WASTEWATER COLLECTION AND DISPOSAL SYSTEM REPORT

FOR

YOUNG NAK CHRISTIAN CHURCH RETREAT CENTER

CUP 03-221

Located in
Hughes Lake, CA

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YOUNG NAK CHRISTIAN RETREAT CENTER
Hughes Lake, CA

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Plans, 50% Reductions and Full Size:

1. *ON-SITE WASTEWATER SYSTEM PLAN*
2. *EXISTING ON-SITE WASTEWATER SYSTEM*
3. *WASTEWATER TREATMENT PLANT*

WASTEWATER COLLECTION AND DISPOSAL SYSTEM REPORT

INTRODUCTION

Water Resource Engineering Associates (WREA) was retained by Young Nak Christian Retreat Center (Center) to determine the feasibility of developing an On-Site Wastewater Treatment System (OWTS) on its property identified as Assessors Parcel Number 3243-017-021 (Site). This report supports information for the Center's Environmental Review and application for a Conditional Use Permit modification (CUP 03-221) to develop the Site.

To support the conclusions of this report, WREA analyzed the Project's characteristics to determine the required capacity and physical requirements for an adequate OWTS. WREA, in conjunction with Professional Geotechnical Consultants, Inc. (PGC) reviewed and evaluated the character of the Site's soil, geology and hydrology to ensure that implementation of the proposed system is feasible.

The project site location is in an undeveloped area of Los Angeles County, outside the service area of any public, municipal sewer system. The nearest public facilities, operated by the Los Angeles Sanitation District located near the intersection of Elizabeth Lake and Lake Hughes Road is approximately 10-miles from the project site.

Connection to this system would require an extensive system of wastewater force mains and pumping lift stations. Construction permitting through environmentally sensitive areas and the acquisition of easements to cross private property along the pipeline route would also be necessary. Estimated project costs are over $5.0 million.

On-site disposal of the generated wastewater is less impactive than the municipal option, and so connection to a municipal public sewer system was not considered further.

BACKGROUND

The focus of this report is to demonstrate the feasibility of developing and operating an OWTS. The developers of the Center intend to provide comfortable accommodations to their attendees. In keeping with this, and also to comply with Los Angeles County Planning (Planning), Environmental Health Division (EHD) and Los Angeles Regional Water Quality Control Board (LARWQCB) requirements, a reliable method of wastewater collection, treatment and disposal for the proposed facilities must be developed.

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The Center will be accommodating populations of attendees on a consistent but somewhat variable basis. The maximum population on any given day will be 250 persons including staff and attendees. Wastewater generation will vary accordingly.

Existing structures on-site that are to remain, such as the caretaker's residence and twelve of the fifteen mobile homes, have operating septic systems. The operation of these systems is not addressed in this report. However, these systems will be abandoned in accordance with County standards and the existing structures connected to the proposed OWTS.

The Los Angeles County Code, Title 28 Plumbing Code, Appendix K Private Sewage Disposal Systems, Section K4 Percolation Tests, (c) cites the absorption requirements for seepage pits where "…. No private disposal system shall be permitted to serve a building if that test shows the absorption capacity of the soil is less than 0.83 gallons per square foot (33.8 L/m^2) or more than 5.12 gallons per square foot (208 L/m^2) per 24 hours, a private disposal system may be permitted if the site does not overlie ground waters protected for drinking water supplies, a minimum thickness of two (2) feet (610 mm) of the native soils below the entire proposed system is replaced by loamy sand, and the system design is based on percolation tests made in the loamy sand." Percolation test results show that the absorption rate exceeds the allowable maximum of 5.12 gallons per square foot per 24 hours. Actual results demonstrated a rate of 16.65 gallons per square foot.

Though no ground water was encountered in the test pits detailed to 30 feet, an existing water well that supplies potable water to the site is located 415' N.W. of the pits. This, combined with the high percolation rates will necessitate the need for a wastewater treatment method other than a conventional septic system.

