FARR WEST
ENGINEERING

TECHNICAL MEMORANDUM

SQUAW VALLEY PUBLIC SERVICE DISTRICT

REDUNDANT WATER SUPPLY – PREFERRED ALTERNATIVE EVALUATION PROJECT PHASE 3 – PREFERRED ALTERNATIVE EVALUATION

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Subject: **Technical Memorandum – Evaluation Criteria and Alternatives Evaluation Approach**

1.0 PURPOSE

The purpose of this Technical Memorandum (TM) is twofold:

1. Define the evaluation approach by which to compare project alternatives; and

2. Identify and describe the criteria that will be used to evaluate, rank, and select the preferred water source, transmission, pumping, and storage combination.

The TM defines a comprehensive list of evaluation criteria developed by the project team, as well as preliminary weighting of each set of criteria and subcriteria. These criteria and preliminary matrix weightings were presented to the Squaw Valley Public Service District (District) at a workshop on October 9, 2015. The workshop included an interactive discussion where District staff and the project team worked together to finalize the evaluation criteria and matrix weighting.

With acceptance by the District, the project team will move forward with evaluating and recommending a preferred project alternative(s) for the Redundant Water Supply Project (project).

2.0 INTRODUCTION

To address the need for a redundant water supply for the Olympic Valley, the District prepared the Alternative/Supplemental Water Supply and Enhanced Utilities Feasibility Study (Feasibility Study) in 2009 (ECO:LOGIC Engineering). The purpose of the study was to determine potential project "fatal flaws" and it investigated the feasibility of importing water supplies from outside District boundaries as a redundant water supply for the Valley's current and future water supply customers.

Farr West Engineering (Farr West) and the District recently completed an update to the Feasibility Study as part of the ongoing project. The primary goal of the project is to identify a redundant source of water supply for the Olympic Valley to allow for reliable quantity and quality that is geographically diverse from the aquifer currently used as the primary source of potable water, and to provide redundancy for improved emergency preparedness.

The scope of work for the project as a whole includes three distinct phases:

- Phase I – Water Supply Feasibility Summary and Gap Analysis.
- Phase II – Evaluation of Water Supply Source(s) Identified in Gap Analysis.
- Phase III – Preferred Alternative Evaluation.

The District recently completed Phase I – Water Supply Feasibility Summary and Gap Analysis (November 6, 2014) and Phase II – Evaluation of Water Supply Source(s) Identified in Gap Analysis (February 24, 2015).

This TM is part of Phase III of the project which includes the recently completed Feasibility Study Update as well as a thorough alternatives evaluation used to develop a project description and support moving forward with the CEQA/NEPA process, public outreach program, planning, permitting, and preliminary design of the water supply project. This TM includes the following sections:

- Corridor Evaluation and Alternatives Selection Approach,
- Preliminary Transmission Main Alignment Evaluation,
- Evaluation Approach, and
- Detailed Evaluation Criteria and Method.

3.0 CORRIDOR EVALUATION AND ALTERNATIVES SELECTION APPROACH

Potential transmission main corridors, water source locations, booster pump station, and terminal tank locations were developed in the Feasibility Study Update and are summarized in Table 1 - Table 3.

Table 1 - Transmission Main Corridors (Figure 4-1 from Feasibility Study Update)

Corridor	Alignment
Highway 89	
	Highway 89 West Shoulder
	Highway 89 East Shoulder
	Placer County Bike Path
	TTSA TRI Sewer Interceptor
	Combination of TRI/Bike Path/Highway 89
USFS 06	
	USFS 06 Road
	Liberty Energy Pole Line

Table 2 - Water Source Alternatives (Figure 3-2 from Feasibility Study Update)

Area	Location
Area A	Near Truckee Airport and Schaffer Mill Rd.
Area B	Vicinity of Donner Creek and Mouse Hole Highway 89
Area C	Southwest portion of MVGB (near Carson Range Tank)
Area D	Southwest portion of MVGB (near Olana Tank)
Zone 4	Within NCSD Zone Water System Boundary

Table 3 - Terminal Tank Alternatives (Figure 4-1 from Feasibility Study Update)

Area	Location
APN 096-230-041	Poulson Property North of Painted Rock
APN 096-290-056	USFS Property South of District Administration Building

It should be noted that the booster pump station required to move water from the Zone 4 or TDPUD systems to Squaw Valley will be evaluated after the source and transmission main preferred alternatives have been identified.

The alternatives evaluation will occur in two stages, with the level of detail increasing in each subsequent stage. The stages include:

- Preliminary Corridor Evaluation, and
- Detailed Alternatives Evaluation.

These stages are presented in more detail below.

4.0 PRELIMINARY TRANSMISSION MAIN ALIGNMENT EVALUATION

The purpose of the preliminary transmission main alignment evaluation is to evaluate the transmission main alignment alternatives and identify any undesirable routes based on constructability issues. The Feasibility Study Update showed that environmental impacts and permitting, USFS and Caltrans right of way requirements did not indicate any fatal flaws for any of the alignment alternatives.

In the Feasibility Study Update, transmission main corridors were developed based on their ability to move water from Truckee to Squaw Valley. Two alignment corridors were identified (Highway 89 and USFS 06), and five alternative alignments were developed within these corridors (Figure 4-1 Feasibility Study Update). The potential alignment alternatives were established based on the following considerations:

- Feasible water supply options which included independent District water supply and/or wheeling water through the NCSD, Zone 4, and/or TDPUD water systems;
- Field investigations of the corridors to assess the physical, engineering, operations and maintenance, and environmental characteristics of each alignment alternative;
- Formal meetings with the USFS and Caltrans regarding permitting and design criteria;
- Meetings with Placer County regarding their preferred bike path alignment along the Highway 89 corridor;
- Meeting with TTSA to discuss constraints and concerns regarding the TRI alignment; and
- Environmental constraints analysis to determine whether there were any major liabilities or fatal flaws that would render a corridor or alignment not permittable.

4.1 CONSTRUCTABILITY EVALUATION

Constructability issues could have a significant impact on the project cost as well as future operation and maintenance. To the extent possible, standard open cut trenching is desirable; however, special construction methods will be required for certain sections of all identified transmission main alternatives. This includes bridge crossings and jack and bore construction for creek and culvert crossings. Other constructability constraints include geotechnical constraints and rock excavation, topography and slope, construction equipment access, length of pipeline, linear alignment, operation and maintenance constraints, and cost.

Each of the identified alternative alignments share some or all of these constraints to some degree. However, the USFS 06 and Liberty Energy Pole Line alignments were found to have major constructability constraints. The USFS 06 alignment includes the longest pipeline (approximately 13 miles) as well as the highest construction cost (approximately $20 million, pipeline only). This alignment also traverses a very non-linear alignment with only one point of primary access for construction and maintenance (Sierra Meadows subdivision). The Pole Line alignment from the upper portion of the Zone 4 water system is a fairly linear corridor, but the major constraint for this alignment is the constructability within the major rock slide area near Big Chief. This area spans more than 1,600 linear feet through a boulder pile with slopes in excess of 75%. Access for

maintenance to both of these pipeline alternatives is frequently limited by the USFS due to weather constraints. For these reasons, the alignments within the USFS 06 corridor will not be further evaluated in the detailed evaluation.

The alignments within the Highway 89 corridor do not exhibit any of the major constructability constraints.

