57.64	$ 58.80	$ 59.97
City of Plymouth		$ 59.14	$ 62.10	$ 63.34	$ 64.61	$ 65.90
City of Loyalton		$ 57.29	$ 68.75	$ 70.13	$ 71.53	$ 72.96
Willow Creek CSD						
					Average	$ 66.28

Estimated EPA[2] Affordability Benchmark @ 1.5% for year 2013/14	$ 56.31/service
Estimated EPA Affordability Benchmark @ 2% for year 2013/14	$ 75.08/service

1. CSD: Community Services District
2. EPA: U.S. Environmental Protection Agency

The projected Scotia CSD water and wastewater user fees of $123/month (see Table 4) are comparable to other similar service providers in northern California and will be within the range of EPA's limits of affordability. No benchmark was available for the other services to be provided by the new Scotia CSD.

One other issue to consider when addressing user fees with the CSD is that because this area is currently a privately owned and operated town, no existing homeowners (as there currently are none, other than TOS) will be affected by the assessment of new user fees. As properties are subdivided and sold, the property buyers will be choosing to enter into the community with the established fees. In this respect, a similarity to a homeowners association can be drawn with the CSD, as purchasers of the homes and associated land will know the agreement and obligations into which they are entering.

Expenditures

An operating budget was prepared for the proposed CSD to model the expected expenditures for the agency. The expenditure projection addresses the standard governmental expense categories of: 1) personnel services, 2) materials and services, 3) capital expenditures, and 4) debt service.

In order to estimate expenditures associated with personnel services, a district organizational structure and staffing level were prepared. An example of an organization chart for the district is represented as Figure 1 on the following page.

This budget assumes that bookkeeping, engineering, and legal services would be contracted out. It is possible that bookkeeping could be incorporated as an in-house service. The expenditure presented for

that line item, as a contract service, could be converted to a part-time salary and benefits if the CSD chooses to do so. As a start-up district, the final organization will depend upon expertise, experience level, and availability to recruit for each position. Therefore, the final staffing of the district could vary; the salary and benefit structure depicted in Table 6 was used for budgeting purposes.

Contingency Fund

As a rule of thumb, operating contingencies for a CSD should consist of a minimum of two months' operating costs. A contingency fund is not used unless emergency or unusual circumstances require it. Typical agency budgets anticipate the contingency fund will be carried over from year to year. TOS will provide for an initial CSD contingency fund at start-up. The proposed start-up budget for the CSD includes $135,000 as a "rainy day fund" to be used as operational contingency funding and reserves as the Scotia CSD is in transition. This amount is based on two months of operational budget in Year One.

Replacement Fund

For planned major component or system replacement projects, debt financing is the typical source of funding. However, it is prudent for any utility or service providing agency to establish an annually funded replacement program to help with planned major equipment and machinery replacement and to reduce or offset debt financing requirements for the large future projects. The 10-year pro-forma statement includes the impacts on the budget and user fees, reflecting an $80,000 per year replacement cost, which could be transferred to a separate sinking fund for accumulation and transferred back to the operating fund for planned capital expenses.

Capital Finance Plan

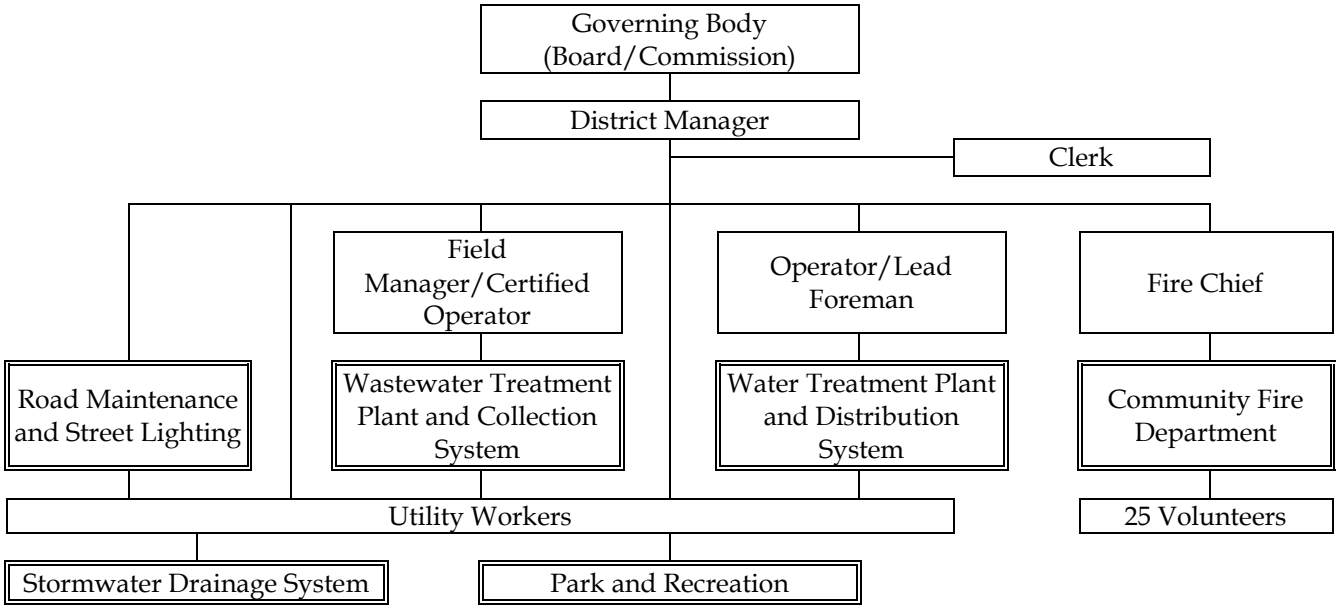
The first five years' capital expenditures projected for the startup Scotia CSD's infrastructure comprise those costs identified for needed improvements to the entire system in order to maintain serviceable levels (see the MSR and its supporting detailed engineering analysis for details). Table 7 presents a projected five-year capital improvement plan for upgrading the facilities along with a proposed source of revenues for financing the improvements. Revenues to offset capital expenditures are derived from a combination of short-term debt financing with repayment based upon an assessment on each property transaction, and long-term debt financing by the CSD through low-interest 3% loan or bond financing with a repayment period of 30 years. A proposed capital finance plan prepared by Nollenberger Capital Partners, Inc. (Nollenberger, 2009) is attached as Attachment 1[1].

Using the projected overall budgeted revenues and expenditures of the CSD, 10-year pro-forma statements were prepared for each of the tax allocation factor scenarios. The pro-forma statements incorporate some inflationary (3% per year) increases for some of the line items, while holding some of the professional service costs at their initial start-up level. The 10-year pro-forma expenditure statement is presented in Tables 1 and 2 (pages 5 and 6, respectively).

[1] Because the original, fiscally very conservative capital finance plan relied on issuance of standard governmental agency revenue bonds for the long-term financing, where revenues from user fees were to be used for payment on principal and interest, Attachment 1 also discusses issuance of Water and Sewer Bonds that constitute a worst-case scenario.

The long-term debt financing by the CSD is projected to net five million dollars, which will be applied toward the water and wastewater capital project costs, and is expected to incur an annual debt service of approximately $200,000 per year. This equates to about $30.22/month per EDU.

Figure 1
Organization Chart



Legend:

Responsibilities/Services
Road Maintenance and Street Lighting
Wastewater Treatment Plant and Collection System
Water Treatment Plant and Distribution System
Community Fire Department
Stormwater Drainage System
Park and Recreation

Personnel
District Manager
Clerk
Field Manager/Operator
Operator/Lead Foreman
Fire Chief
Utility Workers (2)

Table 6
Personnel Services Cost Breakdown

Position/Title	Salary	Benefits (50%)	Total
District Manager	$62,400	$31,200	$93,600
Clerk	$24,960	$12,480	$37,440
Fire Chief	$41,600	$20,800	$62,400
Field Manager/Operator	$41,600	$20,800	$62,400
Operator/Lead Foreman	$41,600	$20,800	$62,400
Utility Worker	$29,120	$14,560	$43,680
Utility Worker	$29,120	$14,560	$43,680
Total Wages & Benefits			**$405,600**

In preparing the first year's estimate of expenditures, the budget was divided into the various service areas provided by the Scotia CSD and allocations for materials and services, based upon budgetary experiences and operational projections for each. Staffing levels were spread throughout each of the services, estimating the time that each service would demand.

Table 7
Five-Year Capital Improvement Program

Element	Year 1	Year 2	Year 3	Year 4	Year 5	Total Dollars
Expenditures[1]						
Wastewater Collection	$92,000	$1,160,000	$1,750,000	$900,000	$386,000	$4,288,000
Wastewater Treatment	$30,000	$100,000	$660,000	$1,406,000	$200,000	$2,396,000
Biosolids Disposal	--	--	$10,000	$110,700	$264,300	$385,000
Water Distribution	$90,000	$1,149,000	$1,000,000	$385,000	$226,000	$2,850,000
Water Treatment	$17,000	$152,000	$143,000	--	$458,000	$770,000
Firefighting Water Storage Tank Replacement	$100,000	$1,600,000	--	--	--	$1,700,000
Storm Drains	$40,000	$708,000	$380,000	--	$474,000	$1,602,000
Roads	--	--	$610,000	$690,000	$493,000	$1,793,000
Fire Protection	--	$266,000	$500,000	--	--	$766,000
Electrical Service & Distribution Upgrade	--	--	$1,100,000	--	--	$1,100,000
Initial Capital for Office Equipment/ CSD[2] Startup	$20,000	--	--	--	--	$20,000
Total Capital Expenditures	**$389,000**	**$5,135,000**	**$6,153,000**	**$3,491,700**	**$2,501,300**	**$17,670,000**
Revenues						
Carry-over from Unexpended Fund Balance of Prev. Year[3]	--	-$389,000	$12,155,400	$6,002,400	$2,510,700	--
TOS/Marathon, Tax Assessment Bond (TAB)	--	$12,670,000	--	--	--	$12,670,000
CSD Debt Finance w/User Fee Revenues	--	$5,009,400	--	--	--	$5,009,400
Total Revenues re: Capital Expenditures	**--**	**$17,290,400**	**$12,155,400**	**$6,002,400**	**$2,510,700**	**$17,679,400**

1. Costs include 20% engineering and 20% contingency
2. CSD: Community Services District
3. Revenues from assessment against property sales are based upon estimated value and sales projections as presented in MuniFinancial study (2007).

Initial $12.7 Million Short-Term Financing

For the short-term financing—up to six years—a $12.7 million Tax Assessment Bond (TAB) will be issued, payable from tax assessments levied on the current property owner (TOS) and the sale of improved parcels and homes. Full repayment will be from TOS. The cost of this financing will be borne by TOS, not by the Scotia CSD or the residents and new homeowners within the CSD. This short-term financing will provide the funding for the majority of the improvements and will be available approximately four months after the creation of the CSD.