The proposed OWTS will be comprised of an Advanced Treatment Unit (ATU) that is a multiple-pass, packed bed aerobic wastewater treatment technology system engineered for long-term processing of domestic-strength wastewater. The proposed ATU is a pre-engineered package system making operation and maintenance uncomplicated.

The wastewater generated onsite will be collected by an underground system of pipelines that will gravity flow to the plant. After treatment, the effluent will be sent to the proposed seepage pits for dispersal.

WASTEWATER COLLECTION AND DISPOSAL SYSTEM REPORT

WASTEWATER GENERATION CATEGORIES, ESTIMATED ANNUAL QUANTITIES

Wastewater generation at the Center is categorized as described below. Annual and maximum day wastewater generation estimates and calculations are shown on Appendix Pages B1 – B2 and are also listed categorically below.

Site Non-Residential

The primary source of wastewater generated by bathroom, private kitchen and laundry functions, is by full and part-time staff and part-time attendees.

The LARWQCB identifies wastewater generated by attendees as "non-residential". Annual wastewater production will vary dependent upon facilities usage. Though the population will not exceed a maximum of 250 on any one day, it is likely attendance numbers will be significantly less on a consistent basis. It is estimated that wastewater generation would not exceed 6.58 million gallons per year. (See Appendix, page B2)

Site Commercial – Cafeteria

Wastewater will also be generated by cafeteria patrons and staff in the process of commercial food preparation and toilet flushing. The quantity of wastewater generated in this category is included in the calculation for "non-residential" above.

STATUTORY AND PERMIT REQUIREMENTS

Statutory Requirements

Due to the lack of public facilities in the area, wastewater will be disposed on-site using an OWTS. Design and installation of the on-site system, that is, the actual physical plant, is subject to regulation and approval by the local agency having jurisdiction, Los Angeles County Department of Health Services, Environmental Health Division (EHD), and the Los Angeles County, Building Department (BD), and Public Works Department (PW).

Once installed and approved by DEH, BD, and PW the performance of the treatment system and the sub-surface discharge of the waste effluent are regulated by the LARWQCB. This discharge will be required to meet water quality requirements set out in the Basin Plan. Meeting these water quality parameters will require advanced or secondary treatment.

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Permit Requirements

The Center will be required to obtain an "approval to construct" for the OWTS from DEH. The application for the approval will include, but not be limited to: system plans and calculations, percolation test results showing soils suitability for sub-surface disposal, demonstration that the seepage pits meet setback requirements, and information regarding the water supply system.

A permit from the BD and PW for the construction of the system will be required. The permit requirements include the application and review of the construction plans.

The Center will also be required to submit an application to the LARWQCB for Waste Discharge Requirements (WDR) for operation of the system and for utilizing the disposal system for subsurface discharge of effluent. Typically, the LARWQCB General WDR Order No. 01-131 (Appendix EI-E18) covers discharges from small (less than 20,000 gallons per day) commercial and multi-family sewage disposal systems. Discharges greater than 20,000 GPD are normally required to obtain an individual WDR. The Center's maximum discharge is estimated at 19,530 GPD, and therefore is within the guidelines of the General WDR.

A condition of the permit will be the installation of groundwater monitoring wells for water quality reporting purposes.

The application for a WDR will include, but not be limited to, a description of operations, approximate discharge flow rates or volumes, effluent characterization, ground water and soil exploration information and compliance documentation with the California Environmental Quality Act (CEQA).

System Construction Permitting

Once the building permit is issued, BD and PW will inspect the construction of all the systems. Well drilling permits will be required from EHD for the construction of the monitoring wells dictated by the WDR. Additionally, compilation of a "construction" stormwater pollution prevention plan (SWPPP) may be required.

Ongoing Operation and Reporting

As a requirement of the WDR, a designated site supervisor will be responsible for the maintenance of the OWTS including sampling and analytical procedures for reporting. The Center will be required to retain the services of a Certified Operator to perform the overall management of the OWTS.

