Agenda Item IV A-1 (TAHOE)
Meeting Date: 11-04-16

Douglas County Sewer Improvement District #1

Wastewater Reclamation Facilities

Douglas County Sewer Improvement District No. 1
Wastewater Reclamation Plant

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2016 Summary of Operations

The Douglas County Sewer Improvement District No. 1 (DCSID) Wastewater Reclamation Facility is located in Zephyr Cove, Nevada within the Lake Tahoe Basin (Basin). It was constructed in 1966 and over the years has undergone a series of upgrades, expansions, and improvements. DCSID provides wastewater service 24 hours a day, 7 days a week, for In-District users as well as four other districts: Kingsbury General Improvement District, Round Hill General Improvement District, Tahoe-Douglas District, and Elk Point Sanitation District. With the exception of flows originating within Kingsbury General Improvement District, all flows are pumped to DCSID via the Beach and/or Main Pump Stations. Kingsbury General Improvement District flows are routed directly to the Reclamation Facility.

DCSID is permitted by the Nevada Division of Environmental Protection to treat average monthly flows up to 3.75 million gallons per day (mgd) and maximum day flows up to 4.2 mgd. The facilities at DCSID include screening, primary sedimentation, activated sludge with mechanical aeration, secondary clarification, and disinfection. Since 1968, 100% of DCSID's treated effluent is pumped via the export pipeline over the mountain ridge to permitted land application/irrigation sites in Carson Valley. Export of treated effluent from the Basin was mandated by federal requirements prior to the organization of the Tahoe Regional Planning Agency for all Sewer Districts in the Basin. The existing solid handling facilities include grit removal, gravity sludge thickening and centrifuge dewatering. Dewatered solids are hauled offsite and composted at the Bently Ranch facility in Minden, Nevada.

Since 1986 DCSID has operated under a comprehensive capital improvement master plan that is continually reviewed and updated as needed. The objectives of this master plan are to identify essential capital improvement projects at DCSID and establish an implementation plan for the recommended improvements. Capital improvement projects identified in the master plan have the following goals and objectives:

- Protect the environment, within the Basin and the Carson Valley
- Minimize costs and special assessments to customers
- Replace aging infrastructure
- Improve efficiency
- Provide adequate level of equipment redundancy
- Comply with and anticipate future regulations (environmental and others)
- Provide adequate capacity to convey and treat future flows and loads
- Provide for an efficient and safe system that is cost effective to operate and maintain

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Mission Statement

Douglas County Sewer Improvement District No. 1 furnishes our customers with reliable and quality wastewater services in a manner which is safe, efficient, cost effective and environmentally sound.

Completed Capital Improvement Projects during the past 10 years (2007-2016) totaled $21M and included the following projects:

- Primary Clarifier Covers – 2007
- Secondary Clarifier Rehabilitation – 2008
- Redundant Force Main – 2010
- Export Pump Station Improvements and Effluent Tanks – 2010
- Plant Reservoir Decommissioning – 2012
- Corrosion Assessment/Air Relief Valve Replacement - 2012
- Asset Management, SCADA and Site Security – 2012
- Sodium Hypochlorite Conversion - 2013
- Main Pump Station Rehabilitation – 2014
- Beach Pump Station Upgrades – 2014
- Redundant Centrifuge - 2015

During this same period of time the District developed applications, applied for, and received Federal grant assistance from the US Army Corps of Engineers and the Environmental Protection Agency. Approximately $8.5M was obtained to offset costs associated with the above Capital Improvement Projects that benefit all of DCSID's rate payers.

DCSID is currently constructing Main Pump Station Emergency Storage Capacity Improvements ($1.5M), and permitting an intertie with South Tahoe Public Utility District, which is estimated to be constructed in 2017 with a cost of $1M. These projects further strengthen environmental protection for Lake Tahoe.