In reviewing its commitment to the Scotia CSD, it should be noted that to date, TOS has incurred and will continue to incur significant costs. The assets to be conveyed by TOS to the Scotia CSD go well beyond the connection fees expected of a "developer." In addition to the site acquisition costs for the town of Scotia, a number of other assets will be deeded to the Scotia CSD at no additional cost to the District. These other assets, valued at approximately $20 million, include the iconic community center buildings (Scotia Museum and historic Winema Theatre), Fire District building, recreational, baseball, community soccer park, Firemen's Park picnic areas, Scotia Community Forest, and various existing water and wastewater plants and operational equipment. The assets to be conveyed without charge to the Scotia CSD also include one of the most valuable privately held water rights and licenses in California. This water right will be conveyed without reservation or reversion to the CSD to put to any beneficial use allowed by law.

It is anticipated that the $12.7 million infrastructure improvements funds will be procured by TOS to have a private sector company construct the improvements prior to transfer to the CSD. The Scotia CSD will be granted all rights to access, employ, and use the infrastructure to deliver services so that the CSD can collect service fees in the interim, taking possession of improved materials, infrastructure, and equipment. The project will be inspected and completion, certified by the appropriate public and regulatory agencies as required by the subdivision conditions of approval prior to transfer of ownership to the new Scotia CSD.

$5 Million Long-Term Financing and Debt Service

Of the total $17.7 million needed in Scotia infrastructure improvements, the developer is handling a $12.7 million investment as part of its overall commitment to the community of Scotia. The remaining $5 million represents a reasonable share of the total costs for completing the project infrastructure upgrades, especially in light of the valuable community assets being conveyed to the CSD at start-up. The three most likely options for long-term, low-interest funding are the State Clean Water Revolving Loan Fund program, the U.S. Department of Agriculture Rural Development's Rural Utilities Services loan program, and the California Special Districts Association's pooled bond program (Pooled Transaction Certificates of Participation).

The debt service proposed for the Scotia CSD under this financial analysis is reasonable and comparable to the costs incurred in other similar communities. Public agencies routinely carry a certain amount of debt service or assess bond levies to fund their facilities and services. As a point of comparison, the monthly Mello-Roos bond levy per parcel for community infrastructure improvements in the Roseville Woodcreek West Community Facilities District is $90. The Mello-Roos Community Facilities Act of 1978 enables cities, counties, special districts, and school districts to establish Community Facilities Districts (CFDs) and to levy special taxes to fund a wide variety of facilities and services. The proceeds of a Mello-Roos tax can be used for direct funding and, in

the case of capital facilities, to pay off bonds. A Mello-Roos Community Facilities District must be approved by two-thirds of the votes cast and the levy is enacted by adoption of an ordinance.

Benefit assessment financing under Mello-Roos district financing can provide for ongoing district infrastructure maintenance and operation costs (water, wastewater, stormwater drainage, and street maintenance). Mello-Roos bond fees are assessed with the formation of a Community Facilities District and are levied on a per-parcel cost basis (not based on the value of the property) in addition to the normal annual property tax levy. While the amount of tax may vary from year to year, it cannot exceed the amount specified when the district was created. Adding Mello-Roos bonds to the total community tax rate can increase the total from 1.75% of assessed value to slightly over 2% depending on the type of improvements financed for a period that usually ranges from 20 to 30 years. The district typically seeks public financing through a bond sale to fund community infrastructure improvements with the additional ability to finance school sites, libraries, parks, and gas and utility transmission lines.

On a number of larger-scale residential community projects, California developers have successfully implemented projects by issuing Mello-Roos bond financing. Mello-Roos bond financing can assist the project by covering all development infrastructure including (roads, sewer, water, sidewalks, utility lines, landscaping, etc.). Counties are encouraging developers who are under-capitalized to use Mello-Roos-backed bonds for infrastructure development. Unfortunately, the burden for repayment of Mello-Roos-backed bonds falls entirely on the homeowner as an added monthly payment in addition to normal loan debt service and property taxes. As a direct pass-through of all infrastructure development costs, the issuance of Mello-Roos bonds for the construction of needed improvements can add a significantly higher monthly rate-payer burden.

The proposed debt service that would be carried by a Scotia CSD and repaid through user fees ($30.22/month/EDU) compares favorably with the fees associated with a Mello-Roos-backed development. Such a development would likely receive all new infrastructure, whereas the Scotia CSD's infrastructure is being updated and brought to standard operating condition (or better). However, the difference in cost is also appreciable, and Scotia CSD users will pay only a fraction of the fees associated with a brand-new development, representing reasonable equivalent conditions.

Gann Limit Discussion

Proposition 4 of the November 1979 ballot, better known as the Gann initiative, imposed an appropriation limit on state and local government agencies in California. Beginning in fiscal year 1980-81, appropriations for the state and each local government are limited to the fiscal year 1978-79 appropriation plus increases according to a formula based on population growth and increases in the cost of living, or the growth of personal income, whichever is less. A Gann limit must be established for any proposed agency. The initiative further requires that the LAFCo will ensure that a Gann limit is calculated for each agency that has an action before the LAFCo. It should be noted that the appropriation limit of the new agency might be established or changed by the electors of such agency consistent with existing law. The duration of any change as determined by the electors cannot exceed four years from the most recent vote of said electors.

Tax revenues for the CSD will be based on negotiations with the County. The Gann limit recognizes adjusted tax revenue and would take into account consumer price index adjustments. An important factor to consider is that appropriations for debt service are not included in the limit calculations, so the debt issue and question is irrelevant to the Gann limit calculations. Assembly

Bill 8 (Greene) created a property tax allocation system that implemented the provisions of California Proposition 13 as enacted by the voters in 1978. A single countywide rate of 1 percent replaced the numerous individual government tax rates. It appears that this small ERAF shift only supports the fire protection function. All of the districts that have been set up since the establishment of the AB 8 system obtain their AB taxes through shifts in the 1993-94 ERAF. Waste and wastewater services are primarily supported by user fees. An issue to consider in determining the Gann limit for the Scotia CSD is the planned sale of the community's housing stock. Upon resale and setting of new assessments, this activity will substantially raise the tax revenue to be received by the CSD.

This reassessment of tax revenue projected over the first few years of CSD operations will need to be evaluated in establishing the Gann limit for the Scotia CSD.

Conclusion

It must be kept in mind that the financial figures presented herein are estimates only; as a start-up entity, the Scotia CSD will need to experience a few years of actual operations to establish the organizational structure and revenue/expenditure experience to refine the budget and more accurately reflect the CSD's board policy and goals. Future budget considerations need to include establishing replacement funding along with reflection of actual experience. A number of needed capital improvement projects (such as, the replacement of the existing Scotia fire tanks, water and wastewater system upgrades, and other community infrastructure) are identified in Scotia's Five-Year Capital Improvement program in Table 7, with funding coming from major capital provided by the TOS and supplemental Scotia CSD bond debt financing.

The majority of revenues (89% under a 15% TAF, 96% under an 8.7122% TAF) to fund operations and maintenance are associated with user fees and the remainder will be derived from property taxes. It is anticipated that the amount of property tax revenue generated for the Scotia CSD will increase significantly over the first five years of operations as the sale of existing homes in Scotia occurs. Additional tax revenue can also be anticipated from the sale of commercial property. The projected increase in taxable base from the reassessment/sale of residences is estimated to rise from $48.9 million to $96.4 million within the initial five-year period. This increased tax revenue will aid the CSD in providing ongoing operations and maintenance services to area residents. Due to the relatively small base of customers, the projected user fees could be perceived as being high compared to some of the larger communities in the area; however, based upon comparisons with other similar service providers, the fees appear reasonable. User fees associated with water and sewer are within the range of affordability as defined by EPA and, considering the range of services provided, the overall user fees can be considered affordable.

The Scotia CSD will be responsible for providing capital project financing for a portion of the costs associated with all proposed start-up improvements. Such financing will most likely be funded through revenue bonds or other types of capital loans. The amount of capital financing projected for the CSD in this budget is that amount associated with annual debt service payments which will be paid through revenues that equate to approximately $30.22/month per EDU assessment. The remainder of capital financing costs will be covered by TOS through short-term debt financing which will be repaid through a portion of revenues associated with property sales.

Other types of capital financing which could be pursued by the CSD for capital projects include USDA financing and special assessment tax financing set as Mello-Roos bonds. The Scotia CSD assessment financing will require voter approval per California Proposition 218 (1996).

The estimates used for maintenance and operations are based on similar operations in other service district and municipal operations. The majority source for the coverage of ongoing district operations will be user fees. The annual district operational projections include an annual employee salary adjustment (cost-of-living) and similar adjustments for inflationary costs of operations.

References

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SHN Consulting Engineers & Geologists, Inc. (September 8, 2010). "Addendum 1.1 to Financial Analysis, Town of Scotia Community Services District Municipal Service Review." Eureka:SHN.

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Attachment 1

Capital Finance Plan for Scotia CSD
Nollenberger Capital Partners, Inc., 2009

EXECUTIVE SUMMARY

Purpose

NCPI has been retained as the financial advisor by the Town of Scotia LLC to assist in the creation of the Town of Scotia CSD. The purpose of the following financial analysis and proposed financing options is two-fold. First, to provide information to the appropriate regulatory agencies that are currently in the process of evaluating the Scotia CSD proposal; and, second, to assist Scotia LLC and its owner Marathon Asset Group in creating a viable financing package for them and the new CSD.

Scope of Services

In performing our role as financial advisor, NCPI performed the following services:

1. Reviewed all the operating data and information provided by Scotia LLC for consistency and accuracy.
2. Compared the proposed Scotia CSD with other operating CSD in Humboldt County as well as in the state.
3. Conferred with legal experts to gain knowledge of legal issues surrounding tax-exempt financing specific to CSDs.
4. Researched and developed numerous financing scenarios available to Scotia CSD. These scenarios included a review of the most current bond markets and credit availability.

Summary of Financing Proposals

Scotia CSD will be able to successfully finance the subdivision and improvement as outlined in their comprehensive plan by implementing two separate debt financings:

Financing 1 (Short Term) - $12 Million Tax Assessment Bond payable from tax assessments levied upon the parcels within the CSD. This will be done during initial period of the CSD when Scotia LLC/Marathon is the sole land owner of all the parcels. Repayment of the TABs will come from property assessment levied on and paid by Scotia LLC/Marathon and from the sale of the improved parcels and homes. Length of

this financing expected to be up to 6 years. ***The cost of this financing will not be for the account of the residents and new homeowners within the Scotia CSD.***

This financing will provide the funding of the majority of the improvements and will be available shortly after the creation of the CSD.