Minimum Siting Distances

The Los Angeles County Plumbing Code (LAPC) and the LARWQCB have established the minimum distances for siting an OWTS, necessary to provide protection to water quality and/or public health, which are specified in Table K-1 of the LAPC (See Appendix C1-C2). The project design meets or exceeds the setback requirements specified in Table K-1. Where the seepage pits shall be located 240' from the nearest building, 415' from well, and 500' from jurisdictional wetlands.

PROJECT SPECIFIC DESIGN REQUIREMENTS

Sizing of the OWTS is based on available or projected use data taking into consideration the functions of wastewater appurtenances and the number and characterization of site usage by the persons served. Peak flow rates including constituent concentrations are determined based on anticipated populations, comparative data and statistical information listed in Table K-3 of the LACC Title 28 Plumbing Code.

Wastewater Generation Quantities

The Center has provided an assessment of projected population for the project. An analysis has been completed that shows a maximum day wastewater generation of approximately 19,530 GPD including infiltration and inflow. The proposed plant will be designed for this capacity. Maximum day wastewater flow generation estimates are shown on Appendix Page B1. Estimated annual wastewater flow generation is shown on Appendix Page B2.

On-Site Wastewater Treatment System Description

The OWTS will consist of four major components, including the: (1) Collection System, (2) Primary Treatment/First Stage Clarifiers, (3) ATU, and (4) Dispersal System. Each component is described further below. As designed, the OWTS incorporated industry-standard materials and equipment and has minimal mechanical components. See Exhibit A: *Conceptual Wastewater Site Plan.*

Collection System

Design of the wastewater collection system will be in accordance with procedures detailed in the Los Angeles Plumbing Code (LAPC) and California Plumbing Code (CPC) design methods utilizing maximum wastewater flows generated for the system. The physical portion of the collection system will

consist of PVC pipe, cleanouts, manholes, and appurtenances of sufficient size to provide adequate performance.

Primary Treatment

Four 15,000-gallon FRP tanks totaling 60,000-gallons will be used as first stage clarifiers and make up the primary treatment component of the system. In the first stage, organic matter will segregate into sludge and scum layers, which will undergo digestion by typical anaerobic processes. The primary stage is capable of removing more than 60% of suspended solids and organic matter. Sludge will be periodically removed from the clarifiers as needed and disposed of by a licensed sanitary pumping service. The combined volume of the primary stage will provide a three-day hydraulic retention time (HRT).

Advanced Treatment Unit

A 20,000-gallon per day, package ATU is proposed and is the second stage of the system. The second stage provides aerobic oxidation and digestion for both organic and nutrient reduction. Incoming effluent from the primary treatment enters the recirculation-blend chamber opposite the recirculation pump system. The effluent is blended and diluted with filtrate from the system before being dosed onto the filter by the recirculation pump. The recirculation pump transports the effluent to a distribution manifold above the filter. Effluent percolates down through the textile media, where organic and inorganic matter is treated by naturally occurring heterotrophic and autotrophic microorganisms that populate the filter. The microbes colonize down through the media relative to the degree of organic and nutrient treatment occurring. No outside chemicals are required for standard effluent reduction. The flow is automatically diverted between the recirculation-blend chamber and the recirculation-filtrate chamber via a recirculation-return valve, controlling the liquid level within the chambers. During extended periods of low forward flow, 100% of the treated effluent is returned to the recirculation-blend chamber. A final pass section of the treatment system provides the final polishing of the effluent prior to entering the recirculation-filter chamber. The final treated effluent from the recirculation-filtrate chamber is then dosed to the seepage pits.

Due to the high absorption rates found, a conventional septic tank-leachfield system will not provide the level of treatment required to meet groundwater quality objectives set out in the Basin Plan, especially regarding nutrients, or nitrogen (N). Typical N concentrations measured at “end of pipe” after this conventional treatment method range from 30 mg/l to 40 mg/l. The water quality objectives for N set for surface waters of the Santa Clara River Watershed Basin Plan (above Lang gauging station) is 5 mg/l.

