Chapter 4

Potential Contaminant Sources within the Local Source Water System

4.0 Potential Contaminant Sources within the Local Source Water System

Stormwater pollution from point sources and nonpoint sources is a challenging water quality problem. Stormwater runoff is generated when precipitation from rain and snowmelt flows over land or impervious surfaces. As the runoff flows over paved streets, parking lots, building rooftops, lawns, farms, construction and industrial sites it accumulates debris, chemicals, sediment or other pollutants that can adversely affect water quality in rivers, lakes, and coastal waters if the runoff is discharged untreated.

The type and severity of pollution is related to land use type and intensity; therefore, the patterns of land use and population provide a tool in its prediction and prevention (**Tables 4.1 & 3.5**). Research conducted in numerous geographical areas, concentrating on various variables and employing widely different methods, has revealed that stream degradation occurs at relatively low levels of imperviousness, such as 10 to 20 percent (USEPA, 1999). The primary method to control stormwater discharges is the use of best management practices (BMPs).

Table 4.1 - Land Use within Watershed Boundaries
SanGIS update 2010 & 2015

San Diego River System				
El Capitan Watershed	2015		2010	
Land Use Category	Acres	% Acres	Acres	% Acres
Parks & Open Space Preserves	24,165	20.1	16,113	13.4
Vacant & Undeveloped Land	78,823	65.5	87,390	72.6
Water	2,279	1.9	2,279	1.9
Total- Undeveloped	105,267	87.5	105,782	87.9
Agriculture	1,800	1.5	1,729	1.4
Commercial	88	0.1	98	0.1
Commercial Recreation	1,163	1.0	1,210	1.0
Industrial	57	0.0	57	0.0
Mobile Home Park	35	0.0	36	0.0
Multi-Family Residential	43	0.0	88	0.1
Schools, Hospitals, Public & Private Institutions	266	0.2	255	0.2
Single Family Residential	535	0.4	457	0.4
Spaced Rural Residential	10,026	8.3	9,520	7.9
Transportation, Communication & Utilities	1,031	0.9	1,060	0.9
Under Construction	5	0.0	8	0.0
Total – Developed	15,049	12.5	14,518	12.1

Table 4.1 Land Use within Watershed Boundaries
SanGIS update 2010 & 2015 (contd)

Murray Watershed Land Use Category	2015 Acres	 % Acres	2010 Acres	 % Acres
Parks & Open Space Preserves	495	21.5	499	21.7
Vacant & Undeveloped Land	1	0.0	1	0.0
Water	177	7.7	177	7.7
Total- Undeveloped	673	29.3	677	29.5
Commercial	39	1.7	42	1.8
Commercial Recreation	145	6.3	146	6.4
Multi-Family Residential	62	2.7	62	2.7
Schools, Hospitals, Public & Private Institutions	110	4.8	107	4.7
Single Family Residential	873	38.0	870	37.9
Transportation, Communication & Utilities	395	17.2	391	17.0
Under Construction	0	0.0	0	0.0
Total – Developed	1,624	70.7	1,618	70.5

San Vicente Watershed Land Use Category	2015 Acres	 % Acres	2010 Acres	 % Acres
Parks & Open Space Preserves	17,541	36.8	16,286	34.2
Vacant & Undeveloped Land	17,768	37.3	19,503	41.0
Water	1,062	2.2	1,063	2.2
Total- Undeveloped	36,371	76.4	36,852	77.4
Agriculture	1,282	2.7	1,456	3.1
Commercial	63	0.1	63	0.1
Commercial Recreation	1,055	2.2	962	2.0
Industrial	3	0.0	3	0.0
Junkyard, Dump, Landfill	2	0.0	11	0.0
Mobile Home Park	0	0.0	7	0.0
Schools, Hospitals, Public & Private Institutions	32	0.1	32	0.1
Single Family Residential	1,775	3.7	1,893	4.0
Spaced Rural Residential	6,366	13.4	5,518	11.6
Transportation, Communication & Utilities	674	1.4	684	1.4
Under Construction	0	0.0	122	0.3
Total – Developed	11,252	23.6	10,751	22.6

Sutherland Watershed Land Use Category	2015 Acres	 % Acres	2010 Acres	 % Acres

Table 4.1 Land Use within Watershed Boundaries
SanGIS update 2010 & 2015 (contd)

Parks & Open Space Preserves	9,094	26.3	8,713	25.2
Vacant & Undeveloped Land	17,125	49.6	17,585	50.9
Water	535	1.5	547	1.6
Total- Undeveloped	26,754	77.4	26,845	77.7
Agriculture	6,597	19.1	6,549	19.0
Commercial	11	0.0	12	0.0
Commercial Recreation	181	0.5	183	0.5
Single Family Residential	32	0.1	31	0.1
Spaced Rural Residential	796	2.3	755	2.2
Transportation, Communication & Utilities	178	0.5	176	0.5
Total – Developed	7,795	22.6	7,706	22.3
Otay-Cottonwood System				
Barrett Watershed	2015		2010	
Land Use Category	Acres	% Acres	Acres	% Acres
Parks & Open Space Preserves	26,726	32.1	22,931	27.6
Vacant & Undeveloped Land	51,165	61.5	55,411	66.6
Water	867	1.0	912	1.1
Total- Undeveloped	78,758	94.6	79,254	95.2
Agriculture	919	1.1	934	1.1
Commercial	14	0.0	16	0.0
Commercial Recreation	271	0.3	251	0.3
Mobile Home Park	5	0.0	5	0.0
Schools, Hospitals, Public & Private Institutions	32	0.0	32	0.0
Single Family Residential	406	0.5	402	0.5
Spaced Rural Residential	1,945	2.3	1,437	1.7
Transportation, Communication & Utilities	910	1.1	902	1.1
Total – Developed	4,502	5.4	3,979	4.8
Dulzura Watershed	2015		2010	
Land Use Category	Acres	% Acres	Acres	% Acres
Parks & Open Space Preserves	2,022	28.5	1,987	28.3
Vacant & Undeveloped Land	3,683	51.9	4,184	59.6
Water	0	0.0	0	0.0
Total- Undeveloped	5,705	80.5	6,171	87.8
Schools, Hospitals, Public & Private Institutions	37	0.5	37	0.5
Spaced Rural Residential	1,300	18.3	765	10.9
Transportation, Communication & Utilities	49	0.7	48	0.7

Table 4.1 Land Use within Watershed Boundaries SanGIS update 2010 & 2015 (contd)				
Under Construction	0	0.0	5	0.1
Total – Developed	1,386	19.5	855	12.2
Morena Watershed	2015		2010	
Land Use Category	Acres	% Acres	Acres	% Acres
Parks & Open Space Preserves	4,517	6.1	4,509	6.1
Vacant & Undeveloped Land	60,386	82.1	61,110	83.1
Water	1,565	2.1	1,565	2.1
Total- Undeveloped	66,468	90.4	67,184	91.4
Agriculture	1,618	2.2	1,592	2.2
Commercial	5	0.0	5	0.0
Commercial Recreation	429	0.6	120	0.2
Mobile Home Park	12	0.0	12	0.0
Schools, Hospitals, Public & Private Institutions	127	0.2	127	0.2
Single Family Residential	96	0.1	85	0.1
Spaced Rural Residential	3,233	4.4	2,836	3.9
Transportation, Communication & Utilities	1,554	2.1	1,554	2.1
Total – Developed	7,074	9.6	6,331	8.6
Otay Watershed	2015		2010	
Land Use Category	Acres	% Acres	Acres	% Acres
Parks & Open Space Preserves	36,691	59.2	29,583	47.7
Vacant & Undeveloped Land	14,759	23.8	22,505	36.3
Water	1,041	1.7	1,040	1.7
Total- Undeveloped	52,491	84.6	53,128	85.7
Agriculture	682	1.1	680	1.1
Commercial	6	0.0	6	0.0
Commercial Recreation	448	0.7	448	0.7
Industrial	57	0.1	57	0.1
Schools, Hospitals, Public & Private Institutions	99	0.2	99	0.2
Single Family Residential	422	0.7	337	0.5
Spaced Rural Residential	7,077	11.4	6,511	10.5
Transportation, Communication & Utilities	671	1.1	680	1.1
Under Construction	73	0.1	36	0.1
Total – Developed	9,535	15.4	8,854	14.3

Table 4.1 Land Use within Watershed Boundaries
SanGIS update 2010 & 2015 (contd)

Miramar System				
	2015		2010	
Land Use Category	Acres	% Acres	Acres	% Acres
Parks & Open Space Preserves	352	54.7	350	54.5
Water	135	21.0	135	21.0
Total- Undeveloped	487	75.6	485	75.5
Multi-Family Residential	6	0.9	0	0.0
Single Family Residential	111	17.2	110	17.1
Transportation, Communication & Utilities	40	6.2	41	6.4
Total – Developed	157	24.4	151	23.5

