Contents

1. Project Background

1.1. Introduction

The Palomar Mountain Mutual Water Company (PMMWC) retained the services of Nolte Associates (Nolte) to examine capital project financial assistance options and define capital project scopes and capital costs. The PMMWC envisions upgrading one of its well transmission pipelines, installing a flow meter, installing an emergency generator for the well equipment and an uninterruptible power source, and increasing water storage capacity for domestic use.

The most immediate problem the PMMWC faces is the deteriorated condition due to corrosion of a 3-inch water transmission pipeline. This pipeline was installed in 1962 and extends from Pedley Valley (well sites) to Crestline Road in Palomar Mountain, CA, separated by a vertical elevation difference of approximately 630 feet. The PMMWC wants to replace the pipeline, approximately 3,100 feet of pipe. The water pipeline goes up over a rocky and forested slope, mainly of cedar and oak trees. The presence of granite in the area is extensive. About 50% of the pipe is exposed on portions that are washed by surface runoff.

The PMMWC owns a 30 foot wide easement along the slope where the pipeline is located. Property lines along the easement are subject to verification by survey. SDG&E owns an easement in the vicinity of the pipeline, which encroaches upon the last portion of PMMWC's easement. The PMMWC powers its well equipment through the electrical grid.

1.2. Scope

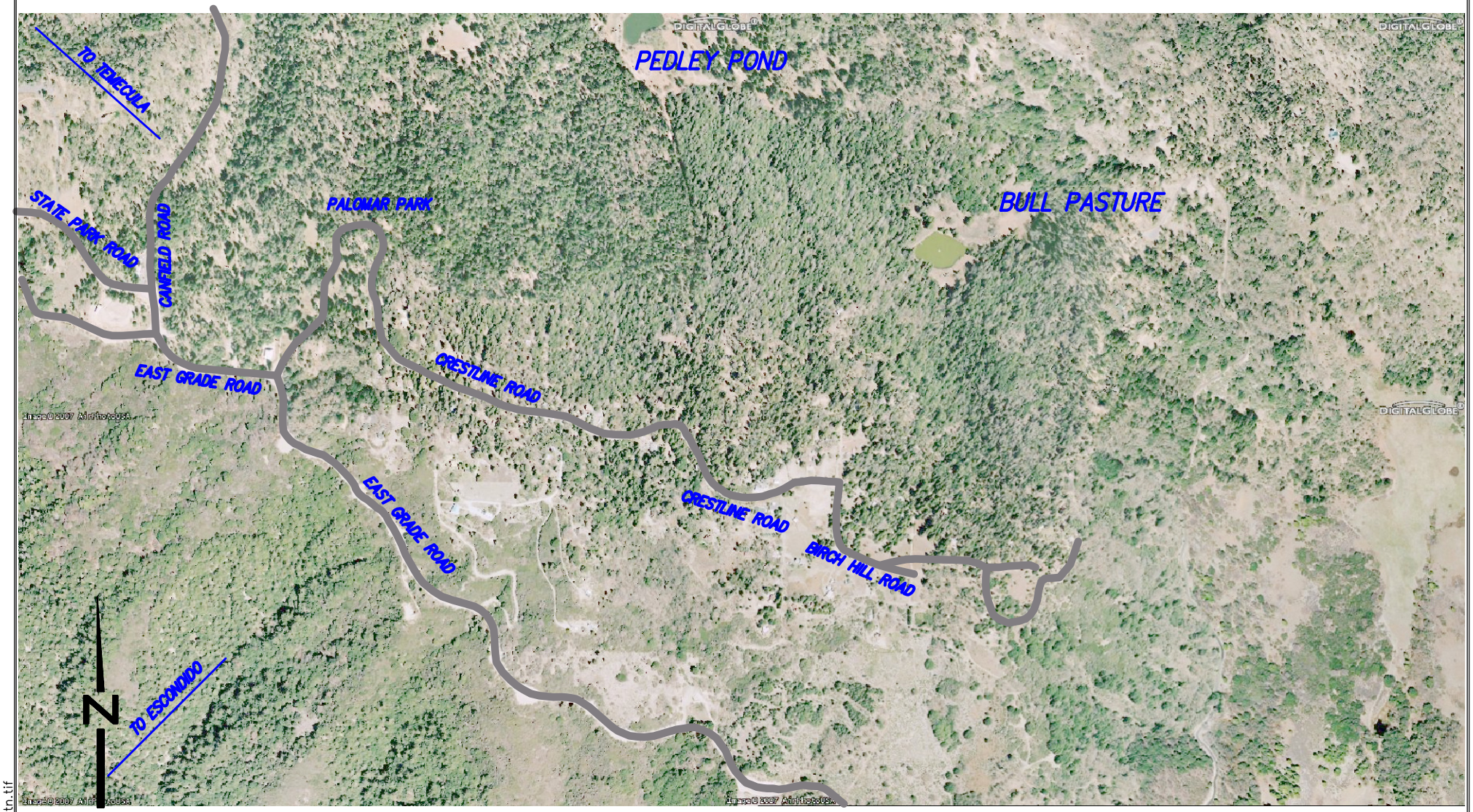
Tasks included in this analysis include defining the project scopes, identifying financing sources, and developing a schedule of phases, costs, and duration for the completion of the projects.

Nolte developed a scope of work for the design and construction of the proposed pipeline replacement. This scope includes a preliminary opinion of probable construction costs, costs for design survey and engineering efforts, legal and administrative costs, and contingencies. Per direction of the PMMWC, the fire suppression capability of the system (storage and distribution) was not evaluated in this study. Nolte evaluated two alternatives for supplying emergency backup power, and an uninterruptible power source for controls and starters, as well as two alternatives for increasing PMWWC's water storage capacity.

Nolte examined the proposed transmission pipeline's diameter in relation to the anticipated operational flow rates, the well horsepower and the velocity in the pipeline.

Nolte contacted private lenders to determine their eligibility requirements for funding predevelopment and construction phase efforts, specifically, the Rural

Community Assistance Corporation (RCAC) and the California Special Districts Association (CSDA), both of which offer bridge loans and construction loans. The findings of this investigation are presented in Section 4 of this report.



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DESIGNER: VW MGR: JFO

PALOMAR MOUNTAIN MUTUAL WATER COMPANY
VICINITY MAP

SHEET NUMBER 1 OF 2 SHEETS

PREPARED FOR: PMMWC DATE SUBMITTED: JUNE 2008

JOB NUMBER SDB044300

2. Existing Water Facilities

2.1. Water Consumption

The general philosophy of PMMWC with regards to water production is to distribute the limited safe yield of the existing well system to the members on an equitable basis. Since all of the units are not connected at the present time, the excess water is available to others on a *first come, first served* basis. Two sources were utilized to obtain historical and projected consumption data: The master plan prepared in July 1985 by *William W. Fannon, Sanitary and Hydraulic Engineer,* and monthly pumping flows provided by PMMWC.

The master plan states the maximum possible number of outstanding connections is 304, which was fixed by the Board of Directors in 1975. Per conversations with Mike Probert (PMMWC), there are currently 70 permanent (year-round) connections, and 126 intermittent connections, for a total of 196 connections.

The estimated available water supply was divided by the maximum number of connections to give the annual flow that could be provided to each shareholder if available. The amount of water that would be supplied to each connection is 35,000 gallons per year, slightly less than 100 gallons per unit per day (gpd).

The peak flow is the limiting factor for the PMMWC water distribution system. The master plan presents a projection for the ultimate peak hour demand of 60,000 gallons per day (gpd), or 42 gallons per minute (gpm) assuming all 304 water units are connected to the system and are active. This corresponds to 197 gallons per day per connection at peak hour flow.

Per PMMWC, July is the month of highest water consumption in Palomar Mountain. Daily cumulative meter readings were provided by PMMWC for pumping and consumption flows for July 2006 and July 2007. The average day demand for July 2006 was 18,076 gallons per day. The maximum day demand in July 2006 was 27,320 gallons per day. The average day demand in July 2007 was 15,790 gallons per day, and the maximum day demand flow in July 2007 was 22,400 gallons. Daily average flows during winter months and low occupancy periods are around 9,500 gallons per day, per PMMWC operator.

Based on the figures presented above, the maximum day demand in Palomar Mountain is approximately 2.2 times the annual average daily demand.

The maximum day demand of July 2007, 27,320 gallons per day, was used to evaluate the conveyance capacity calculations for this report.

2.2. Water Supply Facilities

PMMWC supplies water to its customers from two wells located near Pedley Pond, and one well located in Bull Pasture, northeast of Palomar Mountain. Throughout the history of PMMWC, seven wells have been drilled. Due to their limited yield and to water quality issues, some of these wells have been decommissioned and replaced with new ones. Three wells are considered active: Well 2, Well 3, and Well 5; two wells remain on standby for emergency use, Well 1 and Well 4.