Financing 2 (Long Term) - $5 Million Water and Sewer Bond will be issued once Financing 1 has been completed and deemed a successful financing. This financing will be repaid by the new property owners from their monthly water and user fees. This financing is being structured to market rates to allow for compliance with EPA fee standards.

Assumptions and Key Facts

1. The CSD must be formed prior to the undertaking of any major expenditure. The current land owner is Scotia LLC, a for profit entity. Any expenditure made prior to the creation of the CSD will be for their benefit and profit. It is our opinion that execution of all aspects of the financing is more viable and less subject to scrutiny when executed under a CSD.

2. Any expenditure made prior to the formation of the CSD is expected to be funded by Scotia LLC. Solely for the account and benefit of Scotia LLC and that they will recoup their investment via land sales as contemplated.

3. The CSD is formed in 6-9 months and the Financing 1 is completed 4 months after its creation. Therefore, we would expect that actual subdivision and CIP groundbreaking in approximately 12 months.

Financing 1 (Short Term TABs)

Once the CSD is formed, the CSD will issue approximately $12 Million in Tax Assessment Bonds (TABs). The TABs will be issued under state statute and are more commonly referred to as Act 1911/13/15 Bonds. See Exhibit A. This type of financing is well tested and used frequently within the state. They allow for the type of expenditures included in the Scotia CSD improvement plan. Exhibit A has a listing from the statute of allowable expenditures that can be financed.

The structure and characteristics of the TAB financing is as follows:

1. The CSD will form an Assessment District (AD) which will encompass the entire CSD. The sole purpose for the AD is to facilitate the property tax assessment levy on each of the parcels. The AD and TABs will be "voter approved" by all property owners. Since the LLC will be the sole property owner of all parcels on day one of the CSD, there is no risk of approval. NOTE: This approval is by the land owners, not the residents.

2. Each parcel of land is then given an allocation of the TABs based on a formula. This will be performed on the current parcels (3) and then will be reallocated to the new subdivisions that are contemplated.

3. When each parcel is sold, it is required that the amount of assessment associated with that parcel be repaid. Therefore the repayment of the TABs comes from the sale of the property. It is not born by the new property owner.

4. The TABs are issued as tax-exempt variable rate debt and will have a final maturity of 25 -30 years. They can be prepaid at any time to coincide with the sale of the parcels. We are assuming that they will be interest only for the first 6 years followed by graduated amortization.

5. The interest rate on the TABs will be variable and reset weekly. The current weekly reset is at 0.5%. The annual average reset or interest rate for these kinds of bonds is 1.25%. This will require that the TABs be secured with a Letter of Credit (LOC).

6. The LOC will be provided by a bank for an initial term of 3-5 years. The cost of the LOC is expected to be approximately 1.50% per annum. NCPI acts as a consultant to many credit providers. It is of our opinion that a LOC can be procured as outlined. Current banks in California that currently issue similar LOCs are US Bank, KBC, State Street, Bank of America and Union Bank of California.

7. The total annual interest rate on the TABs will be approximately 3%. The annual debt service is estimated at $360,000. There will be no mandatory principal repayments in the first 6 years.

8. Attached is the debt schedule run for the TABs.

9. One of the key credit positives for a LOC provider is that these TABs are similar to property payments. There is one key difference: Under traditional property tax defaults, there is a five year foreclosure period. **Under TAB law, there is an accelerated foreclosure period of 60 days.**

10. Based on a conservative average residential sale price of $200K per residential parcel, total collateral value provided to the TABs is roughly $50 Million. This gives coverage of over 4.0x. Again, this is what the LOC provider will be evaluating as part of their due diligence. This level of coverage is critical for a successful bond sale and procurement of the LOC.

As a point of reference and for your information, attached Exhibit C, D and E are three examples of similar transactions:

i) The City of Irvine, CA - This is a variable rate TAB completed in 2007. The LOC provider was KBC Bank. We spoke with representatives for KBC in Los Angeles and they indicated interest in potentially providing an LOC for a similar structured transaction in Scotia. (Exhibit B)

ii) The City of Manhattan Beach, CA – This is a fixed rate TAB completed 2006. These TAB did not require an LOC and were sold on their own credit. They were S&P rated BBB+. (Exhibit C)

iii) McKinleyville, CA – This is a fixed rate TAB completed in 1976 and approved by the Board of Supervisors for Humboldt County and issued through the County. (Exhibit D)

Financing 2 (Long Term WS Bonds)

Once the TAB financing is complete and the improvements under way, the CSD will issue $5 MM of conventional Water and Sewer Bonds (WS Bonds). This will be a 30 year financing at a fixed rate. This financing will be repaid by the new property owners from their monthly water and user fees. This financing is being strategically structured to market rates to allow for compliance with EPA standards.

The structure and characteristics of the WS Bonds are as follows:

1. They will be issued directly by the CSD without the need for voter approval. They are secured by the Water and Sewer fees only.
2. These are very standard type bonds and can be issued without an LOC. The interest rate on the WS Bonds is expected to be around 6%.
3. Attached is the debt schedule run for the WS Bonds.
4. Based on these runs, the average monthly fee per ETU is $53.

As a point of reference and for your information, attached Exhibit E is an example of a similar WS Bond issued in Eureka, CA.

RESIDENTIAL and ETU FEE IMPACT SUMMARY

The structure of the 2-part debt issuance was conceived with the notion that a portion of the improvements would be financed by land sales and revenues generated by the existing land owner Scotia LLC/Marathon and a portion by the new residential and commercial property owners. Concern was given primarily to the amount of monthly fees per EDU when sizing Financing 1 and 2.

Financing 1 TAB– As structured this will have no financial impact on the current or future residents of Scotia. All debt service will be paid by Scotia LLC/Marathon and all principal repayment will come from the sale of the existing residential homes. There is no construction risk or completion risk. The proceeds of the TAB will be to only improve on the existing value of the homes.

Financing 2 WS Bonds - These bonds will be repaid by the local residents from their water and sewer fees. Given the value of the water system along with the amount of improvements being made, this system could support a higher bond amount than $5 Million. The WS Bonds are being sized at $5 Million based on reasonable monthly charges. The monthly fee per EDU is $53.

NCPI OPINION and RECOMMENDATION

It is the opinion that the financings as outlined can be complete within the estimated timeframe. These transactions will be structured to market protocols and standards, and other than ordinary market risks that exist in any public offering, we expect them to be executed as described above.

LIST OF EXHIBITS

ASSESSMENT BONDS

DEFINITION AND PURPOSE

As defined by Proposition 218 and its implementing legislation, an assessment is any levy or charge imposed upon real property by a local agency for a special benefit conferred upon the real property from a public improvement. The term "special benefit" is likewise defined to mean "a particular and distinct benefit over and above general benefits conferred on real property located in the assessment district or to the public at large." Assessment bonds are issued upon the security of the assessments and are payable as to principal, interest, and redemption premiums, if any, from either:

- Scheduled installments respecting unpaid assessments, collected either by a direct billing to the property owner or by posting to the secured property tax roll of the county in which the real property is located, or

- Proceeds of prepayments of assessments made by property owners to discharge the lien of the unpaid assessment on a specific parcel

By far the most common assessment bonds in California local agency debt financing are those issued under the Improvement Bond Act of 1915 (Streets and Highways Code Sections 8500 et seq., the "1915 Act"). In addition to 1915 Act assessment bonds, most local agencies are authorized to issue assessment bonds pursuant to the Improvement Bond Act of 1911 (Streets and Highways Code Sections 5000 et seq., the "1911 Act"), and many charter cities have established their own assessment bond authorizing procedures under their municipal affairs powers. For a more detailed discussion of municipal affairs, see **Chapter 4, State Constitutional Limitations**. Both the 1915 Act and the 1911 Act are more fully discussed later in this chapter.

Issuance of assessment bonds is preceded by assessment proceedings in which the governing body of the local agency:

- Establishes the scope of the improvement project to be financed, in whole or in part, with assessment bond proceeds

- Identifies the parcels of land that are perceived to receive a special benefit from the subject improvements

- Establishes the estimated cost and expense of constructing the subject improvements and providing for the assessment proceedings and bond financing

- Determines a fair and equitable allocation of the estimated cost and expense to the benefited parcels in proportion to such benefit

- Following a public hearing, imposes and records the assessments as enforceable liens against the respective benefited parcels and provides an opportunity for property owners to prepay the assessment, without interest, prior to bond issuance

It is common practice to refer to the established area of benefit as an assessment district, but the assessment district is not a separate legal entity—it has no separate governing board and no authority to act independently of the local agency that establishes it, it cannot sue or be sued, and it is not a special district akin to a community services district, water district, or public utility district.

As discussed in more detail below, the proceeds of sale of assessment bonds may be used to finance a reasonably broad range of local public improvements, provided that the local agency can legitimately make a finding that such improvements impart special benefit to the parcels of land to be assessed. Examples of local public improvements that are commonly financed, in whole or in part, with assessment bond proceeds are local streets, streetlights, landscaping, sidewalks, sanitary sewers, water supply and distribution facilities, flood control and drainage improvements, and parking facilities.

LEGAL AUTHORITY; ISSUERS

California has many laws that permit assessment districts to be established to finance public improvements. Some of the laws combine the provisions governing issuance of bonds with the provisions for establishment of the assessment district in the same statute. Other laws only specify the procedures necessary to establish the assessment district and incorporate by reference another statute for the issuance of the assessment bonds.

Three general state statutory schemes are most commonly used in California assessment district financing and are discussed in detail in this section. They are:

- The 1911 Act, which contains both provisions for establishing assessment districts and for the issuance of bonds

- The Municipal Improvement Act of 1913 (Streets and Highways Code Sections 10000 et seq., the "1913 Act"), which contains only provisions for establishing assessment districts

- The 1915 Act, which contains only provisions for the issuance of bonds, and requires use of another statute to establish the assessment district, authorize the public improvements, and impose the assessments

In addition to these three general statutory schemes, which are available to local agencies generally, charter cities may enact their own procedures for assessment district formation and assessment bond issuance, and many charter cities have done so.

With the adoption of Proposition 218, Article XIIID was added to the California Constitution (see the discussion of Proposition 218 in **Chapter 4, State Constitutional Limitations – The Jarvis Family of Initiatives**). Section 4 of Article XIIID specifies both procedural requirements and various limitations applicable to all assessments, irrespective of whether they are imposed pursuant to a general statutory scheme or a charter city procedure, and Section 3 of Article XIIID provides that no assessment may be imposed by a local agency (including a charter city) except in conformity with Article XIIID in general and Section 4 in particular.