Hodges System				
	2015		2010	
Land Use Category	Acres	% Acres	Acres	% Acres
Parks & Open Space Preserves	50,532	31.9	26,105	16.5
Vacant & Undeveloped Land	40,773	25.8	70,950	44.9
Water	1,001	0.6	1,005	0.6
Total- Undeveloped	92,306	58.3	98,060	62.0
Agriculture	23,166	14.6	22,740	14.4
Commercial	573	0.4	547	0.3
Commercial Recreation	2,075	1.3	2,114	1.3
Industrial	204	0.1	197	0.1
Junkyard, Dump, Landfill	85	0.1	83	0.1
Mobile Home Park	189	0.1	107	0.1
Multi-Family Residential	280	0.2	280	0.2
Schools, Hospitals, Public & Private Institutions	780	0.5	766	0.5
Single Family Residential	9,026	5.7	8,575	5.4
Spaced Rural Residential	24,857	15.7	20,059	12.7
Transportation, Communication & Utilities	4,513	2.9	4,460	2.8
Under Construction	168	0.1	157	0.1
Total – Developed	65,916	41.7	60,085	38.0

4.1 Point Source

In 1972, Congress amended the FWPCA (commonly called the CWA) to prohibit the discharge of any pollutant to waters of the United States from a point source unless the discharge is authorized by an NPDES permit. The NPDES program is designed to track point sources and requires the implementation of the controls necessary to minimize the discharge of pollutants. The USEPA defines a point source as any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation (CAFO), landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged.

Initial efforts to improve water quality under the NPDES program primarily focused on reducing pollutants in industrial process wastewater and municipal sewage. These discharge sources were easily identified as responsible for poor, often drastically degraded, water quality conditions. As pollution control measures for industrial process wastewater and municipal sewage were implemented and refined, it became increasingly evident that more diffuse sources of water pollution were also significant causes of water quality impairment. Specifically, stormwater runoff draining large surface areas, such as agricultural and urban land, was found to be a major cause of water quality impairment, including the nonattainment of designated beneficial uses.

To address the role of stormwater in causing or contributing to water quality impairments, in 1987, Congress wrote Section 402(p) of the FWPCA, bringing stormwater control into the NPDES program. In 1990, the USEPA issued the Phase I Stormwater Rules. These rules require NPDES permits for operators of municipal separate storm sewer systems (MS4s) serving populations over 100,000 and for runoff associated with industry, including construction sites five acres and larger. In 1999, the USEPA issued the Phase II Stormwater Rule to expand the requirements to small MS4s and construction sites between one and five acres in size. The rule also allows other sources not automatically regulated on a national basis to be designated for inclusion based on increased likelihood for localized adverse impact on water quality. Point Sources statutorily do not include return flows from irrigated agriculture or agricultural stormwater runoff, individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge. Today's rule also conditionally excludes storm water discharges from industrial facilities that have "no exposure" of industrial activities or materials to stormwater.

To comply with the SDCWA regulations, industrial and construction permittees must create and implement a stormwater pollution prevention plan, and MS4 permittees must implement a stormwater management plan. These plans document the stormwater control measures (SCMs), sometimes known as best management practices or BMPs, which will be used to prevent stormwater emanating from these sources from degrading nearby water bodies. These SCMs range from structural methods such as detention ponds and bioswales to nonstructural methods such as designing new development to reduce the percentage of impervious surfaces.

Point-source pollutants in surface water and groundwater are usually found in a plume that has the highest concentrations of the pollutant nearest the source with diminishing concentrations as distance from the source increases. The various types of point-source pollutants found in waters are as varied as the types of business, industry, agricultural, and urban sources that produce them.

Whether a discharged chemical is harmful to the aquatic environment depends on a number of factors, including the type of chemical, its concentration, the timing of its release, weather conditions, and the organisms living in the area. Commercial and industrial businesses use hazardous materials in manufacturing or maintenance, and then discharge various wastes from their operations. The raw materials and wastes may include pollutants such as solvents, petroleum products, or heavy metals. Point sources of pollution from agriculture include animal feeding operations, animal waste storage and treatment lagoons, or storage, handling, mixing, and cleaning areas for pesticides, fertilizers, and petroleum. Municipal point sources include wastewater treatment plants, landfills, utility stations, motor pools, and fleet maintenance facilities.

For all of these activities, hazardous materials may be included in the raw materials used in the process as well as in the waste stream for the facility. If the facility or operator does not handle, store, and dispose of the raw materials and wastes properly, these pollutants could end up in the water supply. This may occur through discharges at the end of a pipe to surface water, discharges on the ground that move through the ground with infiltrating rainwater, or direct discharges beneath the ground surface.

The most common point-source pollutants in surface water are:

- High-temperature discharges.
- Pathogens (bacteria, viruses, and *Giardia*).
- Nutrients (nitrogen and phosphorus).

Temperature increases and nutrients can result in excessive plant growth and subsequent decaying organic matter in water that depletes dissolved oxygen levels and consequently stressing or killing vulnerable aquatic life. Pathogens can be hazardous to both human health and aquatic life. Pesticides and other toxic substances can also be hazardous to both human health and aquatic life, but are less commonly found in surface water because of high dilution rates.

Hazardous Material and Waste Sites

Automotive and tractor fuels make up the majority of permitted liquid hazardous storage. These fuels are stored in underground fiberglass-reinforced plastic, catholically protected steel, or steel clad with fiberglass-reinforced plastic. These tanks are installed with a leak interception and detection system.

The data used in this report was obtained from the SWRCB which registers and categorizes open hazardous disposal sites and leaking underground storage tanks (LUSTs). These are categorized as: inactive, site assessment, verification monitoring, assessment & interim remedial action, and remediation. The underground storage tanks (USTs) are categorized as registered in (**Table 4.2**)

The US EPA issued revised UST regulations on July 15, 2015. The revisions strengthen the 1988 federal UST regulations by increasing the emphasis on properly operating and maintaining UST systems.

On August 20, 2015 the State Water Resources Control Board notified UST owners and operators they must comply with the federal UST regulations, in addition to California UST statutes and regulations. The new federal UST regulations became effective on October 13, 2015. The new federal UST regulations have been published in the Federal Registry which can be access at the following link: http://www.gpo.gov/fdsys/pkg/FR-2015-07-15/pdf/2015-15914.pdf

Table 4.2 - Open Hazardous Disposal Sites & Permitted Underground Storage Tanks within Local Source System Boundaries SWRCB 2015			
San Diego River System			
El Capitan Watershed Status	Number of Sites Clean up & Disposal Sites	LUST	UST
Open – Inactive	0	0	NA
Open - Site Assessment	0	0	NA
Open - Verification Monitoring	0	0	NA
Open – Closing in monitoring	1	1	NA
Open – Remediation	0	5	NA
Open - Verification Monitoring	0	0	NA
Registered	NA	NA	9
Total 2015	1	6	9
Murray Watershed Status	Number of Sites Clean up & Disposal Sites	LUST	UST
Open – Inactive	0	0	NA
Open - Site Assessment	1	0	NA
Open - Verification Monitoring	0	0	NA
Open – Closing in monitoring	0	0	NA
Open – Remediation	0	3	NA
Open - Verification Monitoring	0	0	NA
Registered	NA	NA	6
Total 2015	1	3	6
San Vicente Watershed Status	Number of Sites Clean up & Disposal Sites	LUST	UST

Table 4.2 - Open Hazardous Disposal Sites & Permitted Underground Storage Tanks within Local Source System Boundaries (contd)			
SWRCB 2015			
Open – Inactive	0	0	NA
Open - Site Assessment	0	0	NA
Open - Verification Monitoring	0	0	NA
Open – Closing in monitoring	0	0	NA
Open – Remediation	0	0	NA
Open - Verification Monitoring	0	0	NA
Registered	NA	NA	1
Total 2015	0	0	1
Sutherland Watershed Status	Number of Sites Clean up & Disposal Sites	LUST	UST
Open – Inactive	0	0	NA
Open - Site Assessment	0	0	NA
Open - Verification Monitoring	0	1	NA
Open – Closing in monitoring	0	0	NA
Open – Remediation	0	0	NA
Open - Verification Monitoring	0	0	NA
Registered	NA	NA	1
Total 2015	0	1	1
San Diego River System			
Grand Total 2015	2	10	17
Grand Total 2010	6	14	19
Otay-Cottonwood System			
Barrett Watershed Status	Number of Sites Clean up & Disposal Sites	LUST	UST
Open – Inactive	0	0	NA
Open - Site Assessment	0	0	NA
Open - Verification Monitoring	0	0	NA
Open – Closing in monitoring	0	0	NA