Two of the three currently active wells are located in Pedley Valley where the ground elevation is approximately 4920 feet. These are Wells 3 and 5. Well 3 is a drilled well with a pump capable of lifting water 800 feet up from the Pedley Valley to the storage reservoir. Per Mike Probert, the rated capacity of Well 3 is 12 gpm and it has a 5 HP motor. Well 5 was installed in 2006 and is 300 feet deep. Well 5 has a 10 HP motor and produces approximately 23 gpm. Well 5 is the primary source of water for the PMMWC. Well 2 is located in Bull Pasture and is 40 feet deep.

Currently, the PMMWC operates their pumps on an intermittent basis. The pumps in Wells 3 and 5 run during night time. Per PMMWC system operator Mike Probert, between 9,300 and 9,500 gallons of water are pumped during a span of four hours during low occupancy months. This is the equivalent of 39 gallons per minute.

According to the operator, the Pedley wells' combined pumping capacity is 35 gpm. However, recent production data indicate that the wells are producing approximately 39 gpm. Variances in production rates are not uncommon and can be caused by pumps operating at a higher efficiency, or a higher water table.

Table 1: Pedley Valley Well Data Summary

WELL	PUMPING RATE (GPM)*	HORSEPOWER
3	12	5
5	23	10

*Provided by PMMWC water system operator

2.3. Distribution System and Storage Reservoirs

The PMMWC water distribution system consists of approximately 32,000 feet of pipeline, ranging in size between 1 and 4 inches in diameter. Water from Wells 3 and 5 in Pedley Valley, and Well 2 in Bull Pasture, flows into the steel 40,000 gallon storage reservoir via separate transmission lines. The reservoir is located at an elevation of 5,710 feet. The transmission line subject of this study is the 3-inch water line from the Pedley Valley wells. The transmission line subject of this study is the 3-inch water line from the Pedley Valley wells.

The 40,000 gallon storage reservoir is useful during periods of high demands like summer weekends, and it also maintains the system pressure. Three additional 10,000 gallon steel tanks were installed next to the existing 40,000 gallon reservoir

to increase the storage capacity of the system to a total of 70,000 gallons. The three tanks are cross connected to the 40,000 gallon tank, and fill and empty simultaneously.

A hydropneumatic tank and a booster pump located adjacent to the reservoir site pressurize water to the residences in the immediate vicinity of the reservoir. There is a second hydropneumatic tank behind the PMMWC building which pressurizes the houses in that area.

Per conversations with Peter Neubauer, County of San Diego, Department of Environmental Health, the recommended water storage capacity for domestic use (based on the number of metered service connections (196) and the maximum average air temperature (70°F) in Palomar Mountain) is 100,000 gallons.

2.4. Metering

Water meters were installed at the service connections of water users, which prior to 1984 had been unmetered. The meter makes it possible to determine the exact consumption of each user for billing periods. The information obtained from the readings has been utilized over the years to develop more accurate demand forecasts. The meters are read manually, once a year.

3. Project Definitions

3.1. Transmission Line Replacement

The PMMWC Board of Directors has expressed concern with the existing 3-inch unlined iron water line that runs from the supply wells in Pedley Valley to Crestline Road. This line extends for approximately 3,100 feet. The water line was installed in 1962 and presents evidence of corrosion along its length, especially on the lower end by Pedley Pond. If this line were to fail, 196 service connections will be deprived of water, although a few of these have private wells. The different project components are described below.

Pipeline Material. The replacement project consists of installing new galvanized steel pipe. Cement mortar lined and coated steel pipe is not available in small diameters. For this reason, galvanized steel is recommended. Galvanized steel pipe is covered with a protective coating of Zinc that greatly reduces its tendency to corrode and extends its life expectancy. The first 2,000 feet of the new line could be replaced with galvanized steel Schedule 80 (700 psi), and the remaining 1,100 feet with Schedule 40 pipe due to lower pressure rating requirements.

Pipeline Diameter. A 3 inch diameter pipe will satisfy the Company's existing water demands. However, to provide for the possibility of future changes in demands or operations, a 4 inch pipeline is recommended. The cost of installing a 4 inch line is higher, but it will allow for increasing water demands or changes in the pumping configuration to take advantage of low electricity rates at night time. At this point and time, although not needed, the installation of a 4 inch pipe is a low cost alternative for increasing system flexibility to modify future operations and demands.

Geotechnical Considerations. The corrosivity of the soil should be examined as part of the soils report prepared during the final design phase of the pipeline. Construction costs could increase due to overexcavation and breaking of the rock. A new data cable from the pump house can be installed along the new trench, where a warning tape that indicates the location of the pipe will be placed as well.

To monitor the corrosion of the new pipe, test lead stations that measure the voltage drop across the pipe can be installed during the construction of the new pipeline. The installation of the test stations is optional. The Zinc coating helps prevent corrosion.

Fittings and Appurtenances. Fittings for this type of pipe are of galvanized malleable (soft) cast iron. They connect by screwing onto the threaded pipe, after applying a small amount of pipe joint compound on the threads.

High end ball valves (carbon steel) are recommended in high pressure zones (450 psi system pressure at base). Ball valves (and blow-off valves if any) should be

installed every 750 feet as line valves to isolate and depressurize pipeline segments for repairs, modifications, inspection or maintenance.

Thrust blocks are recommended along with the installation of the ball valves due to the high pressures associated with the transmission line. Since the act of closing an in-line valve creates a dead end, a thrust block is required if the valve is not installed adjacent to a fitting.

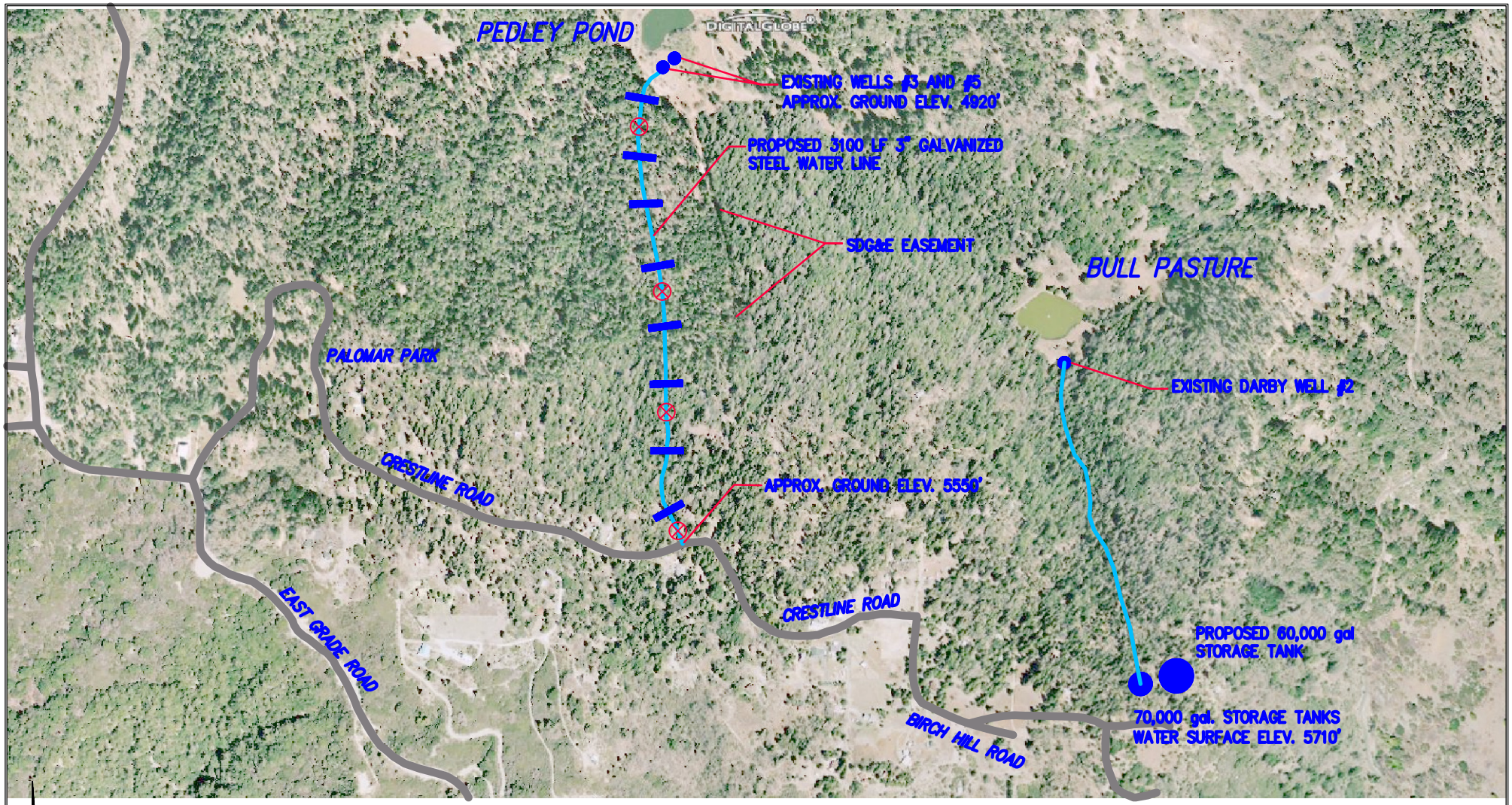
Continuance of service. The existing pipeline should be kept in service during construction to the greatest extent possible. However, the existing pipeline will need to be out of use temporarily to allow for the connection of the new transmission line to the existing portion of the transmission line along Crestline Road and at the Pedley Valley well site.