5.0 EVALUATION APPROACH

The detailed evaluation of project alternatives will include both non-economic and economic components. The sections below include a description of the evaluation method as well as a presentation of the criteria and subcriteria that will be used to perform the detailed non-economic evaluation of water main alignments, water sources, and terminal tank locations.

The results from the non-economic evaluation will ultimately be paired with a cost based analysis that will identify the economic impacts of each alternative. The economic evaluation will provide a means to weigh the potential cost advantages or disadvantages associated with an alternative relative to its non-economic benefits. For example, if the second highest ranked alternative alignment is much less costly, it would be important to consider the possibility of potential savings when recommending the proposed alternative(s).

The detailed evaluation will initially include an evaluation of the transmission alignment and sources independently. The transmission main alignment does not necessarily dictate the source location, and vice versa. The ability to move water through the existing NCSD, Zone 4 and/or TDPUD systems provides the flexibility to provide source water from any of the potential source locations. We will bring the highest scoring source and transmission alternatives together after the independent non-economic and economic evaluations to create a preferred project. When the preferred source and transmission alternative(s) is identified, the required booster pumping alternatives will then be evaluated.

Evaluation of the terminal water storage tanks will also be performed independently of the source and transmission alternatives. The location of the terminal water storage tank in Squaw Valley does not bear on the selection of the source and transmission alterative(s).

5.1 NON-ECONOMIC EVALUATION METHOD

The pipeline, source, and storage alternatives will be evaluated using a matrix comparison. The matrix will be used as a tool to identify the best alternative relative to the competing alternatives based on direct comparison. This section includes a brief description of the methodology used for the comparison. Descriptions of the various criteria and the specific weighting assigned to each criterion are discussed in the sections below.

Each alternative under consideration is scored based on a number of criteria developed by the project team. The relative value assigned to each criterion determines its importance, or weight, compared to the other criteria used in the evaluation. Ultimately, a final score will be summed for each alternative based on the alternative's ranking and the weighting of the criterion. This final score represents the alternative's overall ranking relative to the other alternatives with a higher

score being preferable to a lower one. The final score will be used in the selection of the recommended alternative(s).

Each set of criteria, subcriteria, and evaluation metrics will be assigned a weight based on the importance to the project as a whole, with a maximum of ten (10), representing critical importance, and a minimum of zero (0), representing least importance. Table 4 presents the scale used in the weighting of criteria.

Table 4 – Criteria/Subcriteria Weighting Scale

Verbal Scale	Numeric Scale
Critical	10
Very Important	7.5
Important	5
Less Important	2.5
Least Important	0

The sections below describe in more detail the weighting of the primary evaluation criteria, subcriteria, and evaluation metrics.

6.0 DETAILED EVALUATION CRITERIA AND METHOD - PIPELINE

The detailed evaluation of the transmission pipeline is based upon the results of the preliminary evaluation process and the information available at the time of the evaluation. Therefore, based on the preliminary evaluation it is assumed that neither the USFS 06 alignment, nor the Pole Line alignments are considered viable alternatives and will not be evaluated any further.

6.1 PIPELINE EVALUATION METHOD

With careful consideration given to the goals and objectives of the project and the needs of District, the project team initially developed the evaluation criteria, subcriteria, and weighting convention assigned to each. The District was then solicited for review, input and acceptance of these parameters.

Five evaluation criteria were used to compare the pipeline corridor alternatives:

1. Operations and Maintenance
2. Engineering
3. Public/Regional Impacts
4. Environmental
5. Right-of-Way Requirements

Table 5 applies the weighting scale in Table 4 to each of the five evaluation criteria listed above. The "Priority" in Table 5 represents a normalization of the weighting, which reflects the relative contribution that a particular criterion has on the overall ranking relative to the other criteria. This priority is expressed as a percentage of the sum of all criterion weights. In this case there are five

criteria categories that were weighted separately. These priorities reflect the total criteria scoring, equaling 100 percent.

Table 5 – Pipeline Criteria Weights and Priorities

Criteria	Weight	Priority
Operations and Maintenance	7.5	21.4%
Engineering	10	28.6%
Political and Public Impacts	5	14.3%
Environmental	7.5	21.4%
Right-of-Way Requirements	5	14.3%
Total	**35**	**100%**

The five main criteria listed above were broken down into a total of twenty-one (21) subcriteria, which are specific characteristics used to compare how well each alternative alignment meets each criterion. Each subcriterion was assigned a weight and a priority was calculated, similar to the five main criteria (as described above). Finally, a matrix weight was calculated for each subcriterion. The matrix weight represents the weight of which a particular subcriterion carries compared to all other subcriteria identified in the analysis. The subcriterion matrix weight is based on the product of the subcriterion priority and the criterion priority. The overall matrix weight for each criterion is equal to that criterion's priority. The matrix weight remains constant through the evaluation, unless criteria or subcriteria weighting is modified. Table 6 below summarizes the subcriteria weights, priorities, and matrix weights for the transmission main.

Finally, each subcriterion is defined by a series of evaluation metrics. These evaluation metrics are also given a weight and a calculated priority. The matrix weight of each metric is equal to the overall matrix weight of a subcriterion multiplied by the metrics priority. Criterion metrics are described in more detail below. A summary of criteria, subcriteria, and metric weights, priorities and matrix weights is provided in Table 7.

Ultimately, the last step in the evaluation will be to rank each of the alternative alignments against each subcriterion and calculate the resulting score. For example, there are five alternative alignments, and for each evaluation metric an alignment will be ranked relative to how well it compares on a range from one (1) to five (5), with five representing the highest rank. The score for a given metric is the rank divided by the number of alternatives and then multiplied by the metric matrix weight. These scores are then summed for all metrics to result in a subcriterion score. Subcriterion scores are summed for each alternative alignment to determine the highest scoring alternative. ***Alternative scoring will be completed as the next task of the Project.***

Table 6 – Pipeline Subcriteria Weights, Priorities, and Matrix Weights

Subcriteria	Weight	Priority	Matrix Weight
Operation & Maintenance Weight = 7.5, Priority = 21.4%			
Level of Operator Attention	5	18%	3.9
Accessibility	7.5	27%	5.9
Impacts from Repair and Maintenance	7.5	27%	5.9
Agency Coordination/Permitting	5	18%	3.9
Impacts from Natural Disaster	2.5	9%	1.9
Subtotal	27.5	100%	21.4
Engineering Weight = 10, Priority - 28.6%			
Constructability	10	31%	8.8
Geotechnical Constraints	7.5	23%	6.6
Accessibility	5	15%	4.4
Impacts to Existing Facilities	5	15%	4.4
Compliance with Drinking Water Regulations	2.5	8%	2.2
Flood Plain	2.5	8%	2.2
Subtotal	32.5	100%	28.6
Public/Regional Impacts Weight = 5, Priority = 14.3%			
Potential for Opposition	10	33%	4.8
Aesthetic Impacts	7.5	25%	3.6
Potential Regional Benefits	5	17%	2.4
Agency Cooperation/Dependence	7.5	25%	3.6
Subtotal	30	100%	14.3
Environmental Weight = 7.5, Priority = 21.4%			
Waters	10	33%	7.1
Biological Resources	10	33%	7.1
Cultural Resources	5	17%	3.6
Land Use	5	17%	3.6
Subtotal	30	100%	21.4
Right of Way Requirements Weight = 5, Priority = 14.3%			
Permanent Easements	10	80%	11.4
Temporary Construction Easements	2.5	20%	2.9
Subtotal	12.5	100%	14.3