Table 4.2 -Open Hazardous Disposal Sites & Permitted Underground Storage Tanks within Local Source System Boundaries (contd) SWRCB 2015			
Open – Remediation	0	0	NA
Open - Verification Monitoring	0	0	NA
Registered	NA	NA	3
Total 2015	0	0	3
Dulzura Watershed Status	Number of Sites Clean up & Disposal Sites	LUST	UST
Open – Inactive	0	0	NA
Open - Site Assessment	0	0	NA
Open - Verification Monitoring	0	0	NA
Open – Closing in monitoring	0	0	NA
Open – Remediation	0	0	NA
Open - Verification Monitoring	0	0	NA
Registered	NA	NA	0
Total 2015	0	0	0
Morena Watershed Status	Number of Sites Clean up & Disposal Sites	LUST	UST
Open – Inactive	0	0	NA
Open - Site Assessment	0	0	NA
Open - Verification Monitoring	0	0	NA
Open – Closing in monitoring	0	0	NA
Open – Remediation	0	0	NA
Open - Verification Monitoring	0	0	NA
Registered	NA	NA	2
Total 2015	0	0	2
Otay Watershed Status	Number of Sites Clean up & Disposal Sites	LUST	UST
Open – Inactive	0	0	NA
Open - Site Assessment	1	0	NA
Open - Verification Monitoring	0	0	NA
Open – Closing in monitoring	0	0	NA

Table 4.2 - Open Hazardous Disposal Sites & Permitted Underground Storage Tanks within Local Source System Boundaries (contd)			
SWRCB 2015			
Open – Remediation	0	0	NA
Open - Verification Monitoring	0	0	NA
Registered	NA	NA	2
Total 2015	1	0	2
Otay-Cottonwood System			
Grand Total 2015	1	0	7
Grand Total 2010	2	1	5
Hodges Watershed			
Status	Number of Sites Clean up & Disposal Sites	LUST	UST
Open – Inactive	0	0	NA
Open - Site Assessment	1	0	NA
Open - Verification Monitoring	1	0	NA
Open – Closing in monitoring	1	1	NA
Open-Assessment & Interim Remedial Action	0	2	NA
Open – Remediation	4	6	NA
Open - Verification Monitoring	0	0	NA
Registered	NA	NA	35
Total 2015	7	9	35
Total 2010	8	22	35
Miramar Watershed			
Status	Number of Sites Clean up & Disposal Sites	LUST	UST
Total 2015	0	0	0
Total 2010	0	0	0

Animal Feeding Operations

Animal feeding operations (AFO) are agriculture operations where animals are raised in confined situations and feed is brought to the animals rather than the animals grazing in pastures. Byproducts of these facilities include manure (feces and urine), spent bedding material, animal parts, animal mortality, and feed lot runoff. Source water quality may become impaired due to contaminates originating at these facilities. The primary pollutants associated with animal wastes are nutrients, pathogens, salts, organic matter, solids and volatile & odorous compounds. Much of the waste generated at AFO's is ultimately recycled by application on cropland and pastures. With dairy farms and poultry operations the waste is removed and either stored long term or disposed of frequently. Contamination of surface waters can potentially come from regular activities such as land application of manure wastes and storm water runoff from animal holding areas. Rain events pose risks to facilities such as stored manure, waste lagoons and storage ponds that can runoff or overflow.

The AFO data used in this report derives from two sources. First, data for poultry farms was generated using information from the San Diego County Department of Environmental Health, which is the body that regulates poultry ranches. Secondly, data for dairy farms was created using information from the Regional Water Quality Control Board (RWQCB), which regulates dairy operations.

Poultry Farms

Poultry production in the United States fall into three primary categories: 1) Broilers, which are raised for meat 2) Layers, which produce table eggs and eggs for replenishing both the layers and the broiler flocks 3) Turkeys, which can be divided into meat birds and egg layers. In the City's watershed there are no Turkey ranches, this report will concentrate on the Broilers and Layers.

Broiler production is an integrated industry, which means that the birds are owned by the company that processes and markets them. While some of the farms are owned by the integrator, many are not and the integrator pays the farmer to raise the birds. Broilers are raised in a confined environment, typically raised on the floor of the structure, where they are allowed to move about freely. The floor is cover with an absorbent, high carbon material, which is referred to as litter (i.e. Sawdust, wood shavings, etc.). The litter serves as bedding material, absorbent and serves as manure storage. When the birds mature they are removed from the houses, which are cleaned and sanitized. The waste material is then sent off site or kept on the ranch.

Layers production is somewhat different from broiler production. Layers are raised in cages and their manure falls below the cages were it can be collected and ultimately land –applied. Two methods are used in layer production for the removal of manure: 1) The "frequent cleanout" method is where the manure is taken out once a week and spread near the houses and either dried there or hauled away by a composting operation, 2) The "drying and coning" method is where the manure is allowed to dry under the cages which builds up in cones, and every 6 months the manure except for a 6 inch layer is removed, the manure that is removed is pretty dry and is then hauled off site or kept on site to use for composting spent hens. All of the ranches keep a certain amount of manure on site because every 2 years the birds are past their prime, as layers, and are destroyed and composted on site since they cannot be taken to a land fill.

The San Diego County Department of Environmental Health does not require any permits to operate a commercial poultry farm. In addition, Poultry Farms do not discharge a significant amount of wastewater, so the RWQCB does not require these operations to have a permit. However, watering and cooling systems are generally used, and requirements mandate that these systems be installed in a manner that prevents backflow, overflow, splashes and leaks on manure waste. Furthermore, the Community Health Division of Environmental Health regulates poultry operations for fly breeding and inspects the farms at least once each year.

Since the 2010 WSS, the City's watersheds have seen a decrease in the total number of poultry ranches from nine to eight (**Table 4.3**). As in the 2010 WSS, all the poultry ranches are located in the southern portion of Hodges Watershed near Santa Maria Creek.

Table 4.3- Poultry Ranches within Local Source Water System Boundaries
SanGIS updates 2010, 2015

San Diego River System			
Watershed	Ranch Name	Manure Management	Total Birds
El Capitan			
Total	0		0
Murray			
Total	0		0
San Vicente			
Total	0		0
Sutherland			
Total	0		0
San Diego River System			
Grand Total 2015	0		0
Grand Total 2010	0		0
Otay-Cottonwood System			
Watershed	Ranch Name	Manure Management	Total Birds
Barrett			
Total	0		0
Dulzura			
Total	0		0
Morena			
Total	0		0
Otay			
Total	0		0
Otay-Cottonwood System			
Grand Total 2015	0		0
Grand Total 2010	0		0

Table 4.3- Poultry Ranches within Local Source Water System Boundaries
SanGIS updates 2010, 2015 (contd)

Watershed	Ranch Name	Manure Management	Total Birds
Miramar System			
Miramar			
Total 2015	0		0
Total 2010	0		0
Hodges System			
Watershed	Ranch Name	Manure Management	Total Birds
Hodges			
	Brouwer's Poultry	Floor litter	60000
	Cebe Farms Main Ranch	Floor litter	95000
	Ramona Ranch	Floor litter	85000
	Eben-haezer Ranch	Drying and coning	30000
	Pine Hills Egg Ranch	Frequent cleanout	530000
	Ramona Egg Ranch	Frequent cleanout	0
	Ramona Duck Farm	Floor litter	14500
	Fluegge Egg Ranch (Crownhill)	Frequent cleanout	95000
Total 2015	8		909,500
Total 2010	9		1,752,000

Dairy Farms

Dairy farms are comprised of housing facilities for milking cows, dry cows, and replacements, cropland to grow forge based crops like corn silage and haylage, storage facilities for these and purchased forages (silages), and manure storage and treatment facilities. Cows are typically milked two to three times per day and are generally washed before each milking. In addition, corrals and barns are generally washed daily. It is estimated that tending one cow requires 50 gallons of waste water discharge each day. Manure is rich in organic nitrogen and phosphorous and is recycled to crop land as fertilizer. Sources of pollutants from dairy operations include manure storage, recycling of manure on cropland, milking center wastewater, stormwater runoff and silage leachate.

The RWQCB issues waste water discharge permits for dairy operations. Each dairy farm is issued a permit for a maximum number of milk cows, which are adult females that provide milk. However, the herd is also composed of heifers, dry cows, and calves. They also issue Orders specific to individual dairies, which contain prohibitions, discharge specifications, facility designs, operation specifications and other guidelines for complying with the Watershed Basin Plan. Dairy farms are then required to submit quarterly reports to the RWQCB that describe herd size, manure disposal, groundwater monitoring results, and other pertinent information. Water quality data provided in these reports includes nitrates and dissolved solids. Furthermore, these facilities are inspected on a quarterly basis.

Since the 2010 WSS, the City's watersheds have seen a decrease in the total number of dairy farms from three to two (**Table 4.4**). As in the 2010 WSS, all the dairy farms are located in Hodges Watershed. There have been no reported discharges from these dairies in the past five years.