The existing water line can be left in use when installation of the new 4 inch line is completed. Although its remaining life span is short lived, maintaining this line adds redundancy to the water transmission infrastructure. However, due to its advanced corrosion and deteriorated conditions, it should not be relied upon as the main conveyance conduit.

Flow Meter. PMMWC wants to install flow meter at the bottom of the hill at the Pedley Valley well site. It will be installed downstream of the connection of the two pump discharge pipes. The new meter will measure instantaneous and total flows produced by the wells. Monitoring the production of the wells will assist PMMWC in determining how much of the water that is produced is leaking. A conventional flow meter is not suitable for this application because of the high pressure rating (450 psi). A more specialized flow meter has to be installed.

Trench Stabilization. For slope protection and erosion control, reinforced concrete cut-off walls should be constructed to stabilize the trench backfill and reduce the potential for the pipeline trench to be a conduit for surface runoff. Based on the elevation difference and the estimated length of the pipeline, the slope of the pipe is 20.3%. The average horizontal spacing between cut-off walls is 12.5 feet, per *San Diego Water Agencies Standards*. Some segments of the pipeline may have a steeper slope, decreasing the spacing of the cut off walls and vice versa. Appendix C presents a copy of the specification for cut off walls.

For additional trench protection, small earth mounds can be built perpendicular to the pipeline alignment throughout the entire length of the new pipe, to divert surface water runoff away from the trench.



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PALOMAR MOUNTAIN MUTUAL WATER COMPANY
PROPOSED 3" WATER TRANSMISSION LINE

PREPARED FOR: PMMWC DATE SUBMITTED: JUNE 2008

SHEET NUMBER 2 OF 2 SHEETS

JOB NUMBER SDB044300

Design Criteria. The criteria below were developed to assess the capabilities of the new water infrastructure to meet current and future service demands. The requirements are listed in Table 2. Some of the requirements are in accordance with industry standards.

Table 2: Water Transmission Pipeline Design Criteria

System Element/Condition	Design Requirement
Pipe Material	Galvanized Steel Schedule 80 and 40
Pipe Diameter	4 inch Minimum; inch internal diameter
Hazen-Williams Coefficient (C)	130 for Steel
Maximum Intermediate Valve Spacing	Are required so that no more than 750 feet of line will have to be shut off at any one time.
Isolation Valves	High-end Carbon Steel Valves
Air release-valves	Shall be installed at all high points in line as directed by the Engineer.
Blow-offs	Blow-offs shall be installed at ends of mains and low points where sediment may settle in the line
Tracer Wire	Install copper tracer on top of pipe along trench
Surface Loading	Design Engineer to calculate surface loading when geotechnical report is available (no live loads)
Cut-off Walls	Average spacing between cut-off walls 12.5 feet
Flow rate	39 gallons per minute
Static pressure at Well house	790 feet (342 psi)
There should be a minimum of 10.0 feet separation from sanitary sewers and septic tanks (edge of pipe to edge of pipe)	
Maximum Design Velocity	4 feet per second
Minimum service pressure	40 psi
Minimum pipe cover	3 feet
Ambient Temperature	Maximum 75°F - Minimum 46°F

3.2. Back-up Generator

The PMMWC wishes to install a back-up generator at the well site as an emergency power source for the existing pumping equipment.

Back-up Generators. When power from the grid goes out, the pumping equipment needs an alternative source of power to operate. The standby generator will be turned on/off manually.

Back-up generators are always on standby and are normally powered by liquid propane or diesel. Both alternatives are fuel-efficient. Liquid propane engines are generally cheaper to purchase but diesel is a more cost efficient fuel for extended use.

These two alternatives, propane and diesel, are evaluated below.

Propane Generator. Propane generators are more efficient than gasoline, and last much longer than other generators. Propane burns very cleanly and leaves little or no carbon deposits in the engine. Liquid propane can also be purchased at gas stations, but it is more convenient to have the liquid propane tank filled at request by a propane delivery truck. Many fuel stations are equipped to fill a standard propane tank for a reasonable cost.

Propane has an indefinite shelf life and storage is usually a 500 to 1,000 gallon propane tank. Most propane distributors will automatically check and refuel the tank. Tanks are installed at very low costs by the distributors.

The disadvantage of propane is that it is not as combustible as diesel. Usually it derates engine horsepower by 10% of its gasoline capable rating. Propane is flammable and does not have the cooling or lubricating benefits of diesel fuels on valves.

Generally, the initial cost of a propane generator is its biggest advantage in comparison to the diesel generator. In PMMWC's case however, the requirement of additional equipment to conform with emissions regulations set forth by the County of San Diego, increases the cost of the propane generator.

Liquid propane is extremely efficient, lasting much longer than similar sized generators that utilize standard gasoline for fuel. It also keeps up with the very efficient diesel engine.

Diesel Generator. Diesel engine generators stand out in longevity and efficiency. Major service and/or maintenance is required sporadically on a diesel engine. Modern diesel generators are built for much quieter operation and require less maintenance than liquid propane generators at the same size.

Diesel generator engines have no spark plug wires or carburetors to maintain or replace. Diesel engines run cooler and burn less than half the amount of fuel it takes a gas engine to do the same work. Diesel is also much safer to store than gasoline and liquid propane. Diesel fuel is flammable, but is not explosive and the emissions are far less toxic than gasoline emissions.

The downside of diesel engines is cold-starting. When a diesel generator engine gets too cold, the air temperature cannot be raised enough to ignite the fuel. This can be a significant problem due to the low temperatures in Palomar Mountain during winter months. To avoid this problem, a glow plug must be plugged into power. Since power is always running from the power line, there should be no problems with cold starting when power goes out.

Additionally, diesel fuel has a shelf life. Although it can be extended with the use of fuel preservatives, life expectancy is about two years maximum. Diesel fuel can be affected by bacteria and also by direct sunlight.

Some of the benefits of using a propane generator are listed below:

1. The closest gas station that sells diesel is located 14 miles away from Palomar Mountain, in the Valley Center. Road grade diesel fuel has some additives which are often introduced in winter climates, but it can be used just the same.

   Obtaining propane to refill the generator would be much easier since there is a propane delivery truck that serves the residents of Palomar Mountain for central heating of their homes.

2. In the event of a disaster or emergency situation, gasoline and/or diesel is one of the first resources to be gathered. Using a propane generator could be a more reliable option to keep the well powered.

3. Liquid propane burns cleaner, as all natural gasses do. Propane generators produce low carbon monoxide emissions. Propane fuel makes byproducts that come out of the muffler cleaner and better for the environment.

4. If diesel fuel sits for too long, it can damage the engine and it can corrode the fuel tank. Liquid propane can be stored for years without hurting the engine and with no apparent decrease in quality; propane does not go bad or stale, or pollute the air. It also helps extend the life of the engine.

5. Liquid propane generators work without having to keep the fuel line heated. Propane ignites at a lower temperature than diesel, making propane generators ideal for any climate, no matter how adverse the conditions are. Propane generators also start better when they have been unused for some time and are needed in an emergency situation.

6. Propane tanks of many different sizes can be used depending upon the duration the generator will be needed. Available sizes include: five-gallon tanks, 24-gallon cylinders, or tanks up to 1,000 gallons. The flexible storage capability of liquid propane will keep the pumping equipment from running out of power when it is needed most.

The following are some of the benefits of using a diesel generator:

1. Diesel generators are safer to store and operate. Diesels engines have no spark plugs to replace, or carburetors to service, and it is not explosive like gasoline, propane gas, and liquid propane.

2. Generally, diesel fuel is less expensive compared to propane since it requires a shorter refining process.

3. Diesel requires less fuel consumption per kilowatt (kW) produced because of its higher energy density. This means that more energy is produced with a diesel engine compared with the same volume of propane.

4. Diesel engines are easier to maintain because they have fewer parts and no spark system. The only maintenance generally required is changing the oil, and changing the fuel, air and oil filters.

Power Requirements. There are two power requirement options that PMMWC is considering:

1. The first option will start both existing pump motors at Wells 3 and 5, with a 20 second lag time period. These motors are 5 and 10 HP, respectively (see Table 1), 240 V, 3 phase. The required power rating for this option is a 40 kW (diesel or propane gas) engine.