TABLE 7 - NON ECONOMIC EVALUATION - TRANSMISSION MAIN

Criteria			Subcriteria			Subcriteria Metric			
Criteria	**Weight**	**Priority (%)**	**Subcriteria**	**Weight**	**Priority (%)**	**Metric**	**Weights**	**Priority (%)**	**Matrix Weight**
O & M	7.5	21.4%	**Level of Operator Attention**	5	18.2 %	Number of Appurtenances that require Maintenance and Repair	10	50%	1.9
						Pipeline Length	10	50%	1.9
						Sub-total	**20**	**100%**	**3.9**
			Accessibility	7.5	27.3 %	Remote Locations	10	44%	2.6
						Paved Road v. Dirt Road	7.5	33%	1.9
						Type of Vehicle Access: Snow Cat, ATV, Light Truck, etc.	5	22%	1.3
						Sub-total	**22.5**	**100%**	**5.8**
			Impacts from Repair and Maintenance	7.5	27.3 %	Traffic Control	10	36%	2.1
						Pedestrian/Public Impacts	7.5	27%	1.6
						AC Repair	7.5	27%	1.6
						Revegetation/BMP's	2.5	9%	0.5
						Sub-total	**27.5**	**100%**	**5.8**
			Agency Coordination/Permitting	5	18.2 %	Stream Crossings	7.5	43%	1.7
						Bridge Crossings	5	29%	1.1
						Impacts to Ex. Infrastructure	2.5	14%	0.6
						Interference with Other Utilities	2.5	14%	0.6
						Sub-total	**17.5**	**100%**	**3.9**
			Impacts from Natural Disaster	2.5	9.1 %	Flooding	5	29%	0.6
						Landslides	5	29%	0.6
						Stream Bank Erosion	5	29%	0.6
						Fire	2.5	14%	0.3
						Sub-total	**17.5**	**100%**	**1.9**
			Sub-total	**27.5**	**100.0 %**				**21.4**
Engineering	10	28.6%	**Constructability**	10	30.8 %	Standard v. Non-Standard Methods	10	24%	2.1
						Material Staging	10	24%	2.1
						Construction Vehicle Access	7.5	18%	1.6
						Jack and Bore	5	12%	1.0
						Bridge Crossings	5	12%	1.0
						Traffic Control	5	12%	1.0
						Sub-total	**42.5**	**100%**	**8.8**
			Geotechnical Constraints	7.5	23.1 %	# of Retaining Walls	10	33%	2.2
						Trench Integrity	7.5	25%	1.6
						Reuse of spoils for backfill	7.5	25%	1.6
						Rock Excavation	5	17%	1.1
						Sub-total	**30**	**100%**	**6.6**
			Accessibility	5	15.4 %	Bridge Reinforcement	5	40%	1.8
						Access Agreements	7.5	60%	2.6
						Sub-total	**12.5**	**100%**	**4.4**
			Impact to Existing Facilities	5	15.4 %	Negative effect on existing infrastructure during construction	2.5	100%	4.4
						Sub-total	**2.5**	**100%**	**4.4**
			Compliance with Drinking Water Regulations	2.5	7.7 %	Compliance with California State Waterworks Standards	2.5	100%	2.2
						Sub-total	**2.5**	**100%**	**2.2**
			Flood Plain	2.5	7.7 %	Location with respect to FEMA defined floodplain	5	100%	2.2
						Sub-total	**5**	**100%**	**2.2**
			Sub-total	**32.5**	**100.0 %**				**28.6**
Public/Regional Impacts	5	14.3%	**Potential for Opposition**	10	33.3 %	Consideration to traffic, noise, air quality impacts	10	25%	1.2
						Proximity to residences	10	25%	1.2
						Potential impacts to private property	10	25%	1.2
						Potential Impacts to commercial interests	10	25%	1.2
						Sub-total	**40**	**100%**	**4.8**
			Aesthetic Impacts	7.5	25.0 %	Short term construction impacts (grading, staging areas)	10	50%	1.8
						Long term impacts (change in topography, removal of vegetation, visibility of appurtenances)	10	50%	1.8
						Sub-total	**20**	**100%**	**3.6**
			Potential Regional Benefits	5	16.7 %	Fire Protection	10	57%	1.4
						Potable Drinking Water Source for Others	5	29%	0.7
						Utility corridor (fiber, cable, phone, etc.)	2.5	14%	0.3
						Sub-total	**17.5**	**100%**	**2.4**
			Agency Cooperation/Dependence	7.5	25.0 %	Reliance on neighboring agencies for water supply and use of existing infrastructure	7.5	43%	1.5
						Construction within or near existing utility corridors	5	29%	1.0
						Reliance on other public projects (Placer County Bike Path)	5	29%	1.0
						Sub-total	**17.5**	**100%**	**3.6**
			Sub-total	**30**	**100.0 %**				**14.3**
Environmental	7.5	21.4%	**Waters**	10	33.3 %	Waters of US	10	40%	2.9
						Waters of State	10	40%	2.9
						Stream Crossings	2.5	10%	0.7
						NPDES	2.5	10%	0.7
						Sub-total	**25**	**100%**	**7.1**
			Biological Resources	10	33.3 %	Listed Species	10	40%	2.9
						Critical Habitat	10	40%	2.9
						Species of Concern	2.5	10%	0.7
						Woodlands	2.5	10%	0.7
						Sub-total	**25**	**100%**	**7.1**
			Cultural Resources	5	16.7 %	Proximity to Water	10	33%	1.2
						Slopes	10	33%	1.2
						Known Resources	10	33%	1.2
						Sub-total	**30**	**100%**	**3.6**
			Land Use	5	16.7 %	USFS Lands	10	29%	1.0
						Private Property	7.5	21%	0.8
						Caltrans ROW	2.5	7%	0.3
						Sensitive Receptors	7.5	21%	0.8
						Traffic	2.5	7%	0.3
						Air Quality/Green House Gases	5	14%	0.5
						Sub-total	**35**	**100%**	**3.6**
			Sub-total	**30**	**100.0 %**				**21.4**
ROW Requirements	5	14.3%	**Permanent Easements**	10	80.0 %	Probability of Obtaining an Easement	10	33%	3.8
						Cost of Obtaining an Easement	10	33%	3.8
						% within Existing ROW/PUE Easement	5	17%	1.9
						Public or Private easement	5	17%	1.9
						Sub-total	**30**	**100%**	**11.4**
			Temporary Construction Easements	2.5	20.0 %	Ability to secure temporary construction easements	2.5	100%	2.9
						Sub-total	**2.5**	**100%**	**2.9**
			Sub-total	**12.5**	**100.0 %**				**14.3**
Total	**35**	**100%**							**Total**

Weight = value assigned to given criterion (or subcriterion) with respect to other criteria (or subcriteria).

Priority = the value of weights after normalization.

Matrix Weight = the metric priority multiplied by the criterion priority.

6.2 PIPELINE NON-ECONOMIC CRITERIA AND SUBCRITERIA

Table 7 summarizes the criteria, subcriteria, and evaluation metrics serving as the primary basis for selecting the proposed conveyance pipeline alignment for the project. Detailed descriptions and assigned weightings for the criteria and subcriteria are discussed in the sections below. The weight assigned to each of the criteria has significant bearing on the final score for each alternative. Weights reflect the judgment of the project team, with input provided by the District.