Article XIIID was added to the constitution without any provision being made in Proposition 218 for the amendment or repeal of pre-existing statutory provisions which were in conflict with the provisions of Section 4. Effective July 1, 1997, Sections 53750 et seq. were added to the California Government Code to begin the process of addressing such conflicts. The statutory provisions are discussed in more detail below. In summary, Government Code Section 53753, which closely follows the language of Section 4 itself, first specifies requirements for notice, protest, and hearing in assessment proceedings and, second, provides that any local agency complying with the Section 53753 provisions shall not be required to comply with any other statutory notice, protest, and hearing requirements that would otherwise apply, whether or not such other statutory requirements are in conflict with the corresponding provisions of Section 53753. See **Appendix D – Legal References – Amalgamated Edition of Proposition 218 and SB 919** for more detail on these provisions.

In 2003, the California Legislature enacted SB 392, which was signed into law by the Governor as Chapter 194, Statutes of 2003. Chapter 194 provided for the amendment or repeal of various pre-existing statutory provisions of the 1911 Act and the 1913 Act, primarily related to notice, protest, and hearing procedures, which were in conflict with the provisions of Government Code Section 53753. As a result, the notice, protest, and hearing provisions of the 1911 Act and 1913 Act are now consistent with the provisions of Section 4. Further legislation may be introduced as additional experience is gained in conducting assessment proceedings in light of the requirements and limitations of Section 4. In the meantime, local agencies considering the use of assessment bond financing will need to consider the practical and legal effects of these new provisions early in the planning process for any such proposed financing program.

In addition, all assessment district proceedings leading to assessment bond issuance (unless they are specifically exempted) must comply with the provisions of two other statutory schemes—the Special Assessment Investigation, Limitation and Majority Protest Act of 1931 (Streets and Highways Code Sections 2800 et seq., the "1931 Act") and Streets and Highways Code Sections 3100 et seq. (the "Notice and Foreclosure Provisions"). See further discussion in the section entitled **Process for Establishing Assessment Districts and Levying Assessments.**

The California courts have consistently distinguished assessments from taxes for purposes of both Articles XIIIA and XIIIB of the California Constitution. See the discussion of Articles XIIIA and XIIIB in **Chapter 4, State Constitutional Limitations – The Jarvis Family of Initiatives**. Accordingly, assessments are not subject to the limitation respecting ad valorem

taxes imposed by Section 1 of Article XIIIA, are not subject to the voter approval requirements respecting special taxes imposed by Section 4 of Article XIIIA, and are not subject to the appropriations limit of Article XIIIB, which applies only to proceeds of taxes.

See **Appendix D – Legal References – Table D-1-1** for a list of various statutes that authorize assessment districts to be established, including whether those statutes also authorize bonds to be issued and, if so, the type of bonds authorized.

See **Appendix D – Legal References – Table D-1-2** for a list of some of the local agencies that are authorized to establish assessment districts and issue assessment bonds. Where applicable, reference to the statute that authorizes that particular local agency to establish an assessment district is also provided in **Table D-1-2**.

IMPROVEMENTS THAT MAY BE FINANCED

The public improvements that are authorized to be financed by assessments levied under the 1911 Act and the 1913 Act are listed below. The reader should note, however, that even though these categories of improvements are expressly authorized by statute, the local agency will be required, in the course of the particular assessment proceeding with its own particular facts and circumstances, to make findings of special benefit to the parcels to be assessed and distinguish between the special benefit to those parcels and general benefit to the public at large. To the extent that the subject improvements are perceived to impart some degree of general benefit to the public at large, a corresponding portion of the cost and expense of the improvements must be financed from other sources legally available for such purposes. Section 4 of Article XIIID provides added emphasis to this issue by specifically providing that a local agency must separate the general benefits from the special benefits conferred by the improvements and only special benefits are assessable.

Many of the local agencies shown in **Appendix D – Legal References – Table D-1-2** that are authorized to levy assessments are authorized by their enabling statute to finance public improvements in addition to those public improvements authorized by the 1911 Act and the 1913 Act. Therefore, this list is not exhaustive. Furthermore, in appropriate circumstances, certain expenses deemed incidental to the improvement project, legal proceedings, and bond financing may be included in the assessments levied and therefore in the bond financing. See Section 5024 in the 1911 Act for illustrations of such incidental expenses.

Improvements Authorized by the 1911 Act. Section 5101 in the 1911 Act authorizes the following types of work and improvements:

- Grading and paving of streets and roads
- Construction of sidewalks, parks, bridges, tunnels, subways, or viaducts
- Sanitary sewers and related facilities

- Storm drains and related facilities
- Street lighting facilities and electrical and telephone service facilities, including the underground placement of existing overhead facilities
- Pipes and hydrants for fire protection
- Breakwaters, levies, and other flood or erosion protection
- Wells, pumps, dams, reservoirs, pipes, and other domestic water supply facilities
- Tanks, mains, pipes, and other domestic or industrial gas supply facilities
- Bomb or fallout shelters
- Wharves, piers, docks, and other navigation facilities
- Retaining walls, ornamental vegetation, land stabilization, and all other work auxiliary to any of the above

Improvements Authorized by the 1913 Act. Section 10102 in the 1913 Act authorizes assessments for any of the work and improvements enumerated in the 1911 Act, and Section 10100 supplements the 1911 Act list as follows:

- Water supply
- Electric power supply facilities
- Gas supply facilities
- Lighting facilities
- Transportation facilities designed to serve an area not to exceed three square miles and designed to operate on rails or similar devices
- Any "other works and improvements of a local nature"

With limited exceptions, the public work and improvements financed by assessment bonds issued on the security of assessments imposed under either the 1911 Act or the 1913 Act must be performed and constructed on public property, defined to include easements and rights-of-way that have been dedicated to and accepted by the local agency. An example of an exception relates to work on private property undertaken for the purpose of grade adjustment or to remedy a geologic hazard (including retaining walls or seismic safety work and improvements).

Acquisition of Improvements. Both the 1911 Act and the 1913 Act authorize the acquisition of previously constructed improvements under certain circumstances. Care is required to assure compliance with the specific requirements for such acquisition.

PROCESS FOR ESTABLISHING ASSESSMENT DISTRICTS AND LEVYING ASSESSMENTS

Preliminary. As indicated above, Proposition 218 added Article XIIID to the California Constitution, and Section 4 of Article XIIID contains important new assessment procedures and other provisions which may conflict with pre-existing statutory provisions, (the assessment procedures of the 1911 Act and the 1913 Act were not harmonized with Section 4 until 2003). Pursuant to Section 3 of Article XIIID, whenever such conflicts exist, the provisions of Section 4 govern. Aside from this supremacy provision of Section 3, Proposition 218 did nothing to further alleviate the resulting conflicts.

As a first step in resolving this situation, the California Legislature enacted SB 919 in June 1997, and it was signed into law by the Governor on July 1, 1997, as Chapter 38, Statutes of 1997, and took immediate effect as urgency legislation. Following is a brief discussion of those provisions of Chapter 38 that apply to assessment procedures and assessment bond issuance.

Section 53753. Section 5 of Chapter 38 added Sections 53750 et seq. to the California Government Code under the title of the Proposition 218 Omnibus Implementation Act (the "Implementation Act"). Section 53750 provides definitions of numerous terms utilized in Proposition 218. Section 53753.5 confirms that once a local agency has conducted assessment proceedings in compliance with the notice, protest, and hearing provisions of the Implementation Act, then those provisions shall not apply to any subsequent annual assessment procedure which may be required by the specific statutory scheme being utilized, unless that subsequent annual procedure entails an increase in assessments, as defined by Section 53750.

The most significant provisions of the Implementation Act for this discussion of assessment procedures are set forth in Government Code Section 53753, summarized as follows:

- The hearing on the engineer's report must be preceded by at least 45 days mailed notice to the affected property owners, and the notice must include:
    - The total amount proposed to be assessed and the amount proposed to be assessed on the specific parcel
    - The duration of the payments
    - The reason for the assessment and the basis upon which the amount was calculated
    - The date, time, and place of the public hearing
    - A summary of the procedures for completion, return, and tabulation of the newly-required assessment ballots, the central feature of the new protest procedures mandated by Proposition 218
    - A statement that the assessment shall not be imposed if the assessment ballots submitted in opposition to the assessment exceed those submitted in favor, with each

ballot weighted according to the amount of the proposed assessment on the parcel to which the ballot pertains

- ❒ The mailed notice must be accompanied by the assessment ballot, which must include:
  - The address to which the completed ballot may be returned, whether by mail or in person
  - Identification of the parcel to which the ballot pertains or a place where the property owner can identify the parcel
  - Identification of the property owner or a place where the owner can indicate his or her name, together with a signature line where the ballot can be signed prior to being returned
  - A place where the property owner can mark the ballot to indicate either support for or opposition to the proposed assessment
- ❒ The use of punchcard or bar-coded ballots is expressly permitted
- ❒ The marked and signed ballots must then be returned to the local agency in some manner that assures receipt prior to the close of the hearing. Each assessment ballot must be in a form that conceals its contents once it is sealed by the person submitting the ballot. Inclusion of a return envelope with the mailed notice and ballot is optional. If return envelopes are utilized, the local agency should provide a clear statement of the deadline for receipt of the marked and signed ballots.
- ❒ At any time prior to the conclusion of the public testimony at the hearing, any ballot previously filed may be changed or withdrawn by the person who submitted the ballot
- ❒ At the conclusion of the hearing, the ballots must be tabulated, using the weighted tabulation by amount of assessment. In the event co-owners of a parcel submit conflicting ballots, those ballots are allocated weight in accordance with the proportionality of ownership interests.
- ❒ A majority protest exists if ballots in opposition to the assessment exceed ballots in support, and in the event of a majority protest, the proposed assessment cannot be imposed. Unlike the pre-2003 provisions of both the 1911 Act and the 1913 Act, there is no authority to override a majority protest under any circumstances.

Because neither Proposition 218 nor the Implementation Act provides many of the essential components of a workable statutory scheme for imposing assessments and issuing assessment bonds, local agencies will still be required to select both a procedural act and a bond issuance act. A discussed above, both the 1911 Act and the 1913 Act are now consistent with Proposition 218 and Government Code Section 53753. However, to the extent that local agencies other than

charter cities seek to utilize assessment bond financing under a statutory scheme which is not yet consistent with Proposition 218 and Government Code Section 53753, they will be required to conduct the specified assessment proceedings in a manner which complies with the "overlay" of Proposition 218 and Section 53753.