2. The second option considers powering only the 10 HP motor. The required engine size is a 30kW (diesel and propane gas).

Cost estimates for both options are presented in Appendix A, Construction Cost Opinions.

Portable versus Permanent Generator. Nolte researched the differences between a portable and a permanent generator. A portable generator (in the range of power ratings required for PMMWC) is approximately 10% cheaper than a permanent generator. However, in order for it to be transported, the acquisition of a trailer is required.

Although PMMWC does not anticipate transporting the generator from its location once it is installed (Pedley wells), transporting a diesel generator is much easier than transporting a propane generator. The diesel unit and fuel tank are one integrated piece of equipment, where as the propane unit and tank are two separate pieces and their relocation can be problematical, especially because of the location of the generator. The portable propane generator could be transported to a site with a propane tank already installed, not requiring the propane tank to be transported.

The following table presents a comparison between a propane and a diesel generator.

Table 3: Propane vs. Diesel Generator

ITEM	LIQUID PROPANE GENERATOR	DIESEL GENERATOR
Fuel storage tank	Separate 499 gallon tank not included in cost	100 gallon tank included in total cost integrated with generator
Space requirements	LP generator/tank take up more space	Smaller unit
Fuel refill	Suburban, Pro-flame, and Ferrell Gas distributors come on an as-needed basis	Diesel fuel acquired at nearest gas station
Reliability	Ignites at lower temperatures	Harder to start in cold weather
Fuel life	Several years	Maximum 2 years
Emissions	Burns cleaner and by-products are less harmful to environment	Non-toxic emissions
Safety	Explosive	Non-flammable

Uninterruptible Power Source. An uninterruptible power source is a is a device which maintains a continuous supply of electric power to connected equipment by supplying power from a separate source when utility power is not available. UPS UPS systems provide isolation from power line problems. The difference between a UPS and a standby generator is that a generator does not provide protection from a momentary power interruption and may result in an interruption when it is switched into service, whether manually or automatically.

The disadvantages to these devices are increased cost, increased power consumption, and increased heat generation. Despite the fact that the inverter in a UPS is always on, the reliability of such units does not seem to be affected.

PMMWC and Nolte discussed the nature of power outages in the area. Outages are mainly due to wind, fire and snow, and can last one day or up to two weeks. For this reason, automating the generators can be a complex process. Additionally, the run time of the batteries (12 minutes for half load) is too short to support controllers operations during long period of power outages. Because the duration of power outages is unpredictable, a UPS system was not considered in this study as a capital project.

3.3. Water Storage Tank

PMMWC has expressed interest in increasing the volume of water storage to comply with County requirements. Currently, PMMWC's system has four tanks with a combined capacity of 70,000 gallons. Per conversations with the County Department of Environmental Health, PMWWC should increase the storage capacity to 100,000 gallons.

The first alternative considers installing a fifth steel bolted tank with the capacity to store 30,000 gallons, to complement the existing capacity of 70,000 gallons. The second alternative considers removing the three existing 10,000 gallon tanks and installing a new steel bolted 60,000 gallon tank. Site and access improvements will accompany the installation of the tanks for both alternatives. The new tank, either the 30,000 gallons or 60,000 gallons, will be installed to operate at the same elevation as the existing 40,000 gallon tank, approximately 5710 feet.

3.4. Permitting

Different permitting requirements prior to the installation of the new generator and the replacement pipeline project are anticipated. Palomar Mountain is under San Diego County jurisdiction. Nolte contacted the different agencies in the County from whom permits are required.

Emissions. Nolte contacted the *San Diego County Air Pollution Control District* to discuss permits required for the installation of the new equipment. Permits and fees are waived for stationary emergency engines rated less than 50 HP.

Emissions from an emergency engine are regulated under Rule 69.4.1 of the *San Diego County Air Pollution Control District* rules. These guidelines are implemented by the State and should comply with the *Air Toxic Control Measures* (ACTMs) which set the following limits:

- 6.9 grams/brake HP-hour
- Carbon monoxide (CO) under 4500 parts per million (ppm).

Both the 40 kW diesel and propane engines required to power both motors at Wells 3 and 5, have power ratings of 54 HP. Because either unit is rated higher than 50 HP, the installation of the new equipment would require obtaining an emissions permit from the *San Diego County Air Pollution Control District*.

A 30kW diesel or propane unit used to power only the 10 HP motor is rated at 40 HP. Emissions permits and fees from the *San Diego County Air Pollution Control District* for this engine would be waived.

It is important to consider that in the case of propane generators, converters must be added to lower the emissions to allowable levels. This additional equipment can drive the cost of the unit higher than that of a similarly rated diesel engine.

County Building Code and Noise. Generators used as power source must comply with the *County Building Code,* including the requirement that unit have appropriate UL2200 certification. Generators also have to comply with the property line sound level limits of the County Noise Ordinance (Section 36.404). The most stringent requirement is a one-hour average sound level limit of 45 decibels (dBA) at the property line.

The future generator will be located outside the well house in a weather proof enclosure that will also help reduce noise levels. Coordination between PMWWC and the manufacturer will be required for properly locating the unit to comply with County noise regulations, once property lines have been established.

Table 4 presents a comparison between a 30 kW and a 40 kW generator pertaining to permitting requirements:

Table 4: 30 kW vs. 40 kW Generator

ITEM	LIQUID PROPANE GENERATOR		DIESEL GENERATOR	
	30 kW (40 HP)	40 kW (54 HP)	30 kW	40 kW
Capital Cost	$32,900*	$39,200*	$44,800*	$52,200*
Emissions Permitting	Not required	Required	Not required	Required
County Building Code	Required	Required	Required	Required
Wells Powered	Well 5	Well 3 and 5	Well 5	Well 3 and 5
Max. Water Production	23 gpm	35 gpm	23 gpm	35 gpm

*Price of portable units

Encroachment/Excavation. Encroachment and excavation permits from the County Department of Public Works are also anticipated. Once the boundary survey has been performed, it will be determined if the proposed project will encroach on County right of way and if permits are required for the replacement of the water line.

3.5. Construction Cost Opinions

Nolte prepared cost opinions for the three projects described in Sections 3.1, 3.2., and 3.3. They are attached to this document as Appendix A. Price quotes were obtained from local distributors.

3.6. Evaluation of Existing Water Transmission Line

The design flow for which the existing pipeline is evaluated is 39 gpm which corresponds to the amount of water pumped during night time on low occupancy, winter months. The hydraulic evaluation was performed utilizing the following parameters:

- Surface elevation at wells: 4920'
- Water surface elevation at tank: 5710'
- Pipe length from wells to tank: 5810'
- Roughness coefficient (Hazen-Williams *C*) for steel: 130
- Internal diameter 3 inch nominal pipe: 3.068"

The following results were obtained:

- Head loss through the pipe is approximately 37 feet at 39 gpm.
- Energy grade line at wells: 5747'
- Energy grade line at tank: 5710'
- Velocity: 1.89 feet per second (f/s)

The energy grade line at the tank is equal to the water surface elevation when it is exposed to the atmosphere.

The head loss due to friction throughout the entire length of pipe is negligible (< 5% of the static head). The existing 3 inch steel pipe is adequate for this application. The velocity does not exceed 4 f/s, and it falls within the design criteria established above. The pressure head required at the wells to pump at this rate is approximately 360 psi. PMMWC currently pumps water at 450 psi.

Although the existing 3 inch line adequately serves the needs of the PMMWC, a 4 inch line is recommended for various reasons: reduced head losses through the pipe, reduced pumping requirements, easier maintenance, and flexibility to accommodate future water demand increases.

3.7. Evaluation of Pumping Requirements

PMMWC currently pumps 9,400 gallons per day during a four hour period at night time. This flow rate equals 39 gpm. As discussed earlier, this rate varies from the actual pumping rate of 35 gpm. The maximum day demand is equal to 27,300 gallons per day (140 gallons per unit per day and 196 connections) which is approximately three times the volume of water that is pumped during night time.

If PMMWC anticipates drilling more wells to increase their production capacity, the maximum flow the 4 inch pipe can convey is 143 gpm without exceeding a velocity of 4 f/s. This flow is almost 4 times higher than the current 39 gpm extracted from the wells. It would require the pumps to operate for approximately 3 hours to supply the required 27,300 gallons per day at maximum demand, and drilling one or more water supply wells. Head losses become significant at this flow rate through the 4 inch pipe.

If PMMWC does not foresee drilling new wells, the pumping duration will have to be extended to 13 hours per day to supply the 27,300 gallons at maximum demand at a rate of 35 gpm. If PMMWC wishes to maintain pumping hours low and reduce energy costs, it should consider replacing the pumps with more efficient pumps. Additionally, a larger size pipe will contribute to reducing the pumping time since more water can be conveyed under adequate hydraulic parameters.