The proposed OWTS will produce treated water with N concentrations between 3 mg/l and 5 mg/l and will discharge to seepage pits.

Disposal System

The treated effluent will be dispersed on-site to seepage pits. Because of the site topography and locations of the systems appurtenances, the treated effluent will have to be pumped from the ATU to the seepage pits. The disposal field will be located within undeveloped areas of the site as shown on the site plan.

Based on the Private Sewage Disposal System Percolation Tests by PGC dated December 5, 2008, (See Appendix, Pages D1–D30), systems utilizing septic tanks and seepage pits are appropriate means of effluent disposal for the site. However, the percolation test by PGC results show that the test holes exceed the maximum absorption rate allowed by the LACPC and LARWQCB requires pre-treatment of the sewage effluent prior to inflow to the seepage pit. Additionally, as mentioned earlier in this report, the Basin Plan objectives require a higher level of treatment than a conventional septic tank system offers, hence our proposal for an ATU. The disposal system design will be subject to the parameters detailed in the LAPC and CPC, based on the maximum anticipated daily wastewater generation and, the results of the tests completed at the actual location of each proposed disposal system. The number of pits is determined by dividing the volume of water absorbed by five times the septic tank capacity, as stated in the LAPC Meter Test Method. The seepage pits will also require a dosing system and an area equaling 100% of the seepage pits set aside for replacement.

System Operation Description

The wastewater collection system at the Center is intended to operate by gravity, as follows:

Wastewater will flow from each building into a main PVC collection line via a PVC side sewer or (lateral) line. The main line carries the flow to the primary clarifier. The wastewater will be pumped from the primary clarifier to the ATU.

The flow through the ATU is achieved both by gravity and a series of pumps. The treatment train consists of a series of processes built into prefabricated fiberglass vessels. Flow from the primary clarifier enters the recirc-blend chamber. Effluent from the recirc-blend chamber flows through the recirc crossover pipe into the recirc pump vault. The recirc pumping system pumps effluent through the manifold to the spray nozzles where effluent percolates through media and is split between the recirc-blend and recirc-filtrate chambers. The recirc-return valve allows one-way flow from recirc-filtrate chamber during

low-use periods. Recirc-filtrate chamber provides storage for treated effluent to be pumped to the seepage pits.

Operation and Maintenance

A condition of the WDR will be that the OWTS will require professional operation and maintenance. Licensed and certified operators such as BioSolutions Inc. will be retained by Young Nak for these services on a contractual basis. Due to the simple nature of the mechanical components and the use of industry-standard equipment, the OWTS will be relatively easy to maintain. Scheduled maintenance will be performed weekly, monthly, quarterly, semi-annually and annually. Regular maintenance includes visual inspection and cleaning of tanks, filters and peripherals, recording data from meters and/or counters, and confirming proper operation of the system. Other tasks such as testing and inspection of other components will take place in accordance with the ATU's Operations and Maintenance Manual as published by the ATU's manufacturer. Sampling guidelines will be according to the requirements of the WDR and the State Regional Water Quality Control Board.

Ground Water Quality Monitoring and Reporting Program

LARWQCB will require Young Nak to establish a Groundwater Monitoring and Reporting Program (Program) to fully evaluate the impact of the treated wastewater discharge on groundwater.

In order to implement monitoring, groundwater monitoring wells must be installed to fully assess the up-gradient, background groundwater quality, and the down-gradient groundwater quality. The Program will include the location, depths, construction, and schedule for the installation and proposed sampling of the wells. Within 30 days after installation of monitoring wells, a well installation will be submitted to the LARWQCB. (The LARWQCB will determine the constituents to be monitored with the program, and will be included in the WDR.)

The Program may require submittal of monthly, quarterly, and/or annual monitoring reports, all part of the WDR. The groundwater monitoring schedule may be subject to revision after completion of the first year of baseline water quality monitoring. An operation and maintenance report will also be required to be submitted on an annual basis. Annual monitoring reports routinely contain both tabular and graphical summaries of the monitoring data obtained during the previous year.