The most widely used assessment procedure in California is the 1913 Act, and a summary of its provisions follows. The 1913 Act's provisions pertaining to notice, protest, and hearing are now expressly superseded by the corresponding provisions of Government Code Section 53753, as summarized above. Of particular significance is the introduction of the assessment ballot for measuring protest, the change from land area to amount of assessments in measuring protests, and the elimination of any ability to override a majority protest.

1913 Act. With the exception of developer-oriented assessment proceedings, public improvements constructed under the 1913 Act are constructed by public works contracts of the local agency, awarded after competitive bidding. Unless the local agency chooses otherwise and makes provision for construction financing to come from another source (such as bond anticipation notes, which are expressly authorized by the 1915 Act), the assessment bonds are sold prior to construction, and the monthly progress payments are made to the contractor from bond proceeds. The procedures for establishing an assessment district and imposing the assessments under the 1913 Act are summarized as follows:

- The legal proceedings start with approval of the boundary map, acceptance of petitions (if utilized), and adoption of the Resolution of Intention, which among other things directs the preparation and filing of the engineer's report. The boundary map is then recorded.

- The engineer's report containing the matters prescribed by the 1913 Act (as supplemented by Proposition 218) is filed and preliminarily approved, the hearing is scheduled, and the improvement project is put out to bid. The hearing schedule must allow for preparation of notices and assessment ballots and the completion of mailing them at least 45 days prior to the hearing.

- As assessment ballots are returned prior to the hearing, the responsible person (typically, the county clerk) compiles a record of ballots received and places them in safekeeping as public documents

- Prior to the hearing, project bids are opened, results analyzed, and the apparent best bidder identified. If the apparent best bid is below the cost estimate, consideration should be given to preparing an amended engineer's report to reflect reduced costs and reduced assessments, if appropriate. On the other hand, if the apparent best bid results in increased estimated costs and thus the need to increase assessments, a new cycle of notice, ballots, and hearing will be required.

- The hearing is conducted (and continued if appropriate) and at its conclusion ballots are tabulated and results announced. As indicated above, a majority protest, as

defined by Government Code Section 53753, precludes imposing the assessments. Otherwise, the local agency may approve the engineer's report (as initially filed or as modified), impose the assessments, and order the work and improvements to proceed.

- The assessments are recorded and become liens, and cash payment notices are mailed to the property owners. At the conclusion of the 30-day cash payment period, the local agency determines the amount of unpaid assessments.

- The local agency authorizes issuance of the assessment bonds and concurrently or later approves the Official Statement, if any, sells the bonds by either competitive or negotiated sale, and awards the construction contract

- Upon receipt of bond sale proceeds, a notice to proceed is given to the contractor and project construction commences. Upon completion of construction, leftover construction funds, if any, are distributed in accordance with the 1913 Act.

- Annually, over the life of the assessment bonds, installments on account of unpaid assessments, with interest, are collected from property owners (either by direct billing or by posting to the county property tax roll, depending on which kind of assessment bonds have been issued) and the monies collected are used to pay the bonds' principal and interest

1911 Act. Before 2003, a distinguishing feature of 1911 Act proceedings was that the hearing process was bifurcated. The subjects of the first hearing were limited to establishment of the boundary and the scope of the improvement project. The critical subjects of total costs and individual assessments were deferred to the second hearing, which was conducted following completion of the authorized work and improvements. Of particular significance was the fact that while the 1911 Act provided a majority protest procedure, it was tied to the first hearing, prior to a determination of total costs and individual assessments.

Clearly, this last feature of the 1911 Act was problematic under Proposition 218 and Government Code Section 53753. First, compliance with Section 53753 required that the proposed individual assessments be determined and that mailed notice of them be given to the affected property owners before the protest procedures were conducted. Second, assuming that a local agency chose, pursuant to Section 53753, to conduct protest procedures in connection with the second 1911 Act hearing (which was held after the improvement work is completed) this course of action ran the risk that the local agency would be precluded from imposing the assessments, by virtue of a majority protest, but with the improvement work already completed.

The 2003 amendments to the 1911 Act resolved these issues by amending or repealing those notice, protest, and hearing provisions that were inconsistent with the provisions of Proposition 218 and Government Code Section 53753. Now, the provisions of the 1911 Act concerning notice, protest, and hearing procedures expressly mandate that these procedures be conducted in accordance with the provisions of Government Code Section 52753.

All Assessment Proceedings. In addition to Proposition 218 and Government Code Section 53753, all assessment proceedings are subject to the provisions of the 1931 Act and the Notice and Foreclosure Provisions. The requirements of these two sets of provisions are detailed, and a full description of them is beyond the scope of this discussion. However, a brief summary follows.

The 1931 Act establishes a procedure for giving notice and holding a public hearing that essentially parallels the procedures contained in the 1911 Act and the 1913 Act, contains a limitation on the assessment that can be levied against any parcel, as measured by the value of the parcel, and establishes a procedure for a majority protest against the assessment. The 1931 Act also provides for a number of methods for dispensing with its requirements. The property owner petition is the most common of these.

The Notice and Foreclosure Provisions require that a boundary map and an assessment diagram be created according to the detailed specifications in the statute and filed with the county recorder. A notice of assessment in the form prescribed by the statute also must be recorded. The assessment lien becomes effective only upon the recordation of the notice of assessment in the office of the county recorder. Whenever assessment proceedings are abandoned, the resolution abandoning the proceedings must be filed with the county recorder.

Assessments (or the installments thereon) that are not paid when due become delinquent and subject the property on which the assessment lien is placed to foreclosure proceedings to recover the delinquent amounts, including late charges, penalties, and costs and expenses of foreclosure. Notice of any pending foreclosure proceedings must be given as provided by the Notice and Foreclosure Provisions. This notice is in addition to any other notice that may be required by the statutes that authorize the assessment districts.

PROCESS OF ISSUING ASSESSMENT BONDS

1911 Act Bonds. Under the bond issuance provisions of the 1911 Act (Sections 6400 et seq.), an assessment bond may be issued for the amount of each unpaid assessment of $150 or more on a particular parcel. The security for each assessment bond issued under the 1911 Act is the unpaid assessment lien on a particular parcel, and the principal amount of each bond is equal to the unpaid assessment on that parcel. Thus, one assessment bond may be issued in the amount of $1,500 and another may be issued in the amount of $265. Assessments under $150 may be collected upon the tax roll if the legislative body so determines.

1911 Act assessment bonds provide for payment of a principal installment to the bondholder annually, on January 2. The governing body may provide for the annual principal installments to be payable in other than equal annual amounts and may provide for the classification of assessments into different maturities so that some assessments (and, correspondingly, some of the assessment bonds) mature over a shorter period of time than others. Interest is payable semiannually on January 2 and July 2.

Local agencies considering the issuance of 1911 Act bonds should be aware of the following:

- At the present time, services of paying agent, registrar, and transfer agent are not generally available from outside service providers

- Billing and collection of installments of principal and interest on account of unpaid assessments to pay 1911 Act bonds cannot be made on the county property tax rolls, as with 1915 Act bonds

Accordingly, the treasurer of the local agency must handle these duties, and the staffing for and costs of performing these duties needs to be a part of the preliminary planning for the issuance of 1911 Act bonds. Furthermore, 1911 Act bond provisions (unlike those of the 1915 Act) contain no authorization to include administrative costs in the installments billed to property owners, so those costs must be estimated and provided for either as up-front incidental costs, which are funded directly from bond proceeds, or as annual administrative costs authorized under the statutory scheme for imposing the assessments.

Another important feature that distinguishes 1911 Act bonds from 1915 Act bonds is that foreclosure proceedings for enforcement of delinquent installments of principal or interest must be brought by and in the name of the bondholder, rather than that of the issuer as is the case with 1915 Act bonds. This feature is generally regarded as material in the determination of suitability of 1911 Act bonds for some investors who may not have the time or resources to pursue foreclosure on their own behalf.

For these and other reasons, issuance of 1911 Act bonds is relatively uncommon and generally regarded as suitable for only a limited segment of the investor community.

1915 Act Bonds. As stated earlier in this section, by far the more common assessment bond in California is the 1915 Act bond. The structure of a 1915 Act assessment bond issue is very different from the 1911 Act bond and much more closely resembles the structure of the other common debt instruments described in the succeeding sections of this chapter. Rather than issuing each individual bond upon the security of a specific unpaid assessment, 1915 Act bonds are issued in a pooling arrangement, with the security for all bonds of the issue being the aggregate of the liens on all the parcels within the assessment district. The entire principal amount of a specific 1915 Act bond matures on a specific September 2, and principal denominations are typically $5,000 or integral multiples thereof, with authority to depart from the $5,000 norm when appropriate. Interest is payable semiannually on March 2 and September 2. The maturity schedule for a 1915 Act bond issue is customarily structured to provide for equal annual debt service, although alternatives are authorized.

1915 Act bonds are customarily sold on a negotiated basis. The Resolution of Intention generally specifies a maximum interest rate and a maximum maturity. The final interest rate or rates, together with the maturity schedule, is customarily established when the bonds are sold.

Under the 1915 Act, certain determinations regarding terms of 1915 Act assessment bonds must be resolved and a determination stated in the Resolution of Intention. These are:

- Whether the local agency will obligate itself to advance available funds of the local agency to cure any deficiency that may occur in the bond redemption fund
- Whether a 2 percent delinquent penalty may be charged per month on the amount of a delinquent assessment, rather than the customary one-time late charges and the lower monthly penalties applicable to property tax delinquencies
- Whether the local agency will preclude itself from refunding the bonds for some stated period of time following issuance (not to exceed 10 years after the date of issuance)

LIMITATIONS ON TERMS OF BONDS

1911 Act assessment bonds are subject to the following limitations and requirements, imposed by statute:

- The maximum stated interest rate is 12 percent per year
- No authorization for capitalized interest
- Interest is required to be payable on January 2 and July 2
- Principal is required to be payable on January 2
- Bonds must provide a redemption premium of 5 percent over the life of the bond
- Property owners may prepay the entire outstanding assessment at any time upon payment of a premium to the bondholder
- The maximum maturity is 25 years
- The bonds must be serial bonds
- No authorization is provided for establishment of a reserve fund

1915 Act assessment bonds are subject to the following limitations and requirements by statute:

- The maximum stated interest rate is 12 percent per year
- Two years of capitalized interest is authorized
- Variable interest rate bonds are permitted
- Interest is required to be payable March 2 and September 2

- Principal is required to be payable on September 2
- Redemption premiums must be at least 3 percent for the first five years, but after that the local agency, at the time of bond issuance, may provide for redemption without premium
- The maximum maturity is 40 years
- The bonds may be serial bonds, term bonds, or any combination thereof
- Certain amounts may be collected each year to reimburse the local agency for the expenses of collection and administration
- Express authorization is provided for establishment of a reserve fund

METHOD OF REPAYMENT AND SECURITY FEATURES

Each 1911 Act bond is payable solely from the installments paid on account of a particular parcel, and payment of such installments is secured solely by the lien on that particular parcel, whereas 1915 Act bonds of a single issue are secured on parity by the pooled assessments on all of the parcels assessed for the improvements financed by the issue. 1915 Act bonds also may have a reserve fund for the benefit of bondholders and though rarely done, issuers of 1915 Act bonds are authorized to obligate themselves to advance available funds of the issuer to compensate for delinquent installments from property owners.