Replacing the pumps and increasing the size of the pipeline becomes a more economical alternative in the long term. Ultimately, more units could be occupied on a permanent basis and high water demand weekends could extend to longer periods of time.

Table 5 summarizes the required pipe diameter and pumping schedule for different scenarios, assuming that the maximum day demand is 27,300 gallons and that water is being pumped up to the reservoir.

Table 5: Comparison of Pumping Scenarios

PUMPING RATE (gpm)	DURATION (hours)	PIPE DIAMETER (inch)	VELOCITY (f/s)	HEAD LOSS (feet)
35	13	3	1.7	29.93
		4	0.98	7.76
70	6.5	3	3.4	108.05
		4	1.95	28.02
105	4.34	3	5.10	228.94
		4	2.88	56.73
140	3.25	3	6.8	390.02
		4	3.91	101.15

4. Private Lending Investigation

Nolte contacted the *Rural Community Assistance Corporation* (RCAC) as a potential lender to determine the applicability and requirements for funding predevelopment and construction phase efforts to accommodate the PMMWC's objectives. Nolte contacted the *California Special Districts Association* (CSDA) as well to learn about their financing programs. Because the PMMWC is not a public agency, it is not eligible to receive finding from CSDA, unless they formed a joint power authority with a public agency. This does not seem likely, thus we do not recommend pursuing this option.

The following are key findings:

4.1 Rural Community Assistance Corporation (RCAC)

RCAC is a nonprofit organization dedicated to assisting rural communities achieve their goals and visions by providing training, technical assistance and access to resources. The RCAC offers the Environmental Infrastructure Loan Program that helps create, improve or expand the supply of safe drinking water and waste disposal systems/facilities that serve communities in the rural West. RCAC provides intermediate and long-term loans when system improvements are needed. To obtain RCAC assistance, membership is not necessary.

General Program Requirements and Provisions:

- Eligible applicants include nonprofit organizations, public agencies, non-profit mutual water companies and tribal governments.

- To be eligible, projects must be located in rural areas with populations of 50,000 or less in Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming. Community size is limited to populations of 10,000 for long-term USDA guaranteed loans and short-term loans for which USDA is the long-term lender.

- Eligible projects include water, wastewater, solid waste and storm water facilities that primarily serve low-income rural communities and non-profit mutual water companies.

- The RCAC loan process requires completion of the application form and a description of the purpose of the loan. Loan requests under $300K are approved by RCAC's chief executive officer and those amounts exceeding $300K are subject to finance committee approval.
- RCAC observes the environmental guidelines of the agency requesting the loan is normally subject.

- Projects may rely on RCAC as the sole funding source, subject to USDA approval to guarantee 90% of the loan required for long term loans that the USDA sells on the secondary market at prevailing loan rates (currently in the range of 8.0%); alternatively obtaining direct USDA loans (currently in the range of 4.5% for long term loans).

- Unlike government loans, RCAC loans may fund immediate following recordation with amounts disbursed anytime upon request of the loan recipient.

Loan Products:

- Short-term loans (1 to 3 years) for feasibility (such as preliminary engineering reports – "PER" environmental reports), subject to the following:

  a. Normally not more than $50,000
  b. Unsecured, promissory note only
  c. Normal term – one year
  d. Entity must be eligible for long-term financing from governmental or other source and have reasonable priority rating for probable funding
  e. Entity must agree to repay loan, on extended terms if necessary, if project does not proceed
  f. Must have technical assistance to extent needed, either from RCAC or another acceptable technical assistance source

- Predevelopment (such as engineering, legal, bond counsel), subject to the following:

  a. Amount corresponding with other financing source Letter of Conditions to cover preconstruction costs
  b. Normally not to exceed $350,000
  c. Unsecured, promissory note only
  d. Letter of Conditions from long-term funding source
  e. Normal term – one year
  f. Technical assistance as necessary

- Construction, subject to the following:

  a. Amount corresponding with other financing source Letter of Conditions to cover loan portion of funding commitment
  b. Normally not to exceed $1 million
  c. Generally secured by same type of security as permanent financing source outlined in Letter of Conditions for permanent loan (by promissory note with assignment referenced, attached as a promissory note to the source of anticipated income)

d. Commitment letter for interim financing from other funding source indicating take-out provisions
e. Loan term corresponding with construction period for loan portion which are usually one to three years duration with a commitment letter.
f. Does not require funding from another source subject to a repayment mechanism and RCAC approval.

- Intermediate term loans, subject to the following:

a. Up to 20 years repayment
b. Maximum 5.0% interest rate
c. For smaller capital needs, normally not to exceed $100,000

PMMWC is only eligible to receive a onetime loan amount of up to $100,000 with RCAC's intermediate loan term program. Nevertheless, this fund is currently depleted and it is undetermined at this time when funds will be available.

- Long-term loans, subject to the following:

a. Must meet the requirements of USDA Rural Utilities Service Water and Waste Disposal Guaranteed Loan Program, such as eligible loan purpose and eligible entity
b. Fees – 1 percent loan fee, 1 percent guarantee fee on guaranteed portion of loan (generally 90 percent)
c. Interest rate – set at time of closing in accordance with the secondary market rate (currently averaging 8.0% for fixed rate loans) for the term of the loan. The rate is generally expected to be 2 percent to 3 percent over short-term rates
d. Generally used when system improvements are needed and system does not have priority to qualify for more favorable funding sources
e. Applicant must demonstrate repayment ability and security for the loan

Table 6: RCAC Loan Options Chart

CRITERIA	SHORT TERM	INTERMEDIATE	LONG TERM
Available term of loan	1-3 years	Up to 20 years	Up to 30 years
Interest rate	5.25% (subject to change)	No more than 5%	Set at time of closing, currently 8.5%
Fixed or variable rate	Fixed rate	Fixed rate	Fixed rate
Fees charged	1% loan fee	1% loan fee	1% loan fee 1% of guaranteed portion of loan by USDA, usually 90%
Monthly payment per $100K	$437.50 at 5.25% interest only loan	$659.96 at 5%	Dependent upon loan amount, interest rate, and loan term
Lending limits (guidelines)	Feasibility: $50,000 Predevelopment: $350,000 Construction: $1,000,000	Small capital projects not to exceed $100,000	Subject to balance of fund, cannot guarantee 100% on very large projects over $5,000,000
Environmental documents required	Preliminary Engineering Report	Preliminary Engineering Report	The environmental guidelines that the permanent lender requires
When is loan funded	30 -60 days for preconstruction and predevelopment activities	Fund is currently depleted	60 days or more
Loan securing requirements	Secured by same type of security as permanent financing source outlined in Letter of Conditions for permanent loan (by promissory note)	Fund is currently depleted	Must meet the requirements of USDA Rural Utilities Service Water
Prevailing wages required	Per permanent lender	Per permanent lender	Per permanent lender

Based on the information presented above, PMMWC has the following financing options:

1. Apply for financing with RCAC's intermediate term loan program, which covers capital costs up to $100,000. The duration of this loan is 20 years at a 5% interest rate. Funds from this program can be used to finance the installation of the proposed 30,000 gallon tank (if this project alternative is selected) or the new generator.

2. Apply for financing with RCAC's long term loan program for capital projects adding up to more than $100,000. The duration of this loan is 30 years. The interest rate is determined at closing, but as of June 2008 it is 8.5%. Applicants

are subjected to meet USDA's Rural Utilities Service Water requirements. While RCAC's long term loan program is a viable option, it is not the preferred alternative due to the high interest rate that may apply.

3. Apply for funding directly with USDA. The term of the loan is 40 years at a 4.5% interest rate. Environmental and preliminary engineering reports are among requirements that may delay the funding process. Additionally, USDA loans are funded prior to the construction phase. A bridge loan to fund preliminary activities such environmental, engineering, permitting, etc. is necessary. RCAC offers bridge loans at competitive rates.

Recommendations

1. PMMWC compiles consumption and production information on a regular basis. It is recommended to continue this good practice. Metered data of water consumption at the connected units should be tabulated and recorded for performing better estimates and projections for future improvements. Additionally, the installation of a flow meter will allow PMMWC's operator to compare how much water is being produced, to how much water is actually being consumed.

   Major differences between what is produced and consumed can be indicative of leaks in the water system, which, once detected, can be corrected.

2. Well inspections are recommended on a frequent basis to guarantee that the pumps and motors are operating at their maximum efficiency, and also to monitor the quality of water that is extracted from the wells. Well inspections can be performed simultaneously with the installation of the new transmission pipe.

3. To determine the long term measure of the water production capability of the aquifer, a hydrogeology study should be performed in the near future. This study can help determine the safe yield of the wells and the possibility of drilling new wells in the vicinity or re-activating old ones in the event that Wells 3 and 5 cannot keep up with higher water demands.