Table 4.4- Permitted Dairy Farms within Local Source Water System Boundaries
SanGIS updates 2010, 2015

San Diego River System				
Watershed	Dairy Name	Solid Manure Produced[1] (yds.3/yr.)	Liquid Manure[2] (AFY)	Herd Size[3]
El Capitan				
Total	0	0	0	0
Murray				
Total	0	0	0	0
San Vicente				
Total	0	0	0	0
Sutherland				
Total	0	0	0	0
San Diego River System				
Grand Total 2015	0	0	0	0
Grand Total 2010	0	0	0	0
Otay-Cottonwood System				
Watershed	Dairy Name	Solid Manure Produced[1] (yds.3/yr.)	Liquid Manure[2] (AFY)	Herd Size[3]
Barrett				
Total	0	0	0	0
Dulzura				
Total	0	0	0	0
Morena				
Total	0	0	0	0
Otay				
Total	0	0	0	0
Otay-Cottonwood System				
Grand Total 2015	0	0	0	0
Grand Total 2010	0	0	0	0

Table 4.4 - Permitted Dairy Farms within Local Source Water System Boundaries (contd) SanGIS updates 2010, 2015				
Miramar System				
Watershed	Dairy Name	Solid Manure Produced[1] (yds.3/yr.)	Liquid Manure[2] (AFY)	Herd Size[3]
Miramar				
Total 2015	0	0	0	0
Total 2010	0	0	0	0
Hodges System				
Watershed	Dairy Name	Solid Manure Produced[1] (yds.3/yr.)	Liquid Manure[2] (AFY)	Herd Size[3]
Hodges	T.D Dairy	6500	30	1,375
	Frank Konyn Dairy	9154	47.6	1955
	Dowle Dairy[4]	0	0	NA
Total 2015	2			1,955
Total 2010	3			3,715

1. Manure produce is calculated with the following: one cow produces 6.7 cubic yards of manure per year, one heifer produces 3.3 cubic yards per year and one calf produce 1.3 cubic yards per year.
2. Total volume of liquid manure spread on land under the control of the dairy owner/operator
3. Herd size includes milking cows, heifers, dry cows and calves Non-operational, no dairy cattle on site

Mines (Hard rock)

Discharges from historic abandoned mines affect surface waters throughout the state of California; the USEPA considers these discharges point sources. Pollutants discharging from abandoned mines are generally from the chemical reaction of water and oxygen with naturally occurring residual minerals in the ore body, tailings, or waste rock. The most problematic mines discharge metals in concentrations that are predominantly toxic to aquatic life and pose a threat to human health. Remediation of these mines is very costly and can take many years due to their potential large physical size, remote location, rugged steep terrain, complexity of the natural distribution of the mineralized metal bearing ore, labyrinth of underground workings, and numerous chemical reactions taking place deep underground. Currently, large abandoned mine sites may be impossible to remediate adequately to protect aquatic life, beneficial uses or meet the water quality objectives designated for adjacent receiving waters.

Often the discharges originate from a distinct mine portal, tailings pile, or waste rock disposal area. Soluble pollutants can be released into the environment when rainwater infiltrates into the subsurface where it intersects the residual ore body and underground mine workings. When this oxygenated water contacts a reactive ore body it generates sulfuric acid. The acid in turn can dissolve other elements and minerals including copper, cadmium, lead, and zinc which are especially toxic to fish. The low pH, mineral laden water, referred to as acid mine drainage (AMD), is then collected in the mine workings and discharges from the mine portal where it can enter surface waters. The AMD is commonly toxic to aquatic life and can adversely impact the beneficial uses of the receiving waters. Other discharges, including some where there is no acidity, may contain mercury, arsenic and other substances which pose a threat to human health.

Metal mines may generate highly acidic discharges where the ore is a sulfide mineral or is associated with pyrite. In these cases the predominant metal ion can be iron, zinc, copper, or nickel. The most commonly mined ore of copper, chalcopyrite, is a copper-iron-sulfide and occurs with a range of other sulfides; consequently, copper mines are often major sources of acid mine drainage.

Abandoned gold mines may discharge drainage that contains arsenic in concentrations that pose a threat to human health through ingestion of contaminated domestic drinking water supplies, and if precipitated into the stream sediments, via dermal contact or inhalation of dried precipitates or tailings. Historic gold mines, especially the hydraulic surface mines, may also contain residual mercury used to process and recover the gold. The mercury not only poses a threat to aquatic life, but can bioaccumulate in the food chain and pose a threat to human health through ingestion of contaminated fish.

Wastewater Treatment Facilities

Wastewater**,** also known as sewage, is water-carried wastes, in either solution or suspension produced by residences, businesses, and industries. It is generally composed of 99.9% water with the remaining 0.1% dissolved and suspended material. Wastewater is characterized by its volume or rate of flow, physical condition, chemical constituents, and the bacteriological organisms it contains. Wastewater is generally either treated on site in a private wastewater treatment facility, septic system; or disposed of into a collection system (sanitary sewer system) for treatment at a public wastewater treatment facility.

Wastewater can contain a range of pollutants including: sediment and turbidity; nutrients, particularly nitrogen and phosphorus; toxic compounds, including metals, pesticides and other chemicals; organic matter creating a biochemical oxygen demand; and gross pollutants, including plastic and paper products. Wastewater can carry pathogens that include bacteria, viruses, protozoa, helminthes, molds and fungi.

Human health impacts are dependent on the type and concentration of pollutants in the wastewater, and the duration and method of exposure. Humans can be exposed to pathogens through: contamination of drinking water sources and recreational waters, or direct contact in public areas such as parks and streets. Overflows can also cause organic rich pooling and streams which may result in increased mosquito breeding, which in turn, may create public pest and potential disease situations.

A release of untreated wastewater can exert physical, chemical and biological effects on the receiving environment. This may result in environmental, human health, and aesthetic impacts, which can be both acute and cumulative. Such impacts are dependent on the characteristics of the wastewater and receiving environment, along with the volume and duration of the release. Environmental impacts can be minimal to a localized area if the release is detected and rectified early, or significant if it is located in a sensitive area or volumes are large and occur over time. The potential environmental impacts of sewer overflows are noted in **Table 4.5**.

Table 4.5 -- Environmental Impacts of Untreated Wastewater	
Pollutant	Potential Impact
Suspended Solids	Deposited solids affects benthic habitats
Turbidity	Reduction of water clarity impacting aquatic plants
Nutrients	Stimulation of algae growth
Toxic Compounds	Kills living organisms; disrupts ecology of affected area
Organic Matter	Break-down consumes dissolved oxygen and causes anoxia
Gross Pollutants	Visually unattractive, harmful to wildlife

A Wastewater Treatment Facility provides a multi-stage process to renovate wastewater before reuse or reentry into the environment through a body of water or land application. The degree and method of treatment varies from facility to facility. The goal is to reduce or remove the organic matter, solids, nutrients, pathogens, and other pollutants from the wastewater to meet the Basin Plan water quality objectives of the Hydrographic Sub-area (**Table 4.6**).

Table 4.6 – Permitted Wastewater Treatment Facilities with Permitted Collection Systems within Local Source Water Boundaries

SDRWQCB 2015

San Diego River System				
Watershed	Facility	Hydrologic Unit	Hydrographic Area	Hydrographic Sub-Area
San Vicente	San Vicente WRP	San Diego	San Vicente	Gower
El Capitan	William Heise Park WPCF	San Diego	Boulder Creek	Inaja
	Julian WPCF	San Diego	Boulder Creek	Inaja
Murray	NA	N=0	NA	NA
Sutherland	NA	N=0	NA	NA
	Total 2010	N=3	NA	NA
	Total 2005	N=3	NA	NA
Otay-Cottonwood System				
Watershed	Facility	Hydrologic Unit	Hydrographic Area	Hydrographic Sub-Area

Table 4.6 – Permitted Wastewater Treatment Facilities with Permitted Collection Systems within Local Source Water Boundaries (contd0 SDRWQCB 2015				
Barrett	Pine Valley WPCF	Tijuana	Monument	Pine
Dulzura	NA	N=0	NA	NA
Morena	NA	N=0	NA	NA
Otay	NA	N=0	NA	NA
	Total 2010	N=1	NA	NA
	Total 2015	N=1	NA	NA
Hodges System				
Watershed	Facility	Hydrologic Unit	Hydrographic Area	Hydrographic Sub-Area
Hodges	Santa Maria WRP	San Dieguito	Santa Maria Valley	Ramona
	Total 2015	N=1	NA	NA
	Total 2010	N=1	NA	NA
Miramar System				
Watershed	Facility	Hydrologic Unit	Hydrographic Area	Hydrographic Sub-Area
Miramar	NA	N=0	NA	NA

In general, the Waste Discharge Requirements (WDRs) Program (sometimes also referred to as the "Non Chapter 15 (Non 15) Program") regulates point discharges that are exempt pursuant to Subsection 20090 of Title 27 and not subject to the FWPCA. Exemptions from Title 27 may be granted for nine categories of discharges (such as: sewage or wastewater) that meet, and continue to meet, the preconditions listed for each specific exemption.

San Diego River System

San Vicente Wastewater Reclamation Facility (San Vicente WRF):

The Ramona Municipal Water District (RMWD) is the agency responsible for this facility. WDR Order No. R9-2009-0005 establishes the discharge specifications for the San Vicente WRF.