A. Operations & Maintenance

The operations and maintenance of transmission mains are a significant consideration in the overall project evaluation and preliminary design. Only certain operational subcriteria are pertinent to a comparative evaluation of alternative transmission main alignments and ultimately the selection of the most preferable alignment. For these reasons, this criterion gives a "Very Important" consideration to the operational advantages of any one alternative alignment over another. This criterion attempts to evaluate for each alternative the degree of maintenance, operation and how well the alignment accommodates long term accessibility for maintenance purposes.

Level of Operator Attention

Appurtenances installed along the transmission main will require regular inspection and maintenance. This subcriterion compares alternatives based upon the number of appurtenances installed and will have an "Important" consideration in the final operations and maintenance criterion score. Alternatives with more changes from positive to negative slopes will receive lower scores than corridors with fewer changes in slope. This subcriterion also evaluates the overall length of the alignment with the intention that a longer alignment will have a higher probability for repair than a shorter alignment. Assessments were based upon data and profiles drawn from planning level topographical data, and will potentially vary from actual design level profiles.

Accessibility

Pipelines and appurtenances require routine inspections and/or maintenance. Therefore, they should have long term accessibility, preferably via paved or dirt roads. Access to the pipeline, especially at critical locations such as at the appurtenances, is weighted "Very Important" under the operations and maintenance criterion. This subcriterion evaluates the ability for maintenance crews to access the pipeline appurtenances and fittings for the purpose of long term maintenance. Alternative corridors that are located in remote areas, difficult to access by vehicle, without existing roadways, will receive lower scores than those that are easily accessible by vehicle, either within or near existing roads.

Impacts from Repair and Maintenance

Repair and maintenance activities often require large equipment and construction material staging in order to replace segments of failing infrastructure. This subcriterion evaluates the additional impacts which may be required during maintenance activities. Items such as traffic control, asphalt replacement, BMP's and public access will be estimated for each alternative. Those alternatives which necessitate additional considerations will be ranked lower than those which do not and will

have an "Important" consideration in an alternative's final operations and maintenance criterion score.

Agency Coordination/Permitting

With the length of the water main alignments covering over 8 miles between Truckee and Squaw Valley, numerous water features, roads and other utility line corridors will be crossed or shared by the proposed alignment. The District will need to coordinate maintenance and repair activities with any agency which owns adjacent infrastructure, and this subcriteria presumes that less coordination is favorable to more coordination. Alignments with the fewest crossings of the Truckee River, access bridges, pedestrian bridges, drainage culverts, sewer interceptors and power lines will rank higher than those which cross more infrastructure. This subcriterion shall have a "Less Important" influence on the final criterion score.

Impacts from Natural Disaster

Typically, open trench/direct bury construction provides an extremely secure environment for pipeline materials and the fluids which they transmit. However with the remoteness of the alignments, any potential for the transmission main to be damaged by natural causes is a disadvantage compared to an alignment which will be installed in a more secure environment. The Highway 89 corridor has unstable mountain slopes, a major river which is subject to flooding and a dense pine forest canopy with significant forest fire potential. This subcriterion attempts to estimate the threat posed by flooding, erosion, landslides and fire to each alignment alternative. This subcriterion will have a "Less Important" influence on an alternative's final operations and maintenance criterion score.

B. Engineering

The design and constructability of the pipeline is a "Critical" criterion to consider when selecting alternative alignments, since construction challenges have the potential to cause a significant increase in project costs and/or delay in schedule, and could impact the feasibility of constructing the project as a whole. The engineering criterion considers the potential ease of construction relative to the geology (soils), regulatory compliance, topography, accessibility and work conditions along the alternative alignments. If alternative corridors contain steep, rugged slopes, rock outcroppings, retaining walls, or major obstacles, special construction methods will likely be necessary which will increase construction costs and make for difficult work conditions. The following six subcriteria are used to determine the overall score for engineering for each alternative.

Constructability

Open trench construction is the preferred method for the installation of the transmission main from the Town of Truckee to Squaw Valley. Large heavy equipment will be used to excavate a trench approximately 4-8 feet deep and 3-5 feet wide with finished surfaces to match adjacent surfaces. Bedding and backfill materials will need to be trucked in and staged near construction activities. In cases of river crossings, culvert crossings or bridge crossings the pipeline will need to be installed using a jack and bore method or in an insulated sleeve secured to the bridge. Alignments shown in Figure 4-1which have a high number of special crossings, remote access, challenging

terrain or narrow access will be ranked unfavorably in this subcriteria through the metrics detailed above. This subcriterion will have a "Critical" influence on an alternative's final engineering criterion score.

Geotechnical Constraints

Geotechnical factors are "Very Important" in determining the appropriate construction methods, pipe materials and backfill, and the feasibility of construction. Several of the alternative corridors are located in areas with rock outcroppings. Rock trenching techniques are required when rock is encountered in the trenching process. These techniques are more costly and time consuming than standard open cut trenching techniques. Rocky soils will be difficult to reuse in trench backfill activities and need to be hauled offsite. Retaining wall construction and design would also be required where the pipeline traverses steep side slopes. This subcriterion accounts for any particular intricacies associated with difficult excavation such as blasting and slope stability issues, retaining walls or traversing terrain that may increase construction challenges. Lower ranks are given to alternatives that go through difficult areas identified in the preliminary investigation phases of this project.

Accessibility

Accessibility plays an "Important" role on an alternative's final engineering criterion score, since heavy equipment and large trucks will need access to the work site. Poor accessibility due to light duty bridges and private property will slow the construction progress and significantly impact/increase the mobilization constraints. Within this subcriterion, the alternative is assessed for how accessible it is during construction, such as the relative ease associated with getting construction equipment and materials in and out of the work site. Alternatives that are entirely or almost entirely accessible by way of existing public roadways are given the highest scores and those that are accessed by way of private roads and bridges are given the lowest scores.

Impact to Existing Facilities

With the Highway 89 corridor being a primary access route between the Town of Truckee and North Lake Tahoe, multiple utilities have infrastructure installed either above or below ground. Considerations for how an alignment will impact existing infrastructure is an "Important" factor in determining an alternative's final engineering criterion score and in turn evaluating the feasibility of the proposed project. Alternatives which would require shutdowns, stabilization or re-alignment of existing utilities will rank lower than those which can be constructed without any interference.

Compliance with SWRCB Drinking Water Regulations

While compliance with the California State Water Resource Control Board (SWRCB) regulations is necessary for project permitting, many regulations can be waived or modified according to previously accepted guidance documents and regulator judgement. However, waivers are never a sure thing and any alignment which depends on a modification to an existing regulation should be seen as less feasible than one which does not require special consideration. Due to this variability, this subcriteria has been assigned a "Less Important" weight on an alternative's final engineering criterion score in this analysis.

Flood Plain

When designing and constructing potable water supply facilities, the threat of contamination from flood events should be kept to a minimum. In ground transmission pipelines do not offer a high level of exposure for flood waters to enter into the system, however entrance through an air release blowoff is present. For this reason, this subcriterion will have a "Less Important" weight on an alternative's final engineering criterion score. Alignments which are installed further away from and at a higher elevation than the Truckee River will be ranked higher than those which are closer to the flowline of the river.

C. Public and Regional Impacts

It is important to acknowledge the political sensitivity and concerns of the general public throughout the Truckee area. These concerns generally center on the import of water to Squaw Valley from Martis Valley and are the same for all project alternatives. The issues of political sensitivity and public perception will continue to be mitigated throughout the project through public outreach and education. Therefore, political sensitivity and public perception issues are not considered as evaluation criteria at this phase of the project.