4. Nolte recommends that the transmission line be a 4 inch steel pipe as opposed to a 3 inch line. Some of the advantages of a bigger size pipe are: a) more conveyance capacity on high demand weekends or future growth, b) reduction in friction losses, c) reduction in pumping costs, d) more commonly used pipe diameter and, e) easier maintenance because replacement fittings for 4 inch lines are easier to find.

5. Although threaded pipe has restrained joints, the pressure associated with this transmission line is considerably high. For this reason, it is recommended that thrust blocks be used at pipe bends and/or valves to complement the restraining action of the threads.

   A 4 inch pipe requires flanged connections for fittings. Restrained joints can eliminate the need for thrust blocks at pipe bends and fittings, driving down the overall cost.

6. A portable propane generator is suitable for this application for the following reasons: 1) the remoteness of the Pedley wells site for purposes of filling the fuel tank makes it complicated to fuel a diesel generator, 2) the long shelf life of liquid propane calls for less fuel refilling, 3) propane burns cleaner than a diesel engine and is better for the environment, 6) propane generators are more reliable in cold climates, and 7) propane is already delivered by truck to locations near the well site.

Although the Diesel generator is cheaper, the initial cost of the propane generator can be offset by less refilling of liquid propane. A portable unit reduces costs the initial cost of the equipment. Nevertheless, the generator needs to comply with the sound level limit of 45 decibels (dBA) at the property line. Although the PMMWC wishes to purchase a portable generator, its intended use requires that it remains at the same location permanently. For this reason it is considered a stationary engine and is subject to permitting requirements from the County Department of Planning and Land Use.

The pump at Well 5 (10 HP motor), rated at 23 gpm, can supply PMMWC's maximum day demand if run continuously for 20 hours. For this reason, the portable 30kW propane generator is recommended. In addition, because the 30 kW is rated at 40 HP (less than the 50 HP limit), permits and fees from the San Diego County Air pollution Control District are waived.

7. The recommended alternative for a new storage tank is to remove the three existing 10,000 gallon tanks and installing a new steel bolted 60,000 gallon storage tank. This alternative is more costly, but in the long term it will facilitate operation and maintenance of the storage system. Both tanks, the 40,000 gallon and the 60,000 gallon tanks, will be connected through a pipe that will allow them to float together.

   Some piping modifications have to be completed to the new tank configuration in order to increase operational flexibility of the storage system. The two transmission lines discharge into the existing 40,000 tank. One comes from Well 2in Bull pasture, and the other one from Wells 3 and 5. Two new branches from each transmission line should be directed into the new 60,000 gallon tank in case one tank or the other has to be taken off line. This will allow water being pumped to be discharged into either storage facility. The main outlet is currently on the 40,000 gallon tank. A by-pass line between the connecting pipe and the main outlet pipe needs to be installed to allow water from the new 60,000 gallon tank to flow into the system. The figure below illustrates the recommended piping configuration.

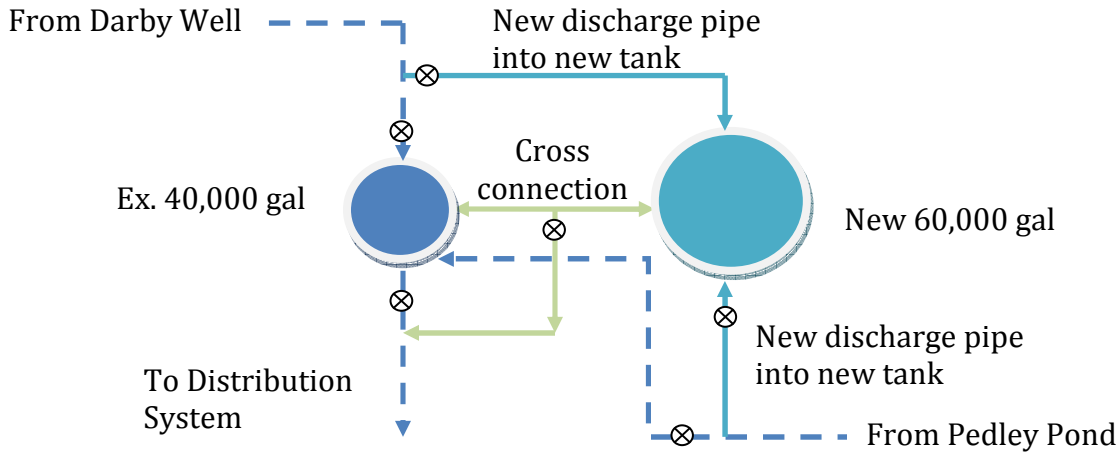


Figure 3. Recommended Piping Configuration

8. Verify that project site is not located in the Cleveland National Forest because permits for survey and/or construction work would be required from the United States Forest Service (USFS). Based on prior experience, obtaining permits from this agency can become a lengthier process. For this reason, Nolte recommends initiating permitting application with USFS as soon as possible so that the improvement work will not be held back because of permitting issues.
9. Based on the information thus far obtained, RCAC financing is recommended. The RCAC has been forthcoming in providing this information and has expressed enthusiasm in being able to assist the Palomar Mountain Mutual Water Company's intermediate and long term financing needs.

   PMMWC should consider the long term loan option both from RCAC and directly from USDA. Although USDA offers low interest rates on their loan program (4.5%), applying directly through USDA is a lengthy process. Applying for a loan from RCAC is significantly easier. The monies are available, and are guaranteed by USDA by up to 90%. Palomar Mountain is likely to be eligible to receive funding from USDA because of the size of the community and the annual median household income (MHI), which for the County Subdivision of Palomar-Julian CCD, is $41,766. These two factors are crucial in determining the amount and terms of the loan.

   If a loan were obtained through RCAC, additional fees have to be considered, like a 1% loan fee, and a 1% guarantee fee for the portion of the loan which is guaranteed by USDA. These fees can add up to $8,500, and can be wrapped up into the loan or paid at closing. No ESCROW companies are involved in the lending process since the loans are not secured by Real Estate.

   The contact information for the RCAC is:

   Rural Community Assistance Corporation
   3120 Freeboard Drive, Suite 201
   West Sacramento, CA 95691
   (916) 447-2854 Office
   (916) 447-2878 Fax

Appendix A: Project Cost Opinions

The following cost opinions do not assume prevailing wages on all the survey work in 2008 dollars. A detailed survey scope of work is provided below.

PMMWC has a legal easement across a 40 acre parcel. The exact boundaries of the water pipeline easement are unknown. As part of the survey work, the easement boundaries will be determined.

Survey Scope of Work

Nolte will perform control survey based on NAD 83 and NGVD 29 datum. We will establish horizontal control using OPUS solution and make a tie to a know bench mark in the area.

Nolte will locate the water line from existing Crestline Road to Pedley Pond, conduct 100 ft strip topographic survey centered on existing water line, locate trees with diameter greater than 6 inches within 100 ft strip, and locate planimetric features such as fences, power poles, wells, roads, gates etc.

Nolte will conduct boundary survey to locate Crestline Road and roads and lots as shown on APN 135-063. Nolte will show found monuments and procedure of survey. This portion of the work could be very challenging. If the work goes well, the cost will be less.

Nolte will plot section lines and background lotting with topographic survey of water line and planimetric feature. Nolte will show 1 ft contour intervals. No easements shall be plotted, no title reports are included.

Portable 30 kW Electric Liquid Propane Generator				
ITEM DESCRIPTION	***Estimated Quantity***	***Unit of Measure***	***Unit of Price***	***Item Total***
30 KW, 32 HOUR TANK AT 100% LOAD W/ WEATHERPROOF HOUSING AND SOUND ENCLOSURE	1	LS	$ 25,700	$ 25,700
AIR/FUEL RATIO CONTROLLER AND CATALICTIC CONVERTER	1	LS	$ 8,000	$ 8,000
499 GALLON LIQUID PROPANE TANK	1	EA	$ 2,400	$ 2,400
LIQUID PROPANE*	400	EA	$ 4.00	$ 1,600
DEPARTMENT OF PLANNING AND LAND USE PERMITTING	1	LS	$ 2,000	$ 2,000
START-UP	1	LS	$ 1,000	$ 1,000
SUBTOTAL				**$ 40,700**
CONTINGENCY	10	%	-	**$ 4,070**
TOTAL GENERATOR (2008$)				**$ 44,770**