The treatment system comprises of a headwork’s facility, two oxidation basins, four clarifiers, two return activated biosolid pump stations, five multimedia pressure filters, reverse osmosis facility, chlorine contact chamber, retention ponds, and drying beds. The SDRWQCB requirements permit a 30-day average dry weather effluent flow of up to 0.8 MGD. The plant effluent is discharged to three holding ponds with a capacity or 236 AF located at the facility with an additional 15 AF storage capacity available at Spangler Peak Ranch.

Effluent from the secondary and tertiary treatment process is for irrigation at The Spangler Peak Ranch. Effluent from the tertiary treatment process is used for irrigation at the San Vicente Golf Course.

Biosolids from the San Vicente WRF dewatered in drying beds at the plant site. The waste is routinely hauled to a landfill for final disposal.

The San Vicente Sewer Service Area (SVSSA) is approximately 99% built out and no plans exist for future expansion of SVSSA collection system.

Julian Water Pollution Control Facility (Julian WPCF):

- The County of San Diego is the agency responsible for this facility. WDR Order No. R9-1983-0009 establishes the discharge specifications for the Julian WPCF.

  The treatment and disposal system is comprised of: comminution, two 80,000 gallon oxidation basins and a 225,000-cubic-foot storage/settling basin.
  During periods of high inflows, large on-site effluent storage basins are utilized to maintain discharge rates within permit limits. The SDRWQCB requirements authorize the maximum discharge of 0.040 MGD by spray disposal.

  The treated effluent is disposed on a 14 acre field adjacent to the facility. During wet weather periods when irrigation cannot be successfully practiced, an interceptor ditch, underground drainage system, and storage reservoir with a 24 day capacity prevents effluent runoff from the irrigation area. The facility has a complete oxidation process. There is no solid waste generated from the treatment process at this facility. In the event of biosolids generation, the biosolids would be dried in adjacent containment beds, stored in covered containment structures, and disposed of after testing in a sanitary landfill.

  The sewer collection system includes approximately 3.0 miles of sewer pipe and a gravity conveyance line which transports sewage to the Julian WPCF. Average daily sewage flows (gpd) per connected Equivalent Dwelling Unit (EDU) fluctuate between 79-125 gpd. This variance may be the result of recent local water conservation efforts which can also reduce sewer flows. During fall and winter months, flows increase due to higher tourism levels, and rainwater infiltration into the sewage collection system. Rainwater infiltration generally worsens as collection systems age. In spite of these lower per unit flows, the existing treatment plant is operating at maximum capacity (0.040 MGD). The Julian Sanitation District Board has imposed a sewer moratorium policy that severely limits any new sewer connections due to the sewage treatment capacity issue. New sewer permits in Julian are only issued under very strict criteria, such as a failing septic system, or to previously purchased sewer commitments. Annexations are not allowed, except for septic system failures.

- *William Heise Park Campground Water Pollution Control Facility (William Heise Park Campground WPCF):* The County of San Diego is the agency responsible for this facility. WDR Order No. R9-1993-0009 establishes the discharge specifications for William Heise Park Campground WPCF.

The treatment and disposal system comprises of: package type modified activated sludge plant, storage pond, and percolation pond. The SDRWQCB requirements certify a maximum discharge of 18,000 gpd by spray disposal on approximately two acres of park property. Biosolids are dried in adjacent containment beds, stored in covered containment structures, and disposed of after testing in a sanitary landfill.

Otay-Cottonwood System

- *Pine Valley Water Pollution Control Facility (Pine Valley WPCF):*
  The County of San Diego is the agency responsible for this facility. WDR Order No. R9-1994-0161 establishes the discharge specifications for the Pine Valley WPCF.

  The treatment and disposal system comprises of: aerated oxidation ponds with a 72 day detention time and eight percolation beds. The treated effluent is disposed of through percolation and evaporation in ponds adjacent to the facility, and discharged into the groundwater system. The SDRWQCB requirements certify a maximum discharge of 0.040 MGD.

Sanitary Sewer Overflows (SSOs)

SSOs often contain high levels of suspended solids, pathogens, toxic pollutants, nutrients, oil, and grease. SSOs pollute surface and ground waters, threaten public health, adversely affect aquatic life, and impair the recreational use and aesthetic enjoyment of surface waters. Typical consequences of SSOs include the closure of beaches and other recreational areas, inundated properties, and polluted rivers and streams. Sewage overflows can cause unpleasant sights and odors, even if their human health and environmental impacts are successfully managed. They can be perceived as offensive, and undermine the confidence of the community in the effectiveness of sewerage authorities.

To provide a consistent statewide regulatory approach to address SSOs, in 2006, the SWRCB adopted Statewide General WDRs for Sanitary Sewer Systems: Water Quality Order No. 2006-0003 (Sanitary Sewer Systems WDR), which was update in 2013 MRP (Order 2013-0058-EXEC). The Sanitary Sewer Systems WDR requires public agencies that own or operate sanitary sewer systems to develop and implement sewer system management plans and report all SSOs to the State Water Board's online SSO database.

A sanitary sewer overflow is any overflow, spill, release, discharge or diversion of untreated or partially treated wastewater from a sanitary sewer system. A Sanitary Sewer System is defined by the State Water Resources Control Board as any system of pipes, pump stations, sewer lines, or other conveyances, upstream of a wastewater treatment plant headwork's and which is comprised of more than one mile of pipes and sewer lines, used to collect and convey wastewater to a publicly owned treatment facility. SSOs include:

- Overflows or releases of untreated or partially treated wastewater that reach waters of the United States;
- Overflows or releases of untreated or partially treated wastewater that do not reach waters of the United States; and

- Wastewater backups into buildings and on private property that are caused by blockages or flow conditions within the publicly owned portion of a sanitary sewer system.

In 2013 SWRCB replaced spill Categories 1 and 2 with Categories 1, 2, and 3. Spills are now classified as follows:

- Category 1 – Spills of any volume that reach surface water
- Category 2 – Spills greater than or equal to 1,000 gallons that do not reach surface water
- Category 3 (formerly Category 2) – Spills less than 1,000 gallons that do not reach surface water

All spills to surface water will be in a distinct category with this change. Spill reporting fields were refined and streamlined with stakeholder input.

Table 4.7- Category 1 & 2 Sanitary Sewer Overflows within Local Source Water System Boundaries

SWRCB 2015

San Diego River System

Watershed	Category	Date	Gallons Released	Impacted Surface Waters
El Capitan	2	3/23/2014	4500	None
		Total 2015	4500	
Murray	1	8/28/2011	125	NA/Paved Surface/Storm Drain
	1	12/17/2013	3500	NA/Drainage Channel
		Total 2015	3625	
San Vicente	None			
		Total 2015	0	
Sutherland				
	None	Total 2015	0	
San Diego River System				
	Grand Total 2015		8,125	N=3
	Grand Total 2010		132,631	N=8

Otay-Cottonwood System

Watershed	Category	Date	Gallons Released	Impacted Surface Waters
Barrett	None			
		Total 2015	0	
Dulzura	None			
		Total 2015	0	
Morena	None			
		Total 2015	0	
Otay	1	6/12/2011	7,050	Surface Water
		Total 2015	7050	
Otay-Cottonwood System				
	Grand Total 2015		7,050	N=1

Category 1 & 2 Sanitary Sewer Overflows within Local Source Water System Boundaries (contd) SWRCB 2015				
	Grand Total 2010		0	N=0
Miramar System				
Watershed	Category	Date	Gallons Released	Impacted Surface Waters
Miramar	None			
	Grand Total 2015		0	N=0
	Grand Total 2010		0	N=0
Hodges System				
Watershed	Category	Date	Gallons Released	Impacted Surface Waters
Hodges	1	2/29/2012	3,500	Irrigation Pond
	1	8/1/2013	1,800	Surface Water
	1	3/13/2015	30	Surface Water
	1	4/7/2015	620	Drainage Channel
	1	6/20/2015	50	Surface Water
	1	11/7/2015	119	NA/Drainage Channel
	2	5/28/2014	2,304	None
	2	8/5/2014	2,697	None
	2	11/17/2014	2,227	None
	2	2/17/2015	2,754	None
	Grand Total 2015		16,101	N=10
	Grand Total 2010		421,500	N=17

There is a wide range of potential causes for dry and wet weather sewer overflows including: sewer blockage, pump station failure, system growth or in-growth, system age and condition, system overload from stormwater.

Dry Weather Overflows

Sewer blockages where pipes are completely or partly blocked are the most common cause of dry-weather overflows. Causes can be infiltration from roots, grease, construction, or vandalism. Typically, blockages develop when displaced pipe joints or cracks in pipes permit the entry of soil or tree roots to form an initial obstruction. It is common for the blockage to become worse as the obstruction in the pipes catches grease and solids from sewage.

Pump station failures may be due to factors such as equipment failure or interruptions to the power supply. System growth or in-growth can overburden sewers and sewage pumping stations that are too small to carry sewage from newly developed subdivisions or commercial areas. Overflows are also caused by system deterioration due to age or improper maintenance.