So, these criteria acknowledge the potential aesthetic impacts to the public as well as regional benefits associated with the project and are considered "Important" to the evaluation.

Potential for Opposition

This subcriteria evaluates the potential for public opposition as it relates to the consideration of traffic, noise and air quality impacts, the proximity of the waterline and appurtenances to private and commercial properties, and potential impacts to private property. Alternatives that are within private property and residential/commercial corridors will be given lower scores since they are more likely to receive opposition from local landowners. This subcriterion will have a "Critical" consideration in an alternative's public and regional impact criterion score.

Aesthetic Impacts

This subcriteria evaluates the short and long term impacts that will exist during and after construction. Short term impacts include construction related tasks such as clearing and grubbing, grading, material and equipment staging areas, and construction vehicle access. Construction related aesthetic impacts will be higher when in close proximity to residential areas. Long term impacts include those realized after construction is complete, and include changes in topography, removal of vegetation, visibility of appurtenances, and maintenance related activities. These impacts will also be higher when in close proximity to residential areas. This subcriterion will have a "Very Important" consideration in an alternative's public and regional impact criterion score.

Potential Regional Benefits

Water supply and construction of a pipeline in the Highway 89 corridor can have substantial positive impacts to the community. This would be seen in enhanced fire protection facilities (hydrants), a potential potable water source to individual and small development areas in the

Truckee River canyon, and development of a utility corridor that may provide enhanced communication services to these same residences as well as Squaw and Alpine valleys. Alternative alignments that are more conducive to providing these regional benefits will be given higher scores. This subcriterion will have an "Important" consideration in an alternative's public and regional impact criterion score.

Agency Cooperation/Dependence

Construction of the project will require close coordination and cooperation with many local agencies, including NCSD, TDPUD, TTSA, and Placer County, at a minimum. Reliance on NCSD and TDPUD will be required for potential water supply and use of existing infrastructure to wheel water to Squaw Valley. The pipeline alternatives are also potentially reliant on acceptance/cooperation with existing utilities and agencies, such as the TTSA TRI interceptor and the proposed Placer County Bike Path. Alternatives that minimize this reliance will be given higher scores. This subcriterion will have a "Very Important" consideration in an alternative's public and regional impact criterion score.

D. Environmental

Environmental considerations are weighted "Very Important" because alternatives that require environmental permits, California Environmental Quality Act (CEQA) compliance, and National Environmental Policy Act (NEPA) have the potential to significantly increase project costs and schedule, or directly impact the viability of a project should the permits become impossible to obtain, or the environmental mitigations become prohibitively costly or unreasonable. California's public agencies under CEQA must disclose and avoid or mitigate to the extent feasible, all probable significant environmental impacts that could result from the District's proposed discretionary action or project.

An ideal project would not have the potential to significantly affect the environment, requiring few, if any mitigation measures. Environmental considerations criterion received a high weighting due to the fact that, during evaluation of the preliminary alternatives, it was a primary criteria used to define feasibility of preliminary corridors in an effort to avoid or minimize significant environmental issues wherever possible. The recommended alternative would require compliance with CEQA, Clean Water Act Section 401 and 404, Federal Endangered Species Act Section 7, National Historic Preservation Act Section 106, California Endangered Species Act and California Fish and Game Code Section 1602, two Regional Board general orders, and other local permits. Additionally, depending on the alternative selected NEPA and use permits could be required.

Within the environmental consideration criterion the overall level of difficulty, the potential to trigger NEPA compliance, the potential costs of obtaining individual permits, and the costs for mitigation measures anticipated for each alternative corridor are assessed. The score for this criterion is comprised of the scores of the subcriteria that are listed below. The subcriteria assigned the maximum weight of '10' were designated so since they are most heavily considered in both the CEQA and Federal and State environmental permitting processes. The alternative with the highest score for this criterion will be the alternative that has been assessed to have the least

environmental impact, and the least difficult and least costly to take through the environmental permitting and CEQA processes.

Water Resources

Potential "Waters of the US" are federally regulated under the Clean Water Act, which increases the difficulty of obtaining permits as well as the associated mitigation costs. Therefore, this subcriterion is considered "Critical" when obtaining environmental permits and completing the CEQA process. This subcriterion considers the portions of the pipeline corridors that are adjacent to, near or cross potential water bodies of the US, such as creeks, streams, drainages, and wetlands protected under the Clean Water Act, Section 404. The entire project as a whole will trigger the CWA Section 404 permit process and will require completion of the CEQA process, regardless of which alignment is chosen. However, from a permit complexity and mitigation perspective, and in order to reduce the overall impacts to these waters, it is preferred to avoid or reduce the number of such impacts whenever possible. The more potential waters of the US that are impacted, the more potential there is to impact the project costs or construction schedule. Therefore, the alternative assessed as having the fewest potential impacts to waters of the US is given the highest score and the one(s) assessed as having the most potential impacts to the waters of the US is given the lowest score.

Riparian zones are essential to soil conservation (erosion control) in protecting aquatic environments and providing wildlife habitat and food. If riparian zones are damaged during construction, restoration is possible by replanting and implementing erosion control measures, however damage to these zones is undesirable because it makes the CEQA and permitting process more difficult, so this metric is weighted "Critical" under the Environmental Considerations Criterion. This metric considers the portions of the pipeline corridor that cross riparian zones (identified by Placer County and aerial images) that are likely regulated by the CDFW.

Alternatives crossing riparian zones that result in substantial obstructions, diversions or changes to natural flow require streambed alteration agreements. The alternative that has the potential to impact the most riparian zones or that may require the most streambed alteration agreements is given the lowest score and the alternative that has the fewest impacts to riparian zones is given the highest score.

The number of stream crossings has the potential to impact water quality. While Waters of the US and State permitting covers potential impacts associated with stream impacts, additional potential CEQA impacts arise that are likely to trigger additional hydrology and water quality mitigation measures. Alternatives that have more stream crossings require more Best Management Practices (BMPs) and avoidance measures that can add to project costs. These alternatives that have more stream crossings are given the lowest score and alternatives with fewer stream crossings are given higher scores.

Biological Resources

This subcriterion is considered "Critical" since special status species are typically the focus of avoidance, minimization and mitigation requirements under CEQA, and impacting their habitat or the individuals involves the approval of and environmental permits from State and/or Federal

public agencies. This subcriterion assesses the construction impacts to areas that have federal or state listed plant and wildlife species or their potential habitats protected under the Federal or State Endangered Species Acts (ESA). The alternative that appears to have the fewest potential impacts to these species and/or their habitats is given the highest score and the alternative that appears to have the most potential impacts to these species and/or potential habitats receives the lowest score.

Species of Special Concern are those species not listed as threatened or endangered under the federal or state ESA but considered sensitive by state or federal agencies or scientific based groups. These species require evaluation under CEQA and can require mitigation measures to reduce potential impacts. Therefore, the metric was given a slightly less than "Important" weight and alternatives with a greater potential for impacts were given lower scores while those alternatives with a lesser potential were given higher scores.

The Placer County tree ordinance mandates that a permit be obtained for removal or disturbance of any tree over six inches in breast height diameter. Since the District is a special district for water utility, it is exempt from the County ordinance. Due to the exemption, this metric is considered slightly less than "Important" compared to the other subcriteria under the Environmental Considerations Criteria. Within this metric, impacts to trees due to disturbance of or the need to remove these trees during construction activities is assessed. Acres of wooded areas within each alternative were assessed to evaluate the need for potential tree trimming. The highest score is given to corridors that have the least impact to trees by staying within existing roads, previously disturbed lands, and/or the areas of the lowest tree density.