*Liquid propane tank only filled 80%

Portable 40 kW Electric Liquid Propane Generator				
ITEM DESCRIPTION	***Estimated Quantity***	***Unit of Measure***	***Unit of Price***	***Item Total***
40 KW, 32 HOUR TANK AT 100% LOAD W/ WEATHERPROOF HOUSING AND SOUND ENCLOSURE WITH TRAILER	1	LS	$ 30,240	$ 30,240
AIR/FUEL RATIO CONTROLLER AND CATALICTIC CONVERTER	1	LS	$ 8,000	$ 8,000
499 GALLON LIQUID PROPANE TANK	1	EA	$ 2,400	$ 2,400
LIQUID PROPANE*	400	EA	$ 4.00	$ 1,600
EMISSIONS PERMITTING	1	LS	$ 2,200	$ 2,200
DEPARTMENT OF PLANNING AND LAND USE PERMITTING	1	LS	$ 2,000	$ 2,000
START-UP	1	LS	$ 1,000	$ 1,000
SUBTOTAL				**$ 47,440**
CONTINGENCY	10	%	-	**$ 4,744**
TOTAL GENERATOR (2008$)				**$ 52,184**

*Liquid propane tank only filled 80%

Portable 30 kW Electric Diesel Generator				
ITEM DESCRIPTION	***Estimated Quantity***	***Unit of Measure***	***Unit of Price***	***Item Total***
30 KW, 28 HOUR TANK AT 100% LOAD W/ 100 GALLON TANK AND WEATHERPROOF HOUSING AND SOUND ENCLOSURE WITH TRAILER	1	LS	$ 26,500	$ 26,500
DIESEL FUEL	100	GAL	$ 4.50	$ 450
DEPARTMENT OF PLANNING AND LAND USE PERMITTING	1	LS	$ 2,000	$ 2,000
START-UP	1	LS	$ 1,000	$ 1,000
SUBTOTAL				**$ 29,950**
CONTINGENCY	10	%		**$ 2,995**
TOTAL GENERATOR (2008$)				**$ 32,945**

Portable 40 kW Electric Diesel Generator				
ITEM DESCRIPTION	***Estimated Quantity***	***Unit of Measure***	***Unit of Price***	***Item Total***
40 KW, 28 HOUR TANK AT 100% LOAD W/ 100 GALLON TANK AND WEATHERPROOF HOUSING AND SOUND ENCLOSURE WITH TRAILER	1	LS	$ 30,000	$ 30,000
DIESEL FUEL	100	GAL	$ 4.50	$ 450
EMISSIONS PERMITTING	1	LS	$ 2,200	$ 2,200
DEPARTMENT OF PLANNING AND LAND USE PERMITTING	1	LS	$ 2,000	$ 2,000
START-UP	1	LS	$ 1,000	$ 1,000
SUBTOTAL				**$ 35,650**
CONTINGENCY	10	%		**$ 3,565**
TOTAL GENERATOR (2008$)				**$ 39,215**

30,000 Gallon Tank				
ITEM DESCRIPTION	***Estimated Quantity***	***Unit of Measure***	***Unit of Price***	***Item Total***
MOBILIZATION, BONDS, CLEANUP AND DEMOBILIZATION	1	LS	$ 5,000	$ 5,000
30,000 GALLON STEEL TANK	1	LS	$ 39,000	$ 39,000
VALVES, FITTING, APPURTENANCES, REPIPING	1	LS	$ 10,000	$ 10,000
ACCESS IMPROVEMENTS	1	LS	$ 5,000	$ 5,000
SITE IMPROVEMENTS	1	LS	$ 9,000	$ 9,000
IMPLEMENT AND MAINTAIN TRAFFIC CONTROL	1	LS	$ 1,000	$ 1,000
SUBTOTAL 1				**$ 69,000**
DESIGN	5	%	-	$ 3,450
SURVEY	1	LS	$ 4,500	$ 4,500
CONSTRUCTION STAKING	2	%	-	$ 1,380
CONSTRUCTION MANAGEMENT AND INSPECTION	1	LS	$ 10,000	$ 10,000
LEGAL AND ADMINISTRATION	1	LS	$ 2,000	$ 2,000
SUBTOTAL 2				**$ 21,330**
CONTINGENCY	10	%	-	**$ 9,033**
TOTAL (2008$)				**$ 99,363**

60,000 Gallon Tank				
ITEM DESCRIPTION	***Estimated Quantity***	***Unit of Measure***	***Unit of Price***	***Item Total***
MOBILIZATION, BONDS, CLEANUP AND DEMOBILIZATION	1	LS	$ 5,000	$ 5,000
60,000 GALLON STEEL TANK	1	LS	$ 70,000	$ 70,000
VALVES, FITTING, APPURTENANCES, REPIPING	1	LS	$ 10,000	$ 10,000
ACCESS IMPROVEMENTS	1	LS	$ 5,000	$ 5,000
SITE IMPROVEMENTS	1	LS	$ 15,000	$ 15,000
REMOVAL AND DISPOSAL OF EXISTING 10,000 GALLON TANKS	1	LS	$ 5,000	$ 5,000
IMPLEMENT AND MAINTAIN TRAFFIC CONTROL	1	LS	$ 1,000	$ 1,000
SUBTOTAL 1				**$ 111,000**
DESIGN	5	%	-	$ 5,550
SURVEY	1	LS	$ 4,500	$ 4,500
CONSTRUCTION STAKING	2	%	-	$ 2,220
CONSTRUCTION MANAGEMENT AND INSPECTION	1	LS	$ 10,000	$ 10,000
LEGAL AND ADMINISTRATION	1	LS	$ 2,000	$ 2,000
SUBTOTAL 2				**$ 24,270**
CONTINGENCY	10	%	-	**$ 13,527**
TOTAL (2008$)				**$ 148,797**

Appendix B: Sequence of Activities

The anticipated tasks for the completion of this project include:

- Applications and engineering/environmental documentation to USDA
- Survey field work
- Design of the pipeline, including a geotechnical report
- Design of storage tank
- Permitting applications for emissions
- Permitting applications for noise, encroachment and excavation from the County (if necessary)
- Permitting applications with United States Forest Service (if applicable)
- Lending applications.

Appendix B summarizes the anticipated sequence of activities, the estimated cost and duration of each activity.

Two sequences of activities were prepared, Option 1 and Option 2. Option 1 assumes that the project site is located within Cleveland National Forest and permitting form the USFS is required. Option 2 assumes that the project site is not located within the Cleveland National Forest and permitting from the USFS is not required. Both options 1 and 2 assume that the project will be financed by USDA. Project completion dates are presented in the sequences of activities.

PALOMAR MOUNTAIN MUTUAL WATER COMPANY

SEQUENCE OF ACTIVITIES: OPTION 1

No.	Activity	Cost (2008$)	July 01/08	August 01/08	September 01/08	October 01/08	November 01/08	December 01/08	January 01/09	February 01/08	March 01/09	April 01/09	May 01/09	June 01/09
1	Boundary Survey –Verify County ROW easement –Permitting with USFS –Permitting with County PW (noise)	$14,300	Boundary Survey (1 month)											
2	Lending Applications –RCAC -USDA	$4,000	Start Lending Applications											
3	Environmental documentation -USFS -USDA	$30,000		Meet with PMMWC Board (08/09/2008)	Start permitting with USFS (1 year) Environmental documentation (3 months)									
4	Topographic Survey	$16,000			Alternative 1: topo Survey if conditions are good (2 weeks)		Alternative 2: topo Survey (2 weeks)							
5	–Final Design Pipeline Storage tank –Geotechnical Report –County Air Pollution Control District: emissions permit –County Public Works Department: noise, encroachment, excavation permitting –Deposit for County review	$78,500				Alternative 1: Design, Geotech, County permitting (4 months): October 01 - January 31	Alternative 2: Design, Geotech, County permitting (4 months): January 01 - March 31							
6	Bidding and Award-Adjust loan terms if necessary	$5,000												
7	Construction Inspection/Closeout	$451,200												

SEQUENCE OF ACTIVITIES: OPTION 1 (cont.)