Wet weather Overflows

Wet weather overflows are caused by stormwater infiltrating the sewer system or damage to system caused by erosion of supporting soil. Excess water can enter through the ground into leaky sewers, illegal connections, and broken or badly connected property sewer/drains. This infiltration/inflow can significantly increase flows in sewers during wet weather far beyond the design storm allowance made for the sewers. Exceeding the capacity of the sewers causes overflows at maintenance holes, pump stations, and sewage treatment plants. Soil erosion can cause overflows due to breakage in sewers due to disturbance in the vicinity of the pipelines and land subsidence.

4.2 Nonpoint Source

Nonpoint sources are a diffused pollution source; nonpoint pollution does not emanate from a discernible, confined, and discrete conveyance but generally results from land runoff, precipitation, atmospheric deposition, drainage, seepage or hydrologic modification. The term "nonpoint source" is defined to mean any source of water pollution that does not meet the legal definition of "point source" in section 502(14) of the Clean Water Act. Nonpoint-source pollution is usually found spread out throughout a large area. It is often difficult to trace the exact origin of these pollutants because they result from a wide variety of human activities on the land as well as natural characteristics of the soil, climate, and topography.

Nonpoint sources of pollution in urban areas include paved surfaces where runoff picks up oils, grease, salts, metals, and other toxic materials. Rainfall and irrigation runoff from agricultural and landscaped areas may contain sediment, salts, pesticides, and fertilizers. Areas with a high density of animals such as agricultural livestock and residential are common nonpoint-sources of pathogens and nutrient pollutants. These pollutants are also found in areas where there is a high density of septic systems or where the septic systems are faulty or not maintained properly.

The most common nonpoint-source pollutants in surface water are:

- Sediment
- Pathogens (bacteria, viruses, and *Giardia*)
- Nutrients (nitrogen and phosphorus)

Septic Systems

Sanitary sewers are usually non-existent in rural areas of the country, forcing rural residents to use On-site Wastewater Disposal Systems (OWDS). OWDS have made relatively high density residential development possible in areas where municipal wastewater treatment facilities are not available. Estimates of septic system density for the 2010 WSS were calculated by using census tract data to determine population within each watershed. Next, the data layer containing the sewer mains in San Diego County, obtained from SanGIS, was overlaid with population density to create a new data layer. This data layer was queried to pull out polygons that were unsewered with a population greater than zero. Graduated color was applied to the septic density field to enable visual assessment of high potential concentrations of septic tanks. Since 2010, the County of San Diego which issues permits for OWDS has begun electronically tracking OWDS permits issued in the County. Table 4.10 outline the number of permits issued for OWDS in the various watersheds.

On June 19, 2012, the State Water Resources Control Board (SWRCB) adopted Resolution No. 2012-0032, adopting the Water Quality Control Policy for Sitting, Design, Operation and Maintenance of

Onsite Wastewater Treatment Systems (**OWTS Policy**) and approving the supporting substitute environmental documentation. The administrative record for the OWTS Policy was approved by the Office of Administrative Law (OAL) on November 13, 2012 and the OWTS Policy became effective on May 13, 2013.

The Regional Water Quality Control Board (RWQCB) is required to incorporate the standards established in the OWTS Policy, or equivalent standards that are protective of the environment and public health, into their water quality control plans. Implementation of the OWTS Policy will be overseen by the SWRCB and the RWQCB, and DEH will have the opportunity to implement a Local Agency Management Program (LAMP) approved by RWQCB.

DEH is currently developing a LAMP for review and approval by the RWQCB to allow for the implementation of the OWTS Policy in San Diego County. The LAMP will include siting, design, operation and maintenance requirements for both conventional and alternative OWTS. In addition, DEH is working to modify our local ordinance to allow for the use of alternative OWTS for new construction. OWDS treat and disperse relatively small volumes of wastewater from individual or small numbers of homes and commercial buildings. Poorly managed systems have been named as a concern by nearly every federal and state program that deals with water resource issues. According to various reports and studies, an estimated 10% to 20% of OWDS fail each year. The most common type of onsite sewage system is the septic tank/drain field system. The main function of the tank is to remove the solids from the wastewater. The drain field is used for sub-surface disposal of the septic tank effluent.

Septic tanks remove some solids and condition the effluent for on-site subsurface disposal. The organic solids retained in the tank undergo a process of liquefaction and anaerobic decomposition by bacterial organisms. Waste that is not decomposed by the anaerobic digestion (septage) eventually has to be removed from the septic tank. Septage is the mixture of sludge, fatty materials, and wastewater. The septage is periodically pumped out by licensed companies. Septage can only contaminate groundwater if the septic tank is damaged and begins to leak or if the pumped septage is not disposed properly. The concentrations of possible pollutants in septage are high, and septage has also been found to harbor pathogens. The clarified septic tank effluent is highly odorous, contains finely divided solids, and may contain enteric pathogens. The effluent from the septic tank is disposed of through the drain field where the remaining impurities are trapped and eliminated in the soil. This process of filtration varies with the soil type, the size of the particles, soil texture, and the rate of the water flow. The major pollutants associated with septic systems are nitrates and bacteria.

Conventional OWDS systems work well for the removal of pathogens, and to a lesser extent some but not all other contaminants, when they are installed in areas with appropriate geology, soils, and hydrologic conditions. The amount of slope, soil permeability and texture, soil depths to impermeable soils, bedrock and groundwater, amount and frequency of rainfall, and distances from drinking water sources and surface water bodies are major factors associated with the system's associated environmental effects. Specific soil conditions, such as soil texture, soil structure, pH, salinity, temperature, oxygen, and moisture, affect the soil microorganisms that are essential for breaking down and decomposing wastewater effluent.

A common failure of a system is when the capacity of soil to absorb effluent is exceeded. Inappropriate sitting or design and/or inadequate long-term maintenance are the primary causes of failure. When this happens the wastewater from the drain lines makes its way to the surface. This type of failure occurs when the soil is clogged with waste particles or other substances and it is harder for the water to move through the soil. When the system fails in this way and wastewater makes its way to the surface, water runoff from rain may wash the contaminants into surface waters or into inadequately sealed wells down gradient.

Many chemicals and pathogens are found in untreated or improperly treated sewage and can be a risk to public health. In the case of OWDS, this may occur where people come in direct contact with surfacing effluent or through ingestion of contaminated foods or drinking water, recreational contact, or droplet spray. Indirect contact may occur through contact with sewage-soiled clothing or tools, handling of pets that have had contact with sewage, or through vectors such as rodents or other organisms in contact with untreated sewage. Other indirect health effects may take place where vectors such as mosquitoes breed in surfacing effluent and may then carry diseases not related to sewage to human and animal populations.

Table 4.8- Septic System Permits Issued (2010-2015) within Local Source Water System Boundaries

County of San Diego 2015

San Diego River System

Watershed	# of Permits Issued
El Capitan	
	40
Murray	
	0
San Vicente	
	8
Sutherland	
	3
San Diego River System	
2015 Total	51

Otay-Cottonwood System

Watershed	# of Permits Issued
Barrett	
	4
Dulzura	
	1
Morena	
	0
Otay	
	15
Otay-Cottonwood System	
2015 Total	20

Table 4.8 – Septic System Permits Issued (2010-2015) within Local Source Water System Boundaries (contd)	
County of San Diego 2015	
Miramar System	
Watershed	# of Permits Issued
Miramar	
2015 Total	0
Hodges System	
Watershed	# of Permits Issued
Hodges	
2015 Total	92

Agriculture

The impact of Agriculture on water quality depends on the type of agricultural activity employed, the grade or slope of an area, and the erodibility and texture of the soil. Soil erosion and sedimentation, nutrients, pesticides, and irrigation runoff are the major agricultural concerns to nonpoint source pollution. The USEPA has estimated that about 75 percent of the sediment, 52 percent of the nitrogen loading, and 70 percent of the phosphorus loading that enters waterways of the 48 contiguous states originates in agricultural settings.

Soil erosion results in nutrient depletion and to a reduction of soil depth and texture all of which directly affect plant growth. Soil erosion may also lead to changes in river channels, and to sedimentation in rivers, lakes and reservoirs. In agriculture, erosion occurs when fields are cleared of vegetation to prepare for crop planting or when vegetation is removed by grazing animals. The physical erosion potential of some soil may be exacerbated by previous agricultural practices which may have reduced the chemical fertility of the soil. The loss in fertility slows vegetative growth and leaves the soil surface exposed to wind and rain. Rates of soil erosion are usually much higher on cropland than on grassland or forest because the soil surface is exposed for at least part of the year during cultivation and the early stages of crop growth.