Cultural Resources

If it is determined that a project may have a substantial adverse change to historical and archaeological resources or disturbs human remains, alternative plans or measures to mitigate the effects to the resource(s) must be considered. Significant cultural resource impacts may require federal permitting under Section 106 of the National Historic Preservation Act, so this subcriterion is weighted "Critical" under Environmental Considerations Criterion. Within this subcriterion, consideration is given to the portions of the alignments that traverse areas of cultural resource sensitivity. An impact is considered significant if it results in a substantial adverse change to the resource, such as demolition, replacement, substantial alteration, and relocation.

Cultural resource sites are rated by sensitivity levels of low, moderate and high by evaluating the proximity to water and the slopes of the area. The alternative that has the greatest potential to impact culturally sensitive areas and/or impact the areas of highest sensitivity is given the lowest score and the alternative that has the least potential to impact culturally sensitive areas or the areas with the lowest cultural resource sensitivity is given the highest score.

Land Use Constraints

It is preferable that the corridor not conflict with existing and future land use designations or uses. This subcriterion is considered "Important" to the environmental permitting and CEQA process. Land use constraints are typically associated with zoning issues; incompatible use issues relative to neighboring properties; and general planning issues relative to moratoriums, easements, or growth constraints. Additionally land use constraints can result from requirements of additional

permitting and NEPA triggers for crossing US forest service lands or encroachment permits for being within State Highway Right-of-Way. Alternatives that are compatible with nearby land uses are given higher scores than those that would be incompatible with nearby land uses. Alternatives that cross US Forest Service lands (metric weight: 10) were given lower scores due to extra permitting and NEPA compliance requirements, while alternatives that cross private property were ranked for potential to conflict with the existing use or generate controversy (metric weight: 7.5). Alternatives within Caltrans (state highway) Right-of-Way were given a lower importance ranking of 2.5 because of the relatively easy encroachment permit process.

Another factor considered in evaluating land use constraints was the amount of disturbed lands. This metric is weighted "5" under the evaluation criteria. Corridors that remain in previously disturbed areas have significantly fewer environmental impacts than those within undisturbed lands. This metric considers the quantity of the corridor that is within disturbed lands, such as paved and dirt roads. The highest score is given to the alternative corridor that will have the least impact to undisturbed land (outside of existing paved or dirt roadways or driveways), because it has the potential to simplify the CEQA process.

Noise pollution is inherent to any construction project and is temporary in nature. Employing mitigation measures can significantly reduce the disturbance to sensitive receptors, such as residences, by limiting construction hours of operation, locating staging areas and hauling routes away from residences wherever possible, and operating noisy equipment during optimal weekday hours when homeowners are away from their residences. Due to the sensitivity of the project area and the public scrutiny applied this potential impact is considered important. The potential for night construction required within the Caltrans Right-of-Way is just one factor that would limit the effectiveness of potential mitigation. Air pollution due to dust generated during construction can be substantially minimized by using Best Management Practices (BMPs), such as staying within paved roads when constructing and hauling materials, covering removed soils and backfill when not in use, as well as regular watering of exposed working areas. Consideration is given to the level of and potential for dust to be generated during construction activities and the potential for complaints about dust pollution from nearby residences within this subcriterion.

This subcriterion attempts to assess the relative potential for complaints and the associated mitigation measures required to minimize impacts to residents due to the noise of construction activities and the vicinity of the construction in relation to residential areas. Higher scores are given to construction locations that are outside of residential zones compared to the alternatives within or near residential zones and higher scores are given to alternatives that have greater pipeline lengths within paved roadways and that are outside of residential areas.

Reduction of traffic impacts is possible by providing alternate routes or by only closing one lane during construction activities, constructing during nonpeak hours (at night), and regulating construction traffic vehicles. The alternative corridors are located along the Truckee River along Highway 89 with few alternate routes available and traffic impacts are considered a moderate concern. Therefore, this metric is considered "Less Important" than others under the environmental criterion. This metric will assess the level of traffic impacts during construction activities within public and private roadways. Alternative corridors within private roads that have little to no other alternate access routes, or alternatives within roads that provide the sole or primary access to many homes are given lower scores than alternative corridors within public

roads and Highway 89 that have one or more alternate routes during construction or have few residents relying on them. The alternative with the fewest traffic impacts is given the highest score.

E. Right of Way Requirements

Right of way (ROW) is an "Important" criterion in determining the most feasible alternative corridor. By locating the corridor in Public ROW, it potentially reduces the environmental impacts, property owner opposition, and project costs. The required land acquisition and associated costs are also reduced by staying within public ROW or existing PUE's eliminating the need to purchase permanent easements. The acquisition of temporary construction easements is included as a subcriterion for the following reasons: construction easements in public ROW are deemed more probable, and some alignments would require construction easements through private property. Finally, the terms of the easement carry significance since a permanent easement would be favorable over a renewable easement or a long term maintenance agreement.

Permanent Easements

The alternative alignments proposed along the Highway 89 corridor traverse a mix of public and private property for the entire eight miles from Truckee to Squaw Valley. Since it would be infeasible to expect the District to purchase all of the property inside of an alignments corridor, an access and utility easement will be necessary for installation, maintenance and operation. Due to the importance of easements, the probability of obtaining an easement becomes vital to the feasibility of an alignment. Public entities, federal or state, are typically considered preferable to that of private land owners since they commonly deal in the granting of easements as opposed to private land owners. An existing easement is also preferred as it sets a precedent for this project to obtain an easement as well. Alignments which cross multiple private parcels or have a high degree of uncertainty tied to the acquisition of an easement will rank lower than those which do not. This subcriterion will have a "Critical" consideration in an alternative's ROW requirements criterion score.

Temporary Construction Easements

Temporary construction easements will be required to account for materials staging, trench spoils, and equipment access during construction. It is not feasible to require a contractor to stay within the footprint of the permanent easement as the permanent width is sized for long term operation and maintenance activities. This evaluation will prioritize the type of owner, public or private, with whom the easement is secured and will reward a shorter length of temporary easement over a longer one. This subcriteria carries a weight of "Less Important" on an alternative's final ROW requirements criterion score.

7.0 DETAILED EVALUATION CRITERIA AND METHOD – WATER SOURCE

The detailed evaluation of the source location is based upon the assumption that the District should attempt to secure additional capacity from a regional utility's existing source prior to developing a new source alternative as presented in this evaluation. If the District is unable to reach an agreement with another utility, they should implement the highest ranking alternative provided in this analysis.

Similar to the pipeline analysis, this section includes the non-economic matrix evaluation method as well as a presentation of the evaluation criteria and subcriteria.

7.1 SOURCE EVALUATION METHOD

With careful consideration given to the goals and objectives of the project and the needs of District, the project team initially developed the evaluation criteria, subcriteria, and weighting convention assigned to each. The District was then solicited for review, input and acceptance of these parameters.

Eight evaluation criteria were used to compare the groundwater source location alternatives:

1. Subsurface Conditions
2. Surface Conditions
3. Water Quality
4. Environmental
5. Political and Public Impacts
6. Right-of-Way Requirements
7. Operations and Maintenance
8. Engineering

Each criterion was assigned a weight based on the criterion's importance to the project as a whole, with a maximum of ten (10), which represents critical importance, and a minimum of zero (0), which represents the least importance. The source location evaluation uses the same weighting scale as presented in Table 4.