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The majority of DCSID's facilities are located in the environmentally sensitive Lake Tahoe Basin. Therefore, DCSID has, at significant cost, constructed, and now operates and maintains critical redundant facilities that would not be necessary in less sensitive locales. These redundant facilities include:

- Redundant Beach Pump Station
- Redundant Force Main
- Redundant Thickener and Centrifuge
- Redundant Effluent Storage Tank
- Redundant Export Pumps
- Redundant Power Supply at all remote facilities and at the Reclamation Plant

Comparative Summary of DCSID Sewer Rates to Other Area Districts

2016 Annual Sewer Rates for a Single Family Residence			
Lake Districts		Valley Districts	
DCSID	**$444.00**	Minden Gardnerville Sanitation District	**$167.90
South Tahoe Public Utility District	*$565.44	Carson City	$396.12
Incline Village General Improvement District	*$742.96	Indian Hills General Improvement District	$432.48
		Douglas County – North Valley	$785.88

* Estimated for a 3 bedroom, 2.5 bathroom, producing 50,000 gal/year

** MGSD receives ad valorem tax revenue to subsidize costs of sewer service. The cost per residence is based on the assessed value with an approximate median value of $80 annually.

The fee structure of those reclamation facilities in Carson Valley, in contrast to those operating at Lake Tahoe, also benefit from relatively steady Connection/Capacity Fee revenues reflective of growth within their Service Areas. Connection/Capacity Fees for the reclamation facilities at Lake Tahoe represent a de minimus percentage of the Districts' total revenues. This condition exists because the Basin is largely built-out – as such development does not appreciably expand existing connections. In addition, the fee structure of those reclamation facilities located in the Basin, in contrast to those operating in Carson Valley, are burdened by the significant cost of having to pump

effluent out of the Basin. For DCSID, the annual power cost to accomplish this environmental requirement alone exceeds $198,000. This does not include additional overhead for personnel and maintenance for the pumps, building, and 20 miles of pipe that make up the export system.

On average, rates for DCSID's in-District residential customers have increased <1% annually in the last 10 years. This demonstrates DCSID's long range planning has achieved management's goal of maintaining reasonable rates while providing a funding mechanism for necessary Capital Improvement Projects.

Sewer Rate Increases for a Single Family Residence							
	Lake Districts			Valley Districts			
	DCSID	STPUD	IVGID	MGSD	CC	IHGID	DC-NV
2018		6%				5%	3%
2017		6%			10%	5%	3%
2016	-	6%	4%	-	11%	5%	3%
2015	**8%**	6%	4%	-	11%	5%	3%
2014	-	6%	9%	-	12%	5%	3%
2013	-	-	11%	-	-	14%	
2012	-	5%	6%	17%	-	-	
2011	-	3%		-	14%	-	
2010	-	2%		-	14%	-	
2009	**3%**	-		-	5%	22%	
2008	**-3%**	4%		-	24%	-	
2007	-	4%		-	-	-	
2006	-	4%		-	-	-	

	Current year
-	No increase
	Unknown at this time

Mission Statement

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DOUGLAS COUNTY SEWER IMPROVEMENT DISTRICT NO. 1
WASTEWATER RECLAMATION FACILITY PROCESSES

The Wastewater Reclamation Facility has a rated capacity of 3.75 million gallons of wastewater per day, primarily of domestic origin, providing secondary treatment with an activated sludge process. After treatment, the reclaimed wastewater is pumped out of the Lake Tahoe Basin to the Carson Valley where it is used for irrigating ranch land.

LIQUID PROCESS

The wastewater that is pumped to the treatment facility is composed of water, solids and dissolved organic materials. Within the facility, the solids and dissolved organic materials are separated from the water.

Raw Sewage Pumps. Three 300-horsepower dual pump systems located in the Main Pump Station lift the raw sewage approximately 215 feet from the collection system to the reclamation facility. In 2009, the District added a second raw sewage force main which adds redundancy and reliability to the system. Another sewage pump station owned by the Kingsbury General Improvement District pumps raw sewage directly to the treatment works.

Influent Flow Meter. The quantity of wastewater that enters the facility is measured using sound waves in an ultrasonic flow meter. This meter records the total flow rate to the facility.

Headworks. A screening and washing system removes plastics, rags and other large objects from the wastewater stream, and allows organics to pass through for further treatment.

Primary Clarifiers. Two large circular clarifiers are the first step in separating the solids from the liquid. In the still water of the clarifiers, the heavy particles settle to the bottom while the lighter particles float to the surface. Skimmers on the surface and scrapers at the bottom of the tank collect the solids for further processing.