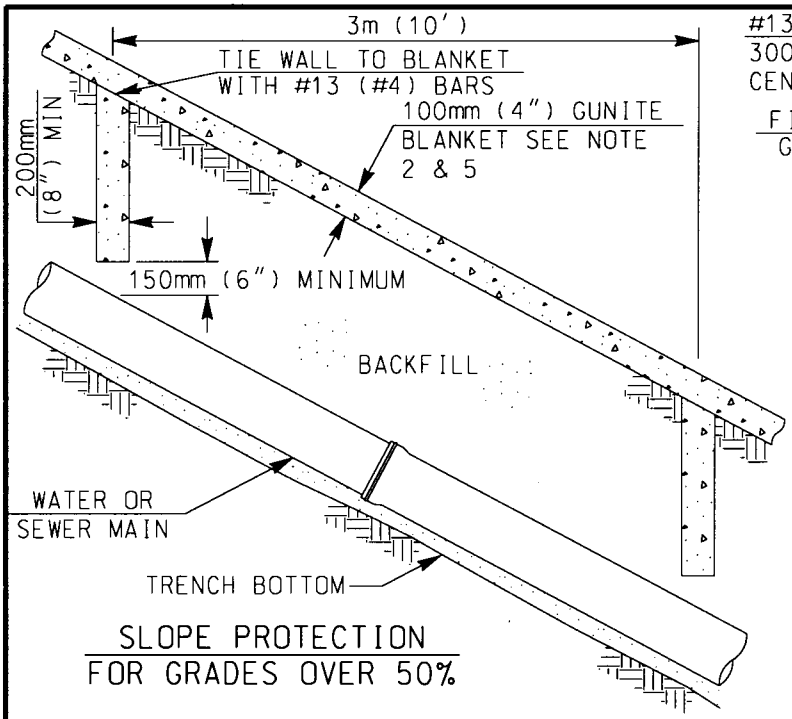
No.	Activity	Cost (2008$)	July 01/09	August 01/09	September 01/09	October 01/09	November 01/09	December 01/09	January 01/10
1	Boundary Survey –Verify County ROW easement –Permitting with USFS –Permitting with County PW (noise)	$14,300							
2	Lending Applications –RCAC –CSDA	$4,000				Adjust Loan Terms (1 month)			
3	Environmental documentation -USFS	$30,000	USFS permitting						
4	Topographic Survey	$16,000							
5	Final Design –Geotechnical Report –County Air Pollution Control District: emissions permit –County Public Works Department: noise, encroachment, excavation permitting –Deposit for County review	$78,500							
6	Bidding and Award-Adjust loan terms if necessary	$5,000			Bidding Assistance (1 month)	Award (1 month)			
7	Construction Inspection/Closeout	$451,200					Construction, inspection , closeout		

PALOMAR MOUNTAIN MUTUAL WATER COMPANY

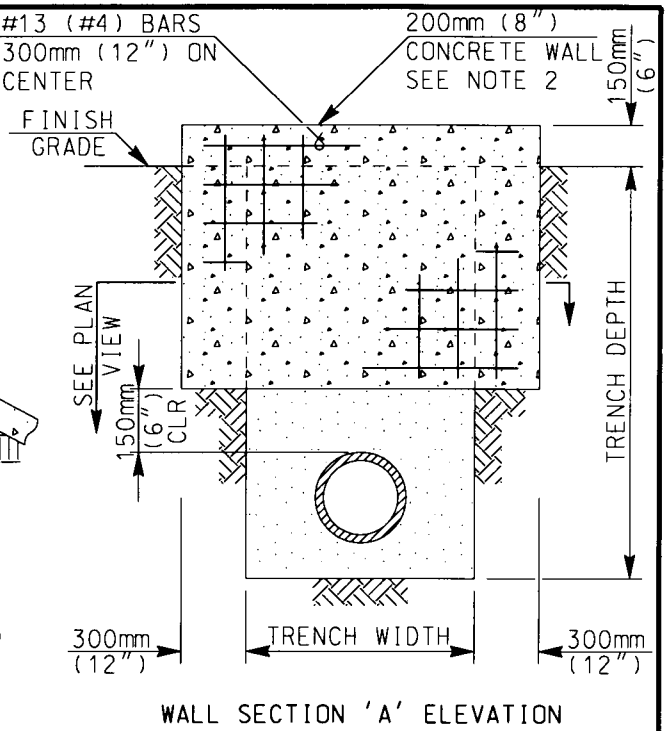
SEQUENCE OF ACTIVITIES: OPTION 2

No.	Activity	Cost (2008$)	July 01/08	August 01/08	September 01/08	October 01/08	November 01/08	December 01/08	January 01/09	February 01/08	March 01/09	April 01/09	May 01/09	June 01/09	July 01/09	August 01/09
1	Boundary Survey –Verify County ROW easement –Permitting with USFS –Permitting with County PW (noise)	$14,300	Boundary Survey (1 month)													
2	Lending Applications –RCAC -USDA	$4,000	Start Lending Applications									Adjust Loan Terms (1 month)				
3	Environmental documentation -USFS -USDA	$30,000		Meet with PMMWC Board (08/09/2008)	Environmental documentation (3 months)											
3	Topographic Survey	$16,000			Alternative 1: topo Survey if conditions are good (2 weeks)		Alternative 2: topo Survey (2 weeks)									
4	Final Design –Geotechnical Report –Electrical subconsultant –County Air Pollution Control District: emissions permit –County Public Works Department: noise, encroachment, excavation permitting –Deposit for County review	$78,500				Alternative 1: Design, Geotech, Electrical, County permitting (4 months): October 01 - January 31		Alternative 2: Design, Geotech, Electrical, County permitting (4 months): January 01 - March 31								
5	Bidding and Award-Adjust loan terms if necessary	$5,000										Bidding Assistance (1 month)	Award (1 month)			
6	Construction Inspection/Closeout	$451,200												Construction, inspection , closeout (3 months)		

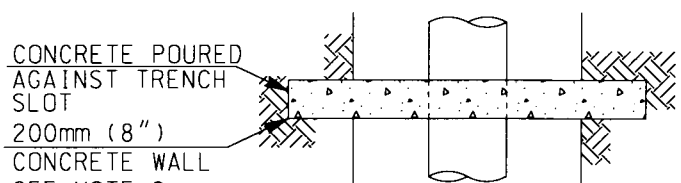
Appendix C: Cut-off Wall Detail



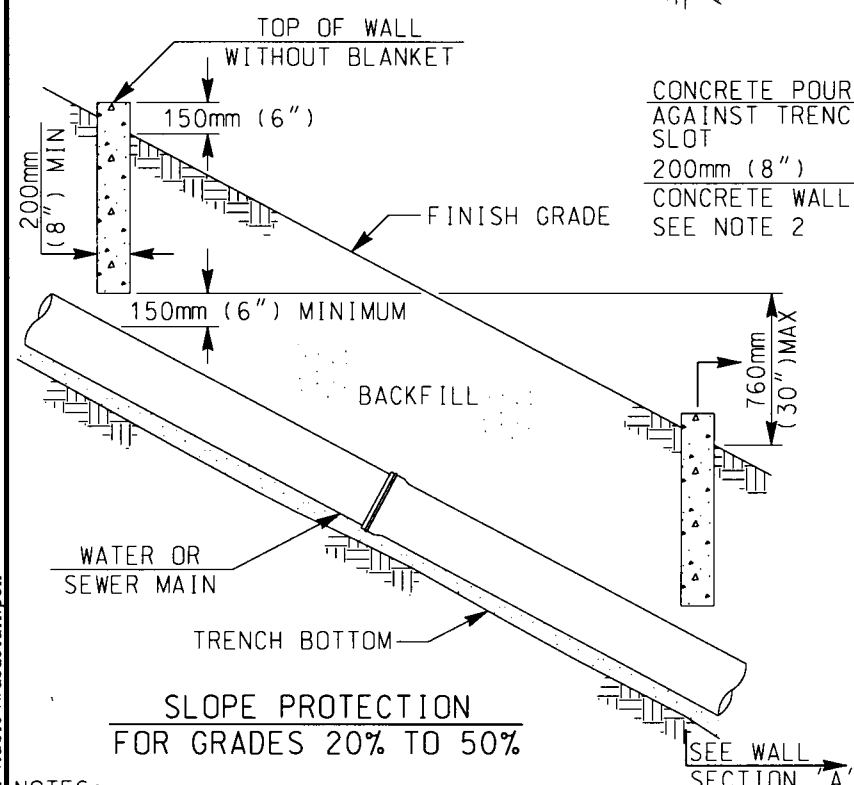
SLOPE PROTECTION FOR GRADES OVER 50%



WALL SECTION 'A' ELEVATION



WALL SECTION 'A' PLAN



SLOPE PROTECTION FOR GRADES 20% TO 50%

NOTES:

1) REFER TO SECTION 02202 OF THE SPECIFICATIONS
2) DETAILS SHOWN REPRESENT THE MINIMUM REQUIRED. THE PROJECT ENGINEER IS REQUIRED TO PROVIDE A SUBMITTAL TO THE DISTRICT FOR REVIEW AND APPROVAL BY THE DISTRICT ENGINEER PRIOR TO INSTALLATION
3) WALLS SHALL BE REINFORCED CONCRETE OR 200mm x 200mm x 400mm (8"x 8"x 16") CONCRETE BLOCK, REINFORCED AND ALL CORES FILLED WITH GROUT SEE SPECIFICATIONS (ALTERNATE 1)
4) FOR GRADES OVER 50%, SLOPE PROTECTION SHALL ALSO INCLUDE AC PAVING, CONCRETE SLAB OR GUNITE BLANKET PLACED OVER THE PIPELINE ALIGNMENT
5) 100mm (4") GUNITE BLANKET WITH 150mm (6") SQUARE x 10 GAGE (6 x 6 - W1.4 x W1.4) WIRE FABRIC AT THE ENGINEERS DESCRETION

LEGEND ON PLANS

SLOPE PROTECTION INSTALLATIONS

WATER AGENCIES STANDARDS

COMMITTEE APPROVAL: 07/30/2007

DRAWING NUMBER: WP-05