Table 8 applies the weighting scale to each of the eight evaluation criteria and represents a normalization of the weighting, which reflects the relative contribution that a particular criterion has on the overall ranking relative to the other criteria. This is expressed as a percentage of the sum of all criterion weights. In this case there are eight criteria categories that were weighted separately. These priorities reflect the total criteria scoring equaling 100 percent.

Table 8 – Water Source Criteria Weights and Priorities

Criteria	Weight	Priority
Subsurface Conditions	10	16.0
Surface Conditions	7.5	12.0
Water Quality	10	16.0
Environmental	7.5	12.0
Political and Public Impacts	5	8.0
Right-of-Way Requirements	5	8.0
Operations and Maintenance	7.5	12.0
Engineering	10	16.0
Total	**62.5**	**100**

The eight main criteria listed above were broken down into a total of twenty-four (24) subcriteria, which are specific characteristics used to compare how well each alternative source meets each criterion. The non-economic evaluation method proceeds in the same manner detailed previously in the pipeline evaluation. ***Alternative scoring will be completed as the next task of the Project***.

Table 9 below summarizes the subcriteria weights, priorities, and matrix weights for the water sources. A summary of criteria, subcriteria, and metric weights, priorities and matrix weights is provided in Table 10.

Table 9 – Water Source Subcriteria Weights, Priorities, and Matrix Weights

Subcriteria	Weight	Priority	Matrix Weight
Subsurface Conditions Weight = 10, Priority = 16%			
Proximity to Areas with Acceptable Groundwater Quality	10	25%	4.0
Anticipated Depth-To-Water and Well Depth	7.5	19%	3.0
Hydrogeologic Conditions Conducive to Providing Necessary Well Yield	10	25%	4.0
Geologic Material Where Secondary Permeability Provides Most of the Well Yield	7.5	19%	3.0
Location in Area in a Highly Exploited Portion of Aquifer	5	13%	2.0
Subtotal	40	100%	16.0

Subcriteria	Weight	Priority	Matrix Weight
Surface Conditions Weight = 7.5, Priority = 12%			
Proximity to Springs and/or Other Surface Water Features, and Complies with TROA Guidelines and General Guidelines of the MVGMP	10	40%	4.8
Proximity to Private or Public Wells	7.5	30%	3.6
Distance from Areas Potential Inundated with Flood Water	2.5	10%	1.2
Distance from Sources of Possible Groundwater Contamination (Natural or Anthropogenic)	5	20%	2.4
Subtotal	25	100%	12.0
Water Quality Weight = 10, Priority = 16%			
Water Quality Compared to Squaw Valley	10	67%	10.7
Level of Treatment Required	5	33%	5.3
Subtotal	15	100%	16.0
Environmental Weight = 7.5, Priority = 12%			
Waters	10	33%	4.0
Biological Resources	10	33%	4.0
Cultural Resources	5	17%	2.0
Land Use	5	17%	2.0
Subtotal	30	100%	12.0
Public/Regional Impacts Weight = 5, Priority = 8%			
Potential for Opposition	10	33%	2.7
Aesthetic Impacts	7.5	25%	2.0
Potential Regional Benefits	5	17%	1.3
Agency Cooperation/Dependence	7.5	25%	2.0
Subtotal	30	100%	8.0
Right of Way Requirements Weight = 5, Priority = 8%			
Permanent Easements	10	80%	6.4
Temporary Construction Easements	2.5	20%	1.6
Subtotal	12.5	100%	8.0
Operation & Maintenance Weight = 7.5, Priority = 12%			
Accessibility	7.5	38%	4.5
Level of Treatment Required	7.5	38%	4.5
Impacts from Repair and Maintenance	5	25%	3.0
Subtotal	20	100%	12.0
Engineering Weight = 10, Priority - 16%			
Constructability	10	50%	8.0
Power Supply	10	50%	8.0
Subtotal	20	100%	16.0