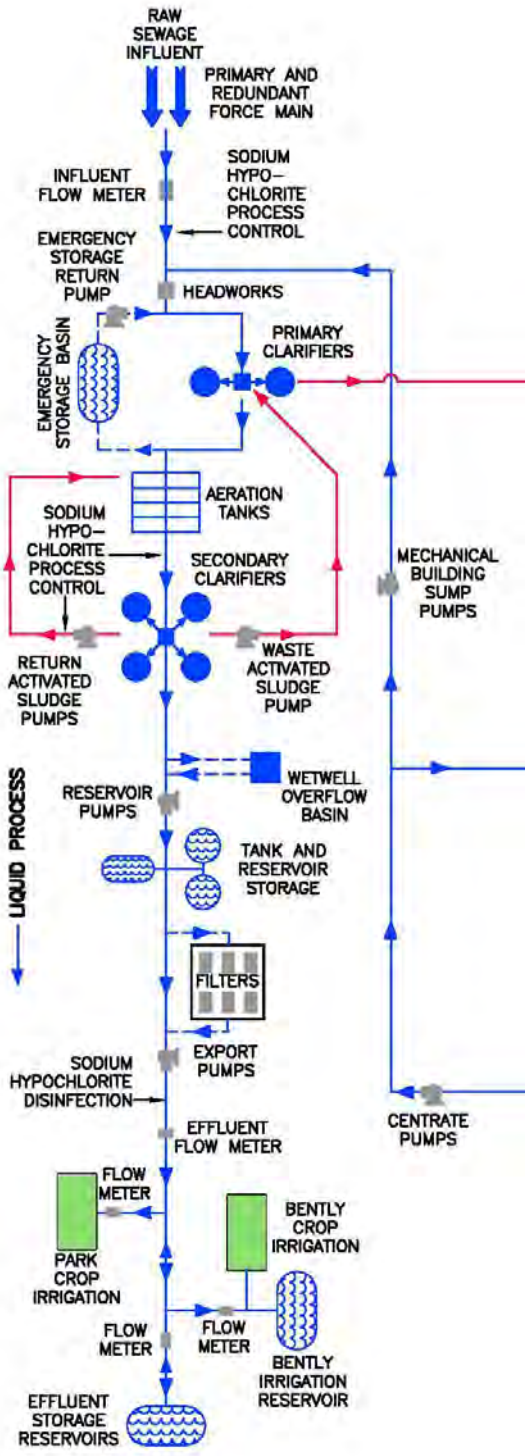
Aeration Tanks. The aeration basin is the heart of the activated sludge process. In the aeration tanks, eight 30-horsepower mechanical aerators mix oxygen into the wastewater. These tanks provide the proper environment for the growth of beneficial microorganisms that convert dissolved organic materials into biosolids which can be easily removed.

Secondary Clarifiers. Four secondary clarifiers again provide a quiescent place for the solids to settle out of the wastewater. Two new clarifiers added in 2007 are in continued use with two additional units in stand-by for emergency use. This time the secondary solids (microorganisms) from the aeration process are settled out of the liquid stream and either returned to the aeration tanks or to solids processing (centrifuge) for removal from the system. At this point, over 95% of the solids have been removed from the liquid stream.

Effluent Storage Tank Pumps. The wastewater from the secondary clarifiers is conveyed to storage tanks located approximately 200 feet higher in elevation than the facility by three 200-horsepower variable speed pumps.

Effluent Storage Tanks. The two 600,000 gallon tanks provide storage of treated wastewater before it is pumped to the Carson Valley. This storage equalizes the flow for optimum operation of the export pumps and increases export pumping efficiency.

Pressure Filters. Very fine solids and algae are removed on the sand beds within the pressure filters. The filters are only used when required to polish the effluent to meet the discharge requirements.



Effluent Meter. This ultrasonic meter provides an accurate record of the quantity of reclaimed water leaving the treatment facility.

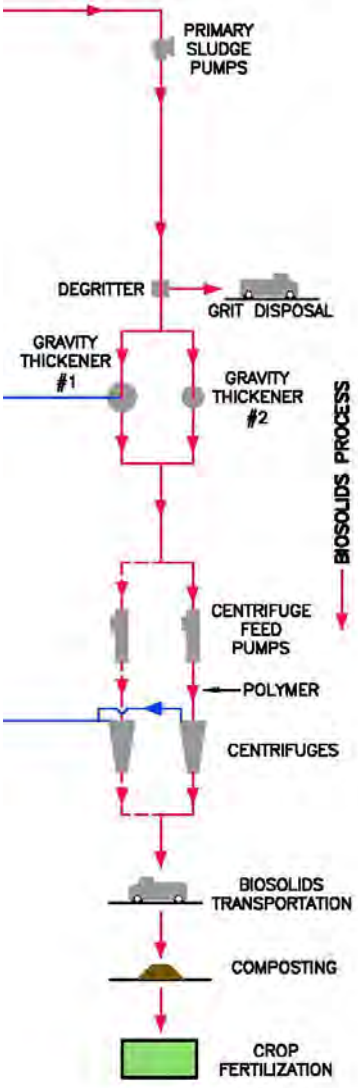
Chlorination. Sodium Hypochlorite is added to the reclaimed wastewater for disinfecting purposes immediately prior to export. Sodium Hypochlorite can also be used at other points in the facility for odor control and control of undesirable microorganisms.