Application of fertilizers such as nitrogen or phosphorus may result in pollutants entering water courses or the groundwater. There is evidence that river and groundwater nitrate levels have increased as a result of increased use of nitrogen fertilizers. Ingestion of water with elevated levels of nitrates and nitrites poses a threat to human health. In addition, fertilizer entering surface waters can result in eutrophication or nutrient enrichment of the water body causing phytoplankton, cyanobacteria, and other aquatic plants become more abundant. When the increased mass of organic matter subsequently dies and decomposes it can release toxins (cyanotoxins) and deplete the dissolved oxygen content of the water. Under reduced oxygen conditions, foul odors are generated, fish populations are adversely affected, and the aesthetic quality and recreational value of the water is reduced.

Another potential nonpoint source of pollution originating from agricultural activity is pesticides which include herbicides, insecticides and fungicides. Surface runoff from irrigation or rainfall can wash pesticides from fields into groundwater, streams, and lakes. The amount of pesticide runoff depends partly on the properties of the pesticide. Runoff ratings are based on the pesticide's ability to bind to the sediment during a runoff event. The leaching potential depends on whether the pesticide dissolves easily in water, the soil structure and texture, the amount and timing of irrigation or rainfall, the amount of adsorption to soil particles, and the persistence of the pesticide. Some pesticides can also be lost to the atmosphere, either as drift during application or through volatilization from surface of soil or plants. Once airborne, they may become available for off-site deposition on land or water.

Agricultural Categories (Table 4.9); excludes home gardens and hobby farms**)**

- *Intensive Agriculture:*
  Intensive agriculture involves high capital investment. Typical characteristics of intensive agriculture include excessive use of chemical fertilizers, pesticides, herbicides, hi-tech machinery and employing high number of labor (per unit land). The main aim of carrying out intensive agriculture is earning maximum amount of profit from a given piece of land.
- *Extensive Agriculture (Field Crops):*
  Extensive agriculture is an agricultural production system that uses small inputs of labor, fertilizers, and capital, relative to the land area being farmed.
- *Orchard or Vineyard*:
  Orchards are an intentional planting of trees or shrubs that is maintained for commercial food production. Most temperate-zone orchards are laid out in a regular grid with a grazed or mown grass or bare soil base that makes maintenance and harvesting easy.

Table 4.9 - Agriculture within Local Source Water System Boundaries
SanGIS; retrieved 2010, 2015

San Diego River System

		2015		2010	
Watershed	Landuse	Acres	% Watershed	Acres	% Watershed
El Capitan	Field Crops	1,260	1	1,184	1
	Intensive Agriculture	52	0	37	0
	Orchard or Vineyard	488	0	508	0
	Total	1,800	1	1,729	1
Murray	Field Crops	0	0	0	0
	Intensive Agriculture	0	0	0	0

Table 4-9 – Agriculture within Local Source Water System Boundaries (contd)
SanGIS; retrieved 2010, 2015

	Orchard or Vineyard	0	0	0	0
	Total	0	0	0	0
San Vicente	Field Crops	787	2	929	2
	Intensive Agriculture	332	1	365	1
	Orchard or Vineyard	163	0	162	0
	Total	1,282	3	1,456	3
Sutherland	Field Crops	6,573	19	6,526	19
	Intensive Agriculture	0	0	0	0
	Orchard or Vineyard	24	0	23	0
	Total	6,597	19	6,549	19
San Diego River System	Field Crops	8,620	4	8,639	4
Grand Totals	Intensive Agriculture	384	0	402	0
	Orchard or Vineyard	675	0	693	0
	Grand Total	9,679	5	9,734	5

Otay-Cottonwood System

		2015		2010	
Watershed	Landuse	Acres	% Watershed	Acres	% Watershed
Barrett	Field Crops	919	1	934	1
	Intensive Agriculture	0	0	0	0
	Orchard or Vineyard	0	0	0	0
	Total	919	1	934	1
Dulzura	Field Crops	0	0	0	0
	Intensive Agriculture	0	0	0	0
	Orchard or Vineyard	0	0	0	0
	Total	0	0	0	0
Morena	Field Crops	1,618	2	1,592	2
	Intensive Agriculture	0	0	0	0
	Orchard or Vineyard	0	0	0	0
	Total	1,618	2	1,592	2

Table 4-9 – Agriculture within Local Source Water System Boundaries (contd) SanGIS; retrieved 2010, 2015					
Otay	Field Crops	597	1	596	1
	Intensive Agriculture	53	0	52	0
	Orchard or Vineyard	32	0	32	0
	Total	682	1	680	1
Otay-Cottonwood System Grand Totals	Field Crops	3,134	1	3,122	1
	Intensive Agriculture	53	0	52	0
	Orchard or Vineyard	32	0	32	0
	Grand Total	3,219	1	3,206	1
Miramar System					
		2015		2010	
Watershed	Landuse	Acres	% Watershed	Acres	% Watershed
Miramar	Field Crops	0	0	0	0
	Intensive Agriculture	0	0	0	0
	Orchard or Vineyard	0	0	0	0
	Total	0	0	0	0
Hodges System					
		2015		2010	
Watershed	Landuse	Acres	% Watershed	Acres	% Watershed
Hodges	Field Crops	14,606	9	14,110	9
	Intensive Agriculture	3,338	2	3,138	2
	Orchard or Vineyard	5,222	3	5,492	3
	Total	23,166	15	22,740	14

Grazing

The key issues of concern regarding the environmental impacts of livestock on both public and private grazing lands are their effects on soil, water quality, riparian areas, and biodiversity (including invasive plant species).

Livestock can affect soil quality through compaction, erosion, and changes in the plant community. Inappropriate grazing practices may accelerate erosion and sediment transport to water, alter stream flow, and disrupt aquatic habitats. Mismanagement of grazing lands can impair the capacity of riparian vegetation to filter contaminants, shade aquatic habitats, and stabilize stream banks and shorelines.

Water quality impacts of livestock on grazing lands include manure and urine deposited directly into water or on land near surface waters where leaching and surface runoff can transport potential contaminants to streams, ponds, and lakes. Water quality contaminants associated with grazing are sediment (erosion), nutrients, organic matter, and pathogens particularly when they are not fenced out from streams and farm ponds.

The animal grazing data presented derives from two sources: the Bureau of Land Management (BLM), and the United States Forest Service (USFS). Although grazing on private land occurs in these watersheds, no spatial data was available for such areas, and grazing on these lands is not included in this report. It is important to note that grazing on BLM and USFS land is a very small percentage of grazing occurring in these watersheds, with most occurring on private lands. It is estimated that Hodges watershed hosts the most grazing use on private lands (Personnel Communication, USFS Staff). The SDRWQCB does not issue waste discharge permits for livestock grazing, nor does grazing require a permit through the San Diego County Department of Planning and Land Use.

A total of 51,163 acres of BLM and USFS lands are permitted for grazing, while this is a large amount of acreage, USFS estimates only a portion of this land is actually grazed (**Table 4.10**).

Table 4.10 - Permitted Active Grazing Ranges within Local Source Water System Boundaries

BLM & USFS 2015

		San Diego River System			
Watershed	Range Name	Number of Head	Total Acres	Estimated Acres Grazed	Ownership
El Capitan	None	0	0	0	N=0
Murray	None	0	0	0	N=0
San Vicente	None	0	0	0	N=0
Sutherland	None	0	0	0	N=0
	Total 2015	0	0	0	N=0
	Total 2010	0	0	0	N=0
		Otay-Cottonwood System			
Watershed	Range Name	Number of Head	Total Acres	Estimated Acres Grazed	Ownership
Barrett	Guatay	20	900	300	USFS
Barrett	Corte Madera	40	6,100	470	USFS
Barrett	Laguna	80	29,700	724	USFS
Dulzura	None	0	0	0	N=0
Morena	Clover Flat	59	7,522	NA	BLM
Morena	Hauser Mountain	11	2,952	NA	BLM
Otay	None	0	0	0	N=0
	Total 2015	210	47,174	1,494	N=5

Table 4.10 - Permitted Active Grazing Ranges within Local Source Water System Boundaries (contd)					
BLM & USFS 2015					
	Total 2010	210	47,174	1,494	N=5
BLM & USFS 2015					
Watershed	Range Name	Number of Head	Total Acres	Estimated Acres Grazed	Ownership
Miramar	None	0	0	0	N=0
	Total 2015	0	0	0	N=0
	Total 2010	0	0	0	N=0
Hodges System					
Watershed	Range Name	Number of Head	Total Acres	Estimated Acres Grazed	Ownership
Hodges	Black Mountain	5	454	5	USFS
Hodges	Mesa Grande	30	3,535	240	USFS
	Total 2015	35	3,989	245	N=2
	Total 2010	35	3,989	245	N=2

Recreation

The primary purpose of a surface water reservoir is for domestic water supply; recreation is a secondary use of the reservoir. The potential sources of contamination associated with the recreational activities include; loss of vegetation, erosion, trash, pathogens associated with humans and animals, spillage/leakage of petroleum products, and production of combustion byproducts.