Assessments that are not paid when due become delinquent and the parcels upon which the delinquent assessments are levied are subject to judicial foreclosure or, where 1911 Act bonds have been issued, to an administrative foreclosure procedure known as the "treasurer's foreclosure." Delinquent assessments accrue penalties under the 1911 Act at the rate of 2 percent per month for assessment bonds and under the 1915 Act at either the same rate or the rate established for general taxes (currently, an immediate 10 percent late charge and, commencing July 1 after the delinquency, 1.5 percent per month). The first month's penalty under the 1911 Act may be kept by the treasurer as a cost of servicing the delinquency.

When 1911 Act bonds have been issued, the foreclosure accelerates the remaining unpaid principal, with the foreclosure sale price established on that basis. The 1911 Act bond in question is actually surrendered and canceled following completion of the foreclosure sale, and the former bondholder receives either cash, if a third party submitted the winning bid at the sale, or title to the property. When 1915 Act bonds have been issued, there is no acceleration of unpaid principal, and the foreclosure sale price is based upon only the delinquent installments of principal and interest, together with penalties, late charges, and attorneys' fees and costs of foreclosure. Assuming a bid in excess of the minimum, the winning bidder takes title to the parcel subject to the continuing lien of future installments as they come due and payable. In the event no adequate bid is received, further proceedings are required, a discussion of which is beyond the scope of this *Primer*.

Property upon which there are assessment liens may be divided. Both the 1911 Act and the 1915 Act contain provisions by which the remaining unpaid assessment can be apportioned among the new parcels in accordance with the benefits received. Costs associated with the procedure to reapportion the assessment may be paid by the property owner or included in the amended assessment. Under the 1911 Act, except under limited circumstances, the bondholder must generally approve any division of land that secures a bond and new assessment bonds corresponding to the new liens and parcels must be issued to the bondholder.

Generally, assuming the ratio of the value of the land to the amount of the assessment is sufficiently high, no additional security such as a letter of credit or bond insurance is necessary or, if available, cost effective for assessment bonds. In certain circumstances, primarily property development situations where the project land is undeveloped and the assessments are comparatively high, issuers or bond underwriters may require the developer to provide a letter of credit to assure timely payment of assessment installments until such time as the credit risk is reduced through development and sale of at least substantial portions to third parties or the general public. To date, bond insurance has been found to be cost effective only with respect to refunding of assessment bonds after significant portions of the assessed property have been developed and sold.

SPECIAL FEDERAL TAX CONSIDERATIONS

In addition to the special federal tax considerations discussed in this section and relating to whether assessment bonds are private activity bonds, the other limitations and requirements described in **Chapter 3, General Federal Tax Requirements** (such as limitations relating to arbitrage bonds and hedge bonds) continue to apply.

General. Assessment bonds may, under certain circumstances, be private activity bonds, the interest on which is taxable. Each assessment district proceeding that includes property owners who do not constitute the general public (e.g. commercial enterprises, businesses, or developer districts) or that will allow the public improvements financed by the bonds to be used in a special manner by a business entity must be analyzed to determine whether the Private Business Tests or the Private Loan Test are satisfied. These issues must be analyzed with particular care when there is only one property owner, such as a developer.

The Private Loan Test and the "Tax Assessment Loans" Exception. As described in **Chapter 3, General Federal Tax Requirements,** an issue of bonds is an issue of private activity bonds if such issue satisfies the Private Loan Test. For federal tax purposes, assessments paid over time are generally deemed to be loans. Accordingly, assessment bonds would satisfy the Private Loan Test and would be private activity bonds. However, the tax code contains an exception for certain tax assessment loans, which are the deemed loans that arise when a governmental unit permits or requires its residents to pay a tax or assessment over a period of years.

U.S. Treasury regulations explain that tax assessment loans are not treated as loans for purposes of the Private Loan Test if:

- The loans arise from the imposition of a mandatory tax or other assessment of general application
- The assessments are imposed for one or more specific, essential governmental functions, and
- Owners of both business and nonbusiness property benefiting from the financed improvements are eligible or required to make deferred payments on an equal basis

The equal basis rule does not prohibit the use of due on sale clauses in connection with assessment or special tax financings, so long as the due on sale clause does not single out certain sales for special treatment. The equal basis rule does prohibit the guarantee of payment of assessments by a deemed borrower if it is reasonably expected that payments will be required under the guarantee.

Additionally, U.S. Treasury regulations provide some significant guidance on the types of activities or facilities that qualify as "essential governmental functions." In general, utility or system improvements owned by a governmental entity and used by the general public (e.g. streets, telephone, electric and cable television systems, and sewage or water facilities) serve essential governmental functions. Otherwise, the service provided by the financed facilities must be customarily performed by governmental entities and the facilities must be owned by a governmental entity.

Private Business Tests. Even if an assessment bond is not a private loan bond, it still may be a private activity bond if it meets the Private Business Tests.

In general, the special rules for assessment bonds cause the Private Payment or Security Test to be satisfied whenever the Private Business Use Test is satisfied. This follows from a rule that provides "special assessments paid by property owners benefiting from financed improvements are not generally applicable taxes." Payments made in respect of privately used property, even if made by the general public, are "private payments" that count against the Private Payment or Security Test unless the payments are generally applicable taxes. Presumably a broadly spread assessment, such as a city-wide or school district-wide assessment, will be a tax of general application. Otherwise, the Private Payment or Security Test is meaningless for assessment bonds.

Notwithstanding the loss of flexibility as a result of the obsolescence of the Private Payment or Security Test, the Private Business Use Test provides flexibility. Subject to the essential governmental function requirement, governmentally owned facilities will not have private business use to the extent the financed facilities are intended to be available and in fact are reasonably available to individuals as well as businesses. Even a special economic benefit to a

limited number of private businesses and limited actual use by the public will not pose a problem. For example, a governmentally owned dead-end road into a private business park or a remote business location, or a cul-de-sac for an industrial park, is not treated as used in a private trade or business, so long as use of the road is not restricted in any fashion.

Three criteria can be used to determine whether assessment bond proceeds will be treated as governmentally used and not as used in the "trade or business" of a commercial entity or business:

- The facilities are designed to serve and are available for use by members of the general public in the governmental unit on an equal basis
- The ultimate ownership and operation of the facilities is with the governmental unit, and
- Development of the land within the district and transfer of the public improvements to the governmental entity is expected to occur with reasonable speed and in fact occurs promptly upon completion of the public improvements

Although it may not be necessary to satisfy each of these three criteria in every instance, the possibility that any one of them may not be satisfied should trigger a particularly detailed federal tax analysis of the financing transaction. Recently released U.S. Treasury regulations provide significant new guidance for analyzing these issues.

POLICY CONSIDERATIONS

The decision to issue assessment bonds may involve a number of competing policy considerations. Many of the types of improvements that may be financed with assessment bonds also may be financed with Mello-Roos bonds, general obligation bonds, or revenue bonds. Financing improvements with assessment bonds results in distributing the project cost to the parcels deemed specially benefited by the project work and improvements. As an overall strategy for financing certain types of improvements, this may be fair. On the other hand, if similar improvements for other parts of the issuer's jurisdiction were financed with bonds that spread the cost of those improvements more widely, it may be appropriate to finance new improvements of the same type in the same way as before.

Second, once the decision to use assessment bonds has been made, the determination of the method for spreading the assessments is a often a sensitive and contentious matter, especially if the owners of some of the parcels to be assessed object to one or more aspects of the assessment proceeding. Managing the objections of unhappy property owners, especially in light of Proposition 218, may entail a determination by the local agency to pay some portion of the project cost and expense from other sources.

Finally, assessment proceedings often are considered in connection with new land development within the jurisdiction of the local agency, and the question arises as to whether the local agency

should support or encourage the development or the developer in such a manner. Many local agencies have adopted formal policies and guidelines to assist in making these sensitive policy determinations.

In the opinion of Rutan & Tucker, LLP, Bond Counsel, based upon an analysis of existing laws, regulations, rulings and court decisions, and assuming, among other matters, compliance with certain covenants, interest on the Series A Bonds is excluded from gross income for federal income tax purposes under Section 103 of the Internal Revenue Code of 1986 and is exempt from State of California personal income taxes. In the further opinion of Bond Counsel, interest on the Series A Bonds is not a specific preference item for purposes of the federal individual or corporate alternative minimum taxes, although Bond Counsel observes that interest is included in adjusted current earnings when calculating corporate alternative minimum taxable income. Bond Counsel expresses no opinion regarding any other tax consequences relating to the ownership or disposition of, or the accrual or receipt of interest on, the Series A Bonds. See "CONCLUDING INFORMATION—Tax Matters" herein.

NEW ISSUE—FULL BOOK—ENTRY ONLY

RATINGS: Moody's: Aa2/VMIG1
Fitch's: AA-/F1+
(See "Ratings" herein)

$40,000,000
CITY OF IRVINE
ASSESSMENT DISTRICT NO. 07-22
LIMITED OBLIGATION IMPROVEMENT BONDS, ADJUSTABLE RATE SERIES A

Dated: Date of Delivery | Price: 100% | Due: September 2, 2032

The $40,000,000 aggregate principal amount of City of Irvine Assessment District No. 07-22 Limited Obligation Improvement Bonds, Adjustable Rate Series A (the "Series A Bonds") offered hereby are issued pursuant to provisions of the Improvement Bond Act of 1915 (Division 10 of the California Streets and Highways Code) (the "1915 Act"), Chapter 5 of Division 7 of Title 2 of the City of Irvine Municipal Code and an Indenture, dated as of May 1, 2007 (the "Indenture"), by and between the City of Irvine (the "City") and The Bank of New York Trust Company, N.A., as trustee (the "Trustee"), to acquire infrastructure improvements to be undertaken for the benefit of Assessment District No. 07-22. All of the improvements to be acquired with the proceeds of the Series A Bonds will be undertaken as provided by the Municipal Improvement Act of 1913 (Division 12 of the California Streets and Highways Code), Chapter 5 of Division 7 of Title 2 of the City of Irvine Municipal Code, Article XIIID of the Constitution of the State of California, and the Proposition 218 Omnibus Implementation Act (Statutes of 1997, Chapter 38).