Export Pumps. Four 300-horsepower pumps export the reclaimed wastewater out of the Lake Tahoe Basin. The reclaimed wastewater travels through 20 miles of pipeline over the 7,400 foot Kingsbury Grade summit elevation, to the Carson Valley land application sites and storage reservoirs.

Land Application. The reclaimed wastewater is used for irrigation of fodder crops on ranches in the Carson Valley. The residual nitrogen and phosphorous in the reclaimed wastewater provide fertilization for the crops.

Return and Waste Activated Sludge Pumps. These pumps are used to control the growth of the desired microorganisms within the treatment process. The microorganism concentration in the aeration basin must be maintained at a proper level to maintain a good effluent quality. The return sludge pumps recycle the biosolids from the secondary clarifiers back to the front of the aeration tanks to ensure there are sufficient microorganisms to feed on the fresh organic material. As the growth of microorganisms increases continually, the waste activated sludge pump is used to remove excess solids.

Effluent Storage Facility. The Buckeye Creek effluent storage reservoir is currently off-line and prohibited from receiving any further treated effluent until the reservoir is relined. Effluent is discharged directly from the export pipe line to the Park Cattle Company Land Application Site, or discharged to the Bently Reservoir. Effluent is stored at the Bently Reservoir until it is used to irrigate alfalfa at the Bently Agrodynamics Land Application Site. Both reservoirs are located on the east side of the Carson Valley at the base of the Pine Nut Mountain Range.



BIOSOLIDS PROCESS

The purpose of the biosolids process is to further separate the solids from the liquid and ultimately dispose of, or condition for reuse, the residual solids. The biosolids process portion of a wastewater treatment process is a critical component of wastewater treatment. If the solids are not efficiently removed at the appropriate places, the process will deteriorate and it becomes difficult to produce good quality effluent.

Primary Sludge Pumps. These pumps remove solids and floating material from the primary clarifiers, transferring them either directly to the centrifuge operation or to the degritter and the gravity thickener.

Degritter. The degritter separates sand and other heavy grit from the sludge. This grit is washed to further remove any organic material that may cause odors and is then trucked to a landfill for final disposal.

Gravity Thickeners. The gravity thickeners receive primary and secondary sludge and are like small clarifiers with even less water and more solids. Again, in a quiescent area, the solids slowly separate from the water and accumulate. The separated water is returned to the liquid stream for more treatment. A small gravity thickener is used as a back-up when the larger one is under repair.

Centrifuge. In addition to the existing centrifuge, in 2010, a new high speed decanter (centrifuge) was added to aid in the removal of solids from the wastewater plant. This also adds redundancy to the process, having one unit in lead and one as a back- up unit. Within this equipment, centrifugal force is used to separate the solids from the liquid. Polymer is added to help bind the fine solid particles together. The resultant solids product, termed “biosolids” is approximately 30% solids and 70% liquid. In this form, the biosolids are easily transportable.

Biosolids Transportation and Reuse. The centrifuged biosolids are transported by truck to a Carson Valley ranch, composted and used as fertilizer on fodder crops

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LAKE
TAHOE
SERVICE
AREA
BOUNDARY
TDD
U.S. HIGHWAY 50
WASTEWATER
RECLAMATION
PLANT
RHGID
EPSD
DCSID
KGID
KINGSBURY
GRADE
GENOA
WEST FORK
MULLER
EXPORT PIPELINE
NEVADA
CALIFORNIA
1 MILE
0
1 MILE

DOUGLAS COUNTY
SEWER IMPROVEMENT DISTRICT NO. 1

SERVICE AREA
LAND APPLICATION SITES
EFFLUENT STORAGE RESERVOIRS