General recreational activities include: hiking, jogging, biking, and picnicking. Activities requiring a permit include: boating, fishing, hunting, water body contact (skiing, personal watercraft), and camping (**Table 4.11**). All reservoirs allow launching of private vessels with the exception of Barrett. San Vicente Reservoir was closed to all recreation in 2007 due to construction associated with the San Diego County Water Authority Emergency Storage Program; the reservoir is scheduled to open for recreation sometime in early spring, 2016.

Table 4.11 Permitted Recreational Use (FY11 thru FY15) on City Owned Property

City and County of San Diego 2015

Reservoir	Permits					Rental			Total Open Days
	Fishing	Hunting	Body Contact	Camping	Launch	Row	Kayak	Motor	
Murray	67,199	0	0	0	17,672	1,342	3,688	2,903	1,810

Table 4.11 Permitted Recreational Use (FY11 thru FY15) on City Owned Property (contd)

City and County of San Diego 2015

San Vicente	0	0	0	0	0	0	0	0	Closed
El Capitan	158,087	0	81,051	0	82,938	350	0	2,603	1,300
Sutherland	20,716	1,119	0	0	3,834	0	0	0	450
Otay	73,746	0	0	0	29,296	829	3,711	5,455	780
Barrett	12,762	3,476	0	0	0	1,475	0	263	505
Morena	28,556	0	0	36,294	1,544	112	0	4,631	1,460
Miramar	16,257	0	0	0	4,656	194	1,589	523	1,810
Hodges	51,293	0	50	0	28,334	184	2,386	1,970	600
Total 2015	428,616	4,595	81,101	36,294	168,274	4,486	11,374	18,348	8,715
Total 2010	501,880	3,424	258,252	47,172	221,397	18,214	unknown	38,144	9,325

Rentals operated by private concessionaire. (contact - Traci Roberts: traci@rockymountainrec.com)

All recreation operated by the County of San Diego. (contact - Rachel Carter: rachel.carter@sdcounty.ca.gov Phone 619-579-4101)

Facilities associated with recreation are owned and operated by the City of San Diego except for those at Morena Reservoir which are operated by the County of San Diego. The facilities generally include: parking, launch, docks, floats, rental boats, trash receptacles, portable toilets, and comfort stations (restroom facilities supplied with running water). Floating relief stations (toilets) are located on all reservoirs with the exceptions of Barrett and Morena. A pre-fabricated toilet facility with manual removal of waste is located at El Capitan Reservoir. There are no boat-holding tank pump-out stations, marinas, or berths available at the reservoirs. On shore, trash cans and portable toilets are placed above current water levels.

All reservoirs open to recreation with the exception of Barrett have a barrier demarcating a restricted access zone around the outlet facilities and dams. This area is to prevent direct recreational contact to the water immediately available for transfer or use by the Treatment Plants.

Fires

Fire can indiscriminately devastate certain vegetation and wildlife communities, but is very important to the sage scrub and chaparral communities located in Southern California. Many taxa of coastal sage scrub plants are adapted to fire by stump sprouting or high seed production. Similarly, many chaparral plants are adapted to frequent fires either through resprouting or seed carry-over (**Vegetation, Chapter 3**). While these communities are adapted to fire and usually recover in three to five years, the soils are subject to increased erosion immediately following a severe burn.

All fires alter the cycling of nutrients and the biotic, physical, moisture, and temperature characteristics of soil. In many cases however, these impacts are either negligible or short-lived and thus have little, if any, impact on the overall ecosystem. In some cases however, the impact of fire on soil conditions can be moderate to severe. The overall degree and longevity of this impact is determined by numerous factors including fire severity, temperature, fire frequency, soil type and moisture, vegetation type and amount, topography, season of burning, and pre- and post-fire weather conditions. In general, when compared to the impacts felt by other ecosystem components, fire effects on soil are typically minor, are often short-lived and can be either positive or negative, with degree of impact increasing with increased fire severity.

Past studies have found post-fire erosion to be facilitated by wind, water, and/or gravity. This includes all of the following types of erosion: raindrop splash, sheet and rill erosion, soil creep, and mass wasting. When compared to unburned sites, the overall extent of erosion will vary considerably. Vegetation removal, combined with changes in soil physical properties, will typically result in erosion following a fire. Whether or not erosion occurs, is not only dependent on fire-influenced changes (bare soil, soil structural changes, altered hydrology etc.), but also on a variety of topographical factors, including slope and aspect, and climatic factors, such as rate and amount of precipitation.

Sediments from the burned areas can impact streams and the aquatic organisms within those streams, ultimately feeding into reservoirs where sediment loads may affect treatment procedures and decrease storage capacity. Water chemistry can be affected directly by input of nutrients and other substances in eroding sediment, and by the direct diffusion of biomass smoke and ash into surface water. Thus, wildfires can contribute to eutrophication of water when additional nutrients are added, particularly nitrogen and phosphorus. Control of large fires is important from both a preservation perspective as well as a watershed management perspective.

Overall, in most cases, a fire increases the amount of nutrients available, and as a result nutrient cycling is increased. While various nutrients can become more available during and after a fire, others may be volatilized and thus lost during a fire. Volatilization, which is temperature dependent, most commonly affects nitrogen and to a lesser extent, sulphur, phosphorus and carbon. Even though volatilization removes nutrients from a system, it can also convert them to a more available form. For example, nitrogen is often converted to the more available form ammonium, during the volatilization process. Thus, even though the total amount of nitrogen on a site decreases, the amount of available nitrogen for primary productivity may actually increase or decrease, depending on the site.

The California Department of Forestry and Fire Protection (CAL FIRE) addresses all large brush fires within the watersheds. The local fire districts handle structural fires only. CAL FIRE has an extensive fire prevention plan and also provides an evaluation of burned sites and a regrowth plan to prevent erosion immediately following a fire. Fire information in this report is supplied by CAL FIRE. The current data available from CAL FIRE is through December 31, 2015. Below are the listed fires and any observations made by City staff, any water quality data associated with the fires will be addressed in Chapter 5?

San Diego River Watershed

From 2010 through 2015 four fires took place that burn land within the SDR watershed (Table 4.13). These fires burned a total of 669 acres, or 0.33% of the watershed, and had minimal impact on the watershed. City staff did not notice significant erosion/sedimentation in this watershed from the burn areas. Compared to the last WSS the SDR watershed experienced fewer acres burned.

Otay Cottonwood Watershed

The OTC watershed experienced nine fires since the last sanitary survey (**Table 4.12**). These fires burned a total of 1453 acres, or 0.64% of the watershed, and had minimal impact on the watershed. City staff did not notice significant erosion/sedimentation in this watershed from the burn areas. Compared to the last WSS the OTC watershed experienced fewer acres burned.

Miramar Watershed

No fires reported in the Miramar Watershed during this time range.

Hodges Watershed

Hodges watershed experienced one fire since the last WSS (Table 4.13). The Boden fire burned a total of 21 acres or 0.01% of the watershed. City staff did not notice significant erosion/sedimentation in this watershed from the burn areas. Compared to the last WSS the Hodges watershed experienced fewer acres burned.

Table 4.12- Reported Fires within Local Source Water System Boundaries

CALFIRE 2015 **San Diego River System**

Watershed	Fire Name	Alarm Date	Acres Burned	Percent of Watershed
El Capitan	Mesa	8/25/2010	255	0.21%
	Monte	8/21/2010	353	0.29%
		Total 2015	608	0.51%
Murray	None			
		Total 2015	0	0
San Vicente	Wildcat 4	7/29/2014	25	0.05%
	Slaughterhouse	5/25/2010	36	0.08%
		Total 2015	61	0.13%
Sutherland	None			
		Total 2015	0	0
San Diego River System				
		Grand Total 2015	669	0.33%
		Grand Total 2010	54362	26.50%

Otay-Cottonwood System

Watershed	Fire Name	Alarm Date	Acres Burned	Percent of Watershed
Barrett	Lyon	9/9/2013	258	0.31%
	Chariot	7/6/2013	684	0.82%
	Barrett	8/27/2011	62	0.07%
		Total 2015	1004	1.21%
Dulzura	None			
		Total 2015	0	0
Morena	Gun	7/23/2006	270	0.37%
	La Posta 2	9/2/2013	14	0.02%
	Buckman 2	9/3/2012	7	0.01%
	La Posta 2	6/16/2012	11	0.01%
	Ridge	8/28/2011	142	0.19%
		Total 2015	444	0.60%
Otay	Lyon	9/9/2013	5	0.01%
		Total 2015	5	0.01%
Otay-Cottonwood System				
		Grand Total 2015	1453	0.64%
		Grand Total 2010	73817	32.50%

Miramar System

Watershed	Fire Name	Alarm Date	Acres Burned	Percent of Watershed
Miramar	None			
		Grand Total 2015	0	0
		Grand Total 2010	0	0

Hodges System

Watershed	Fire Name	Alarm Date	Acres Burned	Percent of Watershed
Hodges	Boden	6/2/2013	21	0.01%
		Grand Total 2015	21	0.01%
		Grand Total 2010	104338	65.90%