At their issuance, the Series A Bonds will bear interest at a Daily Rate determined for each day and payable on the fifth Business Day of each month, commencing July 9, 2007. The maximum interest rate on the Series A Bonds is 12% per annum.

The Series A Bonds initially have the benefit of a direct pay irrevocable letter of credit (the "Letter of Credit") issued by

KBC Bank N.V., New York Branch

(the "Bank"). The Letter of Credit will authorize the Trustee, subject to strict compliance with the terms of the Letter of Credit, to draw on the Letter of Credit up to an amount sufficient to pay (a) the principal of the Series A Bonds when due, (b) the purchase price of Series A Bonds that are purchased pursuant to tenders and that are not remarketed, and (c) up to 55 days' interest accrued on the Series A Bonds, all as more fully described in this Official Statement. The Letter of Credit does not support Series A Bonds that bear interest at a Fixed Rate. The Letter of Credit expires on June 14, 2012, unless extended or terminated on the earlier occurrence of certain events described in this Official Statement. The Bank is not obligated to extend the Letter of Credit. See "LETTER OF CREDIT AND THE REIMBURSEMENT AGREEMENT—The Initial Letter of Credit" herein. On the fifth Business Day prior to the expiration or termination of the Letter of Credit, the Series A Bonds will be subject to mandatory tender for purchase.

The Series A Bonds are subject to optional and mandatory redemption by the City prior to maturity, to mandatory purchase under certain circumstances and, under certain circumstances, to purchase on the demand of their Owners, as described in this Official Statement. See "THE SERIES A BONDS—Redemption—Mandatory Purchase—*Tenders for Purchase upon Election of Owner*" herein.

The Series A Bonds will be issuable as fully registered bonds in denominations of $100,000 and any integral multiple of $1,000 in excess thereof. Initially, the Series A Bonds will be delivered in fully registered form only and when delivered, will be registered in the name of Cede & Co., as nominee for The Depository Trust Company, New York, New York ("DTC"), which will act as securities depository for the Series A Bonds. Ownership interests in the Series A Bonds may be purchased in denominations and in book-entry form only as described herein. Upon receipt of payments of principal of, premium, if any, and interest on the Series A Bonds, DTC will in turn remit such principal, premium, if any, and interest to the participants in DTC (as described herein) for subsequent disbursement to the beneficial owners of the Series A Bonds. See "Appendix C—Book-Entry System."

All obligations of the City under the Series A Bonds are not general obligations of the City, but are limited obligations, payable solely from, first, proceeds of draws made under the Letter of Credit pursuant to the Indenture and, second, from assessments levied on the parcels within Assessment District No. 07-22 (including prepayments thereof), together with interest thereon and any penalties received with respect thereto. Neither the faith and credit nor the taxing power of the City, or of the State of California, or any political subdivision thereof, is pledged to the payment of the Series A Bonds. Notwithstanding any other provision of the Indenture, the City is not obligated to advance available funds from the City treasury to cure any deficiency in the Redemption Fund established under the Indenture.

THIS COVER PAGE CONTAINS CERTAIN INFORMATION FOR QUICK REFERENCE ONLY. IT IS NOT A COMPLETE SUMMARY OF THE SERIES A BONDS. INVESTORS SHOULD READ THE ENTIRE OFFICIAL STATEMENT TO OBTAIN INFORMATION ESSENTIAL TO THE MAKING OF AN INFORMED INVESTMENT DECISION.

The Series A Bonds are offered when, as and if issued and delivered to the Underwriters. The Series A Bonds are subject to the approval as to certain legal matters by Rutan & Tucker, LLP, Costa Mesa, California, Bond Counsel, and the satisfaction of certain other conditions. Certain legal matters will be passed upon for the City by Rutan & Tucker, LLP, Costa Mesa, California, City Attorney, for the Underwriters by Orrick, Herrington & Sutcliffe LLP, Los Angeles, California, and for the Bank with respect to the Letter of Credit by Ballard Spahr Andrews & Ingersoll, LLP, Philadelphia, Pennsylvania, and Linklaters LLP, Brussels, Belgium. It is anticipated that the Series A Bonds in book-entry form will be available for delivery through the facilities of DTC in New York, New York on or about June 14, 2007.

Banc of America Securities LLC

UBS Investment Bank

Dated: June 14, 2007

NEW ISSUE FULL BOOK ENTRY

RATING FOR EACH SERIES
S&P: "BBB+"
(See "RATING" herein.)

In the opinion of Hawkins Delafield & Wood LLP, Bond Counsel to the City, under existing statutes and court decisions and assuming continuing compliance with certain tax covenants described herein, (i) interest on the Bonds is excluded from gross income for Federal income tax purposes pursuant to Section 103 of the Internal Revenue Code of 1986, as amended (the "Code"), and (ii) interest on the Bonds is not treated as a preference item in calculating the alternative minimum tax imposed on individuals and corporations under the Code; such interest, however, is included in the adjusted current earnings of certain corporations for purposes of calculating the alternative minimum tax imposed on such corporations. In addition, in the opinion of Bond Counsel to the City, under existing statutes, interest on the Bonds is exempt from personal income taxes imposed by the State of California. See "TAX MATTERS" herein.

CITY OF MANHATTAN BEACH

$4,525,000 UNDERGROUND UTILITY ASSESSMENT DISTRICT NO. 05-2 Limited Obligation Improvement Bonds, Series 2006

$4,682,823 UNDERGROUND UTILITY ASSESSMENT DISTRICT NO. 05-6 Limited Obligation Improvement Bonds, Series 2006

Dated: Date of Delivery

Due: September 2, as shown on inside cover

Pursuant to the provisions of the Improvement Bond Act of 1915 (Division 10 of the California Streets and Highways Code) (as amended, the "1915 Act"), the City of Manhattan Beach, California (the "City"), is issuing two separate bond issues, the City of Manhattan Beach Underground Utility Assessment District No. 05-2 Limited Obligation Improvement Bonds, Series 2006 (the "05-2 Bonds") and the City of Manhattan Beach Underground Utility Assessment District No. 05-6 Limited Obligation Improvement Bonds, Series 2006 (the "05-6 Bonds") (collectively, the "Bonds" and, individually, a "Series of Bonds"), for the purpose of financing the undergrounding of existing overhead utility facilities (each a "Project" and collectively, the "Projects") within the City's Underground Utility Assessment District No. 05-2 (the "05-2 District"), and Underground Utility Assessment District No. 05-6 (the "05-6 District") (collectively, the "Districts" and individually, a "District"), respectively, establish separate Reserve Funds (as defined herein) for each Series of Bonds and pay costs of issuance of the Bonds.

Interest on the Bonds is payable on March 2, 2007, and semiannually thereafter on March 2 and September 2 of each year. Each Series of Bonds is issued as fully registered bonds, registered in the name of Cede & Co. as nominee of The Depository Trust Company, New York, New York ("DTC"), and will be available to ultimate purchasers in the denomination of $5,000 or any integral multiple thereof (plus one odd Bond amount with respect to the 05-6 Bonds), under the book-entry system maintained by DTC. Ultimate purchasers of the Bonds will not receive physical certificates representing their interest in the Bonds. U.S. Bank National Association, Los Angeles, California, the fiscal agent, registrar, and transfer agent for each Series of Bonds (the "Fiscal Agent") will make payments of the principal of, premium, if any, and interest on the Bonds directly to DTC, or its nominee, Cede & Co., so long as DTC or Cede & Co. is the registered owner of the Bonds. Disbursements of such payments to the Beneficial Owners of the Bonds is the responsibility of DTC's Participants and Indirect Participants, as more fully described herein. See APPENDIX E – "THE BOOK-ENTRY SYSTEM".

Each Series of Bonds is issued upon and secured by a portion of the Outstanding Assessments (as defined hereinafter) levied on parcels within its corresponding District. The Bonds are special limited obligations of the City and are not payable from the City's general fund. Outstanding Assessment installments of principal and interest sufficient to meet annual debt service on each Series of Bonds are to be included on the regular Los Angeles County tax bills sent to owners of property against which there are Outstanding Assessments. These annual assessment installments are to be used to pay debt service on their corresponding Series of Bonds as they become due. To provide funds for payment of each Series of Bonds and the interest thereon as a result of any delinquent installments, the City will establish a separate Reserve Fund for each Series of Bonds from its corresponding Bond proceeds, as described herein. See "SECURITY FOR THE BONDS" herein.

Property in the 05-2 District subject to the Outstanding Assessments is comprised of 143 residential parcels owned by various homeowners. Property in the 05-6 District subject to the Outstanding Assessments is comprised of 215 residential parcels owned by various homeowners, and one parcel zoned as commercial. See "THE DISTRICTS" herein.

The Bonds are subject to optional redemption and mandatory sinking fund redemption as more fully described herein. See "THE BONDS – Redemption" herein. Transfers of property ownership and other similar circumstances could result in prepayment of all or part of the Outstanding Assessments. Such prepayment would result in redemption of a portion of a Series of Bonds prior to their stated maturities.

THE BONDS ARE LIMITED OBLIGATION IMPROVEMENT BONDS AND ARE SECURED SOLELY BY THE OUTSTANDING ASSESSMENTS AND THE AMOUNTS IN THE RESPECTIVE BOND FUND AND RESERVE FUND OF EACH SERIES OF BONDS. THE BONDS ARE NOT SECURED BY THE GENERAL TAXING POWER OF THE CITY OF MANHATTAN BEACH, THE COUNTY OF LOS ANGELES (THE "COUNTY"), OR THE STATE OF CALIFORNIA (THE "STATE") OR ANY POLITICAL SUBDIVISION OF THE STATE. NEITHER THE FAITH AND CREDIT NOR THE TAXING POWER OF THE CITY, THE COUNTY, THE STATE OR ANY POLITICAL SUBDIVISION THEREOF IS PLEDGED TO THE PAYMENT OF THE BONDS. THE INFORMATION SET FORTH IN THIS OFFICIAL STATEMENT, INCLUDING INFORMATION UNDER THE HEADING "SPECIAL RISK FACTORS," SHOULD BE READ IN ITS ENTIRETY.

This cover page contains certain information for general reference only. It is not a summary of this issue. Investors are advised to read the entire Official Statement to obtain information essential to the making of an informed investment decision.

The Bonds are offered when, as, and if issued by the City and received by the Underwriter, subject to approval by Hawkins Delafield & Wood LLP, Los Angeles, California, Bond Counsel. Certain legal matters will be passed upon for the City by the City Attorney and by Hawkins Delafield & Wood LLP, Los Angeles, California, Disclosure Counsel. Certain legal matters will be passed upon for the Underwriter by its counsel Orrick, Herrington & Sutcliffe LLP, Los Angeles, California. Gardner, Underwood & Bacon LLC, Los Angeles, California is serving as Financial Advisor to the City. It is anticipated that the Bonds in book entry form will be available for delivery in New York, New York, through the facilities of DTC, on or about August 10, 2006.