All groundwater monitoring reports will include, well identification, date and time of sampling, sampler, laboratory identification, quarterly measurement of groundwater levels, a groundwater contour map depicting the direction of

groundwater flow across the parcel, and quarterly calculation of vertical separation of groundwater to the bottom of disposal trenches. Additionally, monthly average and maximum daily waste flow, and estimated population served are required. Observations of any overflow or surfacing in the disposal areas must be reported. If waste sludge, septage, or other wastes are hauled offsite, the chain of custody must be documented.

The monitoring program will be prepared under the direction of a California Registered Geologist, Certified Engineering Geologist, or a California Registered Civil Engineer with appropriate experience in hydrogeology.

Siting and Setbacks

The area required for the installation of the ATU is expected to be between 3,000 and 4,000 square feet, and can be discreetly disguised from public places. The Center may choose to enclose the Plant area with fencing.

The minimum area required for the seepage pits is approximately 500 square feet. An additional identical area will be set aside for 100% expansion (see conceptual plans attached).

The seepage pits piping as shown on the conceptual plan is no closer than 25' from a property line and no closer than 240' to the nearest existing or proposed structure.

The proposed treatment process, in addition to professional operation and maintenance, will prevent nuisance odors.

Site lighting is generally used only for emergency maintenance and can be directed to avoid illuminating the surrounding areas.

Traffic to and from the plant shall be minimal, limited to maintenance and operations only, and no parking will be required.

All system components will meet or exceed minimum setback distances for sewage disposal systems.

SUMMARY

The Center OWTS as presently proposed and described herein is feasible and will meet the statutory and permit requirements of all Local and State involved agencies, will be designed and installed to meet all Local Codes and Ordinances and will provide reliable operation in regards to wastewater collection, treatment and disposal.

APPENDIX

YOUNG NAK CHRISTIAN RETREAT CENTER
Lake Hughes, CA

WASTEWATER COLLECTION AND DISPOSAL SYSTEM REPORT

MAXIMUM DAY WASTEWATER GENERATION CALCULATIONS

Description	People Quantity/Day[1]	Unit Generated GPD[2]	Max. Day Generated GAL
Dormitory	96	50	4,800
Cottages (Mobile Homes)	96	60	5,760
Daytime Attendees (Max)	74[3]	20	1,480
Caretaker (Resident)	2	100	200
Staff (Commuting)	4	20	80
Cafeteria (Dining Hall)	750[4]	7	5,250
Total Maximum Day Generated			**17,570 GAL**

SUB TOTAL MAXIMUM DAY WASTEWATER SYSTEM GENERATION	17,570	GAL
10% ALLOWANCE FOR INFILTRATION AND INFLOW	1,760	GAL
TOTAL	**19,330**	**GAL**

KEY

GAL = GALLONS
GPD = GALLONS PER DAY

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[1] Population figure provided by owner's representative. Maximum day population is 250.
[2] Usage figure by WREA based on accepted engineering standards adapted from 2010 California Plumbing Code, Table K-3 and *Wastewater Engineering, Treatment and Reuse*, Fourth Edition, Table's 3-2 through 3-4. Metcalf & Eddy, 2003.
[3] Total daily attendance including daytime visitors not to exceed 250 people.
[4] Meals per day.

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ESTIMATED ANNUAL WASTEWATER GENERATION CALCULATIONS

Description	People Quantity/Day[5]	Maximum Generated GPD	Days per Year[7]	Max. Day Generated GAL, Anual
Attendees and Staff	250	19,330[6]	337	6,514,210

TOTAL MAXIMUM ANNUAL WASTEWATER GENERATED 6,514,210 GAL

KEY

GAL = GALLONS
GPD = GALLONS PER DAY
MAX. = Maximum

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[5] Population figure provided by Dennis Kearney, Impact Sciences, owner's representative.
[6.] Generation figure by WREA based on accepted engineering standards, see Page B1.
[7] Assumes the Center will be closed four weeks per year for holidays, etc.