UBS Investment Bank

Dated: August 2, 2006

NOTICE INVITING PROPOSALS

$2,540,882.30 IMPROVEMENT BONDS
COUNTY OF HUMBOLDT
McKINLEYVILLE ASSESSMENT DISTRICT NO. 1
AND
$31,957.40 CERTIFICATES
REPRESENTING ASSESSMENTS AGAINST PUBLIC PROPERTY
McKINLEYVILLE ASSESSMENT DISTRICT NO. 1

NOTICE IS HEREBY GIVEN that sealed proposals will be received and opened by a representative of the Board of Supervisors of Humboldt County at the offices of Stone & Youngberg Municipal Financing Consultants, Inc., One California Street, Suite 2750, San Francisco, California 94111, on

MONDAY, AUGUST 30, 1976

at the hour of 2:00 o'clock P.M. for the purchase in one lot of $2,540,882.30 principal amount of improvement bonds of the County of Humboldt designated "Improvement Bonds, County of Humboldt, McKinleyville Assessment District No. 1" and $31,957.40 principal amount of certificates representing assessments against public property in McKinleyville Assessment District No. 1. All proposals must be for the purchase of all of the bonds and the certificates hereby offered for sale, and will be considered subject to the following terms and conditions:

DESCRIPTION OF BONDS: $2,540,882.30 principal amount of bonds, issued under and pursuant to the Municipal Improvement Act of 1913 and the Improvement Bond Act of 1915, numbered consecutively from 1 to 509, inclusive, dated August 26, 1976, all in the denomination of $5,000 (except for bond number 1, which is in the denomination of $882.30). The bonds will mature serially in consecutive numerical order according to the following schedule:

Maturity Date (July 2)	Principal Amount	Maturity Date (July 2)	Principal Amount
1977	$ 60,882.30	1990	$ 95,000.00
1978	35,000.00	1991	100,000.00
1979	40,000.00	1992	110,000.00
1980	45,000.00	1993	120,000.00
1981	45,000.00	1994	125,000.00
1982	50,000.00	1995	135,000.00
1983	55,000.00	1996	150,000.00
1984	60,000.00	1997	160,000.00
1985	65,000.00	1998	175,000.00
1986	70,000.00	1999	185,000.00
1987	75,000.00	2000	200,000.00
1988	80,000.00	2001	220,000.00
1989	85,000.00		

Any bond may be redeemed on any January 2 or July 2 prior to its fixed maturity date, at the option of the Treasurer of the County of Humboldt, upon giving the notice provided in the Improvement Bond Act of 1915 and upon payment of the principal amount thereof and interest accrued thereon to the date of redemption, plus a redemption premium of five per cent (5%) of the principal amount thereof.

DESCRIPTION OF CERTIFICATES: $31,957.40 principal amount of certificates, issued under and pursuant to the Municipal Improvement Act of 1913 and the Improvement Act of 1911, dated August 26, 1976. Each of the certificates is issued upon and represents an unpaid assessment against public property in said proceedings, and is payable exclusively from the assessment levied upon the lot or parcel of land described on the face of such certificate for the payment of the improvement therein described. Each certificate matures in installments (which are in even annual proportions of the total assessment) on June 2 in each of the years 1978 to 1982, inclusive.

INTEREST RATE: Maximum eight per cent (8%) per annum, payable (for the bonds) on January 2, 1977 and semiannually thereafter on January 2 and July 2 in each year, and payable (for the certificates) on June 2, 1978 and semiannually thereafter on June 2 and December 2 of each year. Bidders must specify the rates of interest which the bonds and certificates hereby offered for sale shall bear. Bidders may specify any number of separate interest rates, and any rate may be repeated as often as desired; provided, however, that (i) the same rate of interest must be bid for all of the certificates and for all of the bonds maturing on July 2, 1977 through July 2, 1982; (ii) the difference between the highest and lowest coupon rates specified in any bid shall not exceed two per cent (2%); (iii) each interest rate specified must be a multiple of 1/20 of 1% and a zero rate of interest cannot be specified; (iv) no bond or certificate shall bear more than one rate of interest, no interest payment shall be evidenced by more than one coupon and supplemental coupons will not be permitted; (v) each bond and certificate shall bear interest from its date to its stated maturity date at the interest rate specified in the bid; (vi) all bonds of the same maturity shall bear the same rate of interest; and (vii) any premium must be paid in bank funds as part of the purchase price, and no bid will be accepted which provides for the cancellation and surrender of any interest coupon or for the waiver of interest or other concession by the bidder as a substitute for payment in full of the purchase price in bank funds. Bids which do not conform to the terms of this paragraph will be rejected.

PAYMENT: Both principal and interest on the bonds and certificates are payable in lawful money of the United States of America at the office of the Treasurer of the County of Humboldt, in Eureka, California.

EXECUTION AND REGISTRATION: Coupon bonds and certificates will be issued by the County of Humboldt. The bonds and certificates will be executed by the manual signature of at least one official authorized to execute the same. The bonds and certificates are registrable only as to both principal and interest, and after being registered are not subject to discharge from registration.

SECURITY OF BONDS: The bonds are issued upon and secured by unpaid assessments levied in assessment proceedings, and such unpaid assessments, together with interest thereon, constitute a trust fund for the redemption and payment of the principal of the bonds and the interest thereon, and all the bonds are secured by the moneys in the redemption fund created pursuant to said proceedings and by the unpaid assessments, and, including principal and interest, are payable exclusively out of said redemption fund. Under the circumstances provided in the Improvement Bond Act of 1915, the County of Humboldt, in the absence of any other bidder, is obligated, by deposits into the redemption fund, to purchase land at delinquent assessment sales and to pay future delinquent installments of assessments and interest thereon until such land is resold by the County of Humboldt or redeemed and, if there are no funds available therefor in the County of Humboldt treasury, to levy a special tax upon the taxable property in the County of Humboldt, not to exceed $.10 on each $100 of assessable property in any one year, to raise funds sufficient for such purpose.

TAX EXEMPT STATUS: In the event that prior to the delivery of the bonds and certificates (a) the income received by any private holder from bonds or certificates of the same type and character shall be declared to be taxable (either at the time of such declaration or at any future date) under any federal income tax law, either by the terms of such laws or by ruling of a federal income tax authority or official which is followed by the Internal Revenue Service, or by decision of any federal court; or (b) any federal income tax law is adopted which will have a substantial adverse tax effect on holders of the bonds or certificates as such, the successful bidder may, at his option, prior to the tender of the

NEW ISSUE - BOOK-ENTRY ONLY

Ratings: Moody's: Aaa
Standard & Poor's: AAA

In the opinion of Jones Hall, A Professional Law Corporation, San Francisco, California, Bond Counsel, subject, however, to certain qualifications described herein, under existing law, the interest on the Bonds is excluded from gross income for federal income tax purposes and such interest is not an item of tax preference for purposes of the federal alternative minimum tax imposed on individuals and corporations, although for the purpose of computing the alternative minimum tax imposed on certain corporations, such interest is taken into account in determining certain income and earnings., In the further opinion of Bond Counsel, such interest is exempt from California personal income taxes. See "TAX MATTERS" herein.

$2,975,000
CITY OF EUREKA, CALIFORNIA
WASTEWATER REVENUE REFUNDING BONDS, SERIES 1998

Dated: February 1, 1998

Due: September 1, as shown below

The City of Eureka Wastewater Revenue Refunding Bonds, Series 1998 (the "Series 1998 Bonds") are being issued by the City to provide funds, together with other available moneys, for the refunding of all of the City's outstanding Wastewater Revenue Refunding Bonds, Series 1988. See "THE SERIES 1998 BONDS" herein.

Interest on the Series 1998 Bonds is payable on September 1, 1998, and semiannually thereafter on March 1 and September 1 of each year. Principal is payable on the dates set forth below. The Series 1998 Bonds are being issued in fully registered form and, when issued, will be registered in the name of Cede & Co., as nominee of The Depository Trust Company, New York, New York ("DTC"). DTC will act as securities depository of the Series 1998 Bonds. Individual purchases of interests in the Series 1998 Bonds will be made in book-entry form only, in the principal amount of $5,000 or any integral multiple thereof. Purchasers of such interests will not receive bonds representing their interests in the Series 1998 Bonds. Principal of and interest on the Series 1998 Bonds are payable directly by First Trust of California, National Association, San Francisco, California, as trustee (the "Trustee"), to DTC, which is obligated in turn to remit such principal and interest to DTC Participants for subsequent disbursement to the Beneficial Owners of the Series 1998 Bonds, as described herein. See "BOOK-ENTRY SYSTEM" herein.

The Series 1998 Bonds are not subject to optional redemption but are subject to special mandatory redemption. See "THE SERIES 1998 BONDS - Redemption Provisions" herein.

The Series 1998 Bonds and the interest thereon are payable solely from a first lien on and pledge of the Net Revenues derived by the City from the operation of the City's wastewater treatment system. There is currently no other parity debt to which the Net Revenues are pledged. The Series 1998 Bonds do not constitute an indebtedness of the City within the meaning of any constitutional, statutory, or charter provisions or limitations and the City is not obligated to levy any ad valorem taxes therefor or to use any other funds of the City to pay the Series 1998 Bonds or the interest thereon.

The scheduled payment of principal of and interest on the Series 1998 Bonds when due will be guaranteed under an insurance policy to be issued concurrently with the delivery of the Series 1998 Bonds by FINANCIAL SECURITY ASSURANCE INC.

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MATURITY SCHEDULE

Maturity Date (September 1)	Principal Amount	Interest Rate	Price or Yield	Maturity Date (September 1)	Principal Amount	Interest Rate	Price or Yield
1998	325,000	3.8%	100.104%	2002	380,000	3.9%	99.792%
1999	350,000	3.8	100.146	2003	385,000	4.0	100.000
2000	355,000	3.8	100.000	2004	400,000	4.0	99.714
2001	370,000	3.9	100.000	2005	410,000	4.1	100.000

The Series 1998 Bonds will be offered when, as and if issued and received by the purchasers, subject to the approval of validity by Jones Hall, A Professional Law Corporation, San Francisco, California, Bond Counsel. Certain legal matters will be passed on for the City by the City Attorney. It is anticipated that the Series 1998 Bonds, in book-entry form, will be available for delivery to DTC in New York, New York on or about February 18, 1998.

Date: February 12, 1998

The Detailed Engineering Analysis is bound under separate cover.