TABLE 10 - NON ECONOMIC EVALUATION - WATER SOURCE

Criteria			Subcriteria			Subcriteria Metric				
Criteria	**Weight**	**Priority (%)**	**Sub criteria**	**Weight**	**Priority (%)**	**Metric**		**Weights**	**Priority (%)**	**Matrix Weight**
Subsurface Conditions	10	16.0%	**Proximity to Areas with Acceptable Groundwater Quality**	10	25.0 %	Water Quality Data Available		5	100%	4.0
							Sub-total	**5**	**100%**	**4.0**
			Anticipated Depth-To-Water and Well Depth	7.5	18.8 %	Depth to Water		7.5	50%	1.5
						Depth of Well		7.5	50%	1.5
							Sub-total	**15**	**100%**	**3.0**
			Hydrogeologic Conditions Conducive to Providing Necessary Well Yield	10	25.0 %	Existing well data available to base yield estimates		7.5	43%	1.7
						Exploratory drilling program requirements		10	57%	2.3
							Sub-total	**17.5**	**100%**	**4.0**
			Geologic Material Where Secondary Permeability Provides Most of the Well Yield	7.5	18.8 %	Nearby wells produce water mainly from primary porosity of unconsolidated sediments		7.5	60%	1.8
						Title 22 capacity rating (alluvial vs. bedrock)		5	40%	1.2
							Sub-total	**12.5**	**100%**	**3.0**
			Location in Area in a Highly Exploited Portion of Aquifer	5	12.5 %	Historic groundwater usage		7.5	50%	1.0
						Water level trends, if known		7.5	50%	1.0
							Sub-total	**15**	**100%**	**2.0**
			Sub-total	**40**	**100.0 %**					
Surface Conditions	7.5	12.0%	**Proximity to Springs and/or Other Surface Water Features, and Complies with TROA Guidelines(b) and General Guidelines of the MVGMP**	10	40.0 %	Affect on springs or streams, including Truckee River and tributaries		7.5	60%	2.9
						Compliance with TROA and MVGMP		5	40%	1.9
							Sub-total	**12.5**	**100%**	**4.8**
			Proximity to Private or Public Wells	7.5	30.0 %	Proximity to private or public wells		10	67%	2.4
						Mitigation required to reduce interference		5	33%	1.2
							Sub-total	**15**	**100%**	**3.6**
			Distance from Areas Potentially Inundated with Flood Water	2.5	10.0 %	Flood Plain Delineation		2.5	100%	1.2
							Sub-total	**2.5**	**100%**	**1.2**
			Distance from Sources of Possible Groundwater Contamination (Natural and Anthropogenic)	5	20.0 %	Distance to natural contamination		10	50%	1.2
						Distance to anthropogenic contamination		10	50%	1.2
							Sub-total	**20**	**100%**	**2.4**
			Sub-total	**25**	**100.0 %**					
Water Quality	10	16.0%	**Water Quality Compared to Squaw Valley**	10	66.7 %	Primary Standards		10	33%	3.6
						Secondary Standards		10	33%	3.6
						Radionuclides		10	33%	3.6
							Sub-total	**30**	**100%**	**10.7**
			Level of Treatment Required	5	33.3 %	Chlorination		10	40%	2.1
						pH Adjustment		5	20%	1.1
						Fe, Mn, As, surface water, etc.		10	40%	2.1
							Sub-total	**25**	**100%**	**5.3**
			Sub-total	**15**	**100.0 %**					
Environmental	7.5	12.0%	**Waters**	10	33.3 %	Waters of US		10	44%	1.8
						Waters of State		10	44%	1.8
						Stream Crossings		2.5	11%	0.4
							Sub-total	**22.5**	**100%**	**4.0**
			Biological Resources	10	33.3 %	Listed Species		10	40%	1.6
						Critical Habitat		10	40%	1.6
						Species of Concern		2.5	10%	0.4
						Woodlands		2.5	10%	0.4
							Sub-total	**25**	**100%**	**4.0**
			Cultural Resources	5	16.7 %	Proximity to Water		10	33%	0.7
						Slopes		10	33%	0.7
						Known Resources		10	33%	0.7
							Sub-total	**30**	**100%**	**2.0**
			Land Use	5	16.7 %	USFS Lands		10	29%	0.6
						Private Property		7.5	21%	0.4
						Caltrans ROW		2.5	7%	0.1
						Sensitive Receptors		7.5	21%	0.4
						Traffic		2.5	7%	0.1
						Air Quality/Green House Gases		5	14%	0.3
							Sub-total	**35**	**100%**	**2.0**
			Sub-total	**30**	**100.0 %**					
Public/Regional Impacts	5	8.0%	**Potential for Opposition**	10	33.3 %	Consideration to traffic, noise, air quality impacts		10	100%	2.7
						Proximity to residences/commercial properties				
						Potential impacts to private property				
							Sub-total	**10**	**100%**	**2.7**
			Aesthetic Impacts	7.5	25.0 %	Short term construction impacts (drilling, grading, staging areas)		7.5	100%	2.0
						Long term impacts (construction of well house, removal of vegetation, visibility of appurtenances)				
							Sub-total	**7.5**	**100%**	**2.0**
			Potential Regional Benefits	5	16.7 %	Supplemental source for existing water system (TDPUD, NCSD)		10	100%	1.3
							Sub-total	**10**	**100%**	**1.3**
			Agency Cooperation/Dependence	7.5	25.0 %	Reliance on neighboring agencies for use of existing infrastructure		7.5	100%	2.0
							Sub-total	**7.5**	**100%**	**2.0**
			Sub-total	**30**	**100.0 %**					
ROW Requirements	5	8.0%	**Permanent Easements**	10	80.0 %	Probability of Obtaining an Easement		10	33%	2.1
						Cost of Obtaining an Easement		10	33%	2.1
						% within Existing ROW/PUE Easement		5	17%	1.1
						Public or Private easement		5	17%	1.1
							Sub-total	**30**	**100%**	**6.4**
			Temporary Construction Easements	2.5	20.0 %	Ability to secure temporary construction easements		2.5	100%	1.6
							Sub-total	**2.5**	**100%**	**1.6**
			Sub-total	**12.5**	**100.0 %**					
O & M	7.5	12.0%	**Accessibility**	7.5	37.5 %	Remote Locations		10	40%	1.8
						Paved Road v. Dirt Road		7.5	30%	1.4
						Type of Vehicle Access:		5	20%	0.9
						Snow Cat, ATV, Light Truck, etc.				
						Snow Removal		2.5	10%	0.5
							Sub-total	**25**	**100%**	**4.5**
			Level of Treatment Required	7.5	37.5 %	Type of treatment processes		10	100%	4.5
							Sub-total	**10**	**100%**	**4.5**
			Impacts from Repair and Maintenance	5	25.0 %	Pedestrian/Public Impacts		10	100%	3.0
							Sub-total	**10**	**100%**	**3.0**
			Sub-total	**20**	**100.0 %**					
Engineering	10	16.0%	**Constructability**	10	50.0 %	Material Staging		10	36%	2.9
						Drilling equipment and construction vehicle access		10	36%	2.9
						Development and testing residuals and water disposal		7.5	27%	2.2
							Sub-total	**27.5**	**100%**	**8.0**
			Power Supply	10	50.0 %	Location of Available power supply		10	100%	8.0
							Sub-total	**10**	**100%**	**8.0**
			Sub-total	**20**	**100.0 %**					
Total	**62.5**	**100%**								**Total**

Weight = value assigned to given criterion (or sub criterion) with respect to other criteria (or sub criteria).

Priority = the value of weights after normalization.

Matrix Weight = the metric priority multiplied by the criterion priority.

7.2 WATER SOURCE NON-ECONOMIC CRITERIA AND SUBCRITERIA

Detailed descriptions and assigned weightings for the criteria and subcriteria are discussed in the sections below. Any subcriterion which is also applicable to the pipeline evaluation and has already been detailed will not be replicated in this section. The weight assigned to each of the criteria has significant bearing on the final score for each alternative. Weights reflect the judgment of the project team, with input provided from the District.

A. Subsurface Conditions

The performance and reliability of any underground drinking source is highly dependent on a variety of subsurface conditions. The project team developed a list of five subcriterion which provides a broad view of elements related to underground conditions. Because the ability of an underground source to produce water is of "Critical" importance, this criteria has been assigned a weight which reflects that importance.

Proximity to Areas with Acceptable Groundwater Quality

Groundwater quality of any new source will have a "Critical" weight in the evaluation of a source alternative. This subcriterion will evaluate the horizontal proximity between the proposed well location and existing wells with known water quality. A proposed location alternative which is closer to an existing well with good water quality will be ranked higher than a location which is further away or near a well with poor water quality. If adjacent water quality is unavailable, the location shall be scored higher than a location with poor groundwater quality.

Anticipated Depth-To-Water and Well Depth

Depth to groundwater is a "Very Important" consideration in well design and in a source alternative's final subsurface condition criterion score since as the size of the pump increases driving up construction and operation costs. Deeper wells also cost more to construct. Well locations with shallower groundwater will rank higher than those with aquifers further from the surface.

Hydrogeologic Conditions Conducive to Providing Necessary Well Yield

Well yield is a "Critical" consideration in the performance evaluation of a groundwater well and it will play an equal role in determining the location for the well. Location alternatives will be assessed for the availability of existing well data and for the need for an exploratory drilling program. Locations with limited data available and which require exploratory drilling will rank lower than those which have existing wells or information to base well yield estimates off of.

Geologic Material Where Secondary Permeability Provides Most of the Well Yield

This subcriterion addresses the geologic material associated with primary production of water. This is considered "Very Important" in the selection of a location for a well. Wells with production zones primarily in unconsolidated sediments will receive higher ratings that wells constructed in bedrock. This subcriterion also addresses the SWRCB regulations governing well capacity ratings,

based on the fact that determining well capacity is impacted by completion in alluvial material versus bedrock.

Location in Area in a Highly Exploited Portion of Aquifer

This subcriterion will play an "Important" role in the source location evaluation through assessment of historic groundwater usage and any water level trends, if available. Similar to other subcriteria which attempt to evaluate well yield, the construction of a new source in a highly exploited area will rank lower than that of a location with a minimal amount of groundwater pumping. Locations with little available data will rank slightly higher than those with poor performance data.

B. Surface Conditions

While many of the subsurface conditions are difficult to assess without extensive testing, surface conditions are capable of thorough investigation and will play a "Very Important" role in a preferred source location selection. Well locations will be evaluated against three subcriteria which will score a well location with favorable surface conditions over that of a location with unfavorable conditions.

Proximity to Springs and/or Other Surface Water Features

There are two major water features within the influence of the proposed source locations which are the Truckee River and the Martis Valley Groundwater Basin (MVGB) and the interaction between the proposed well location and these features will have a "Critical" weight in the Surface Condition assessment. Both features have existing guideline documents which detail the impact of source locations on these features and the surrounding areas. Well locations which do not affect nearby springs, streams and tributaries will rank higher than those which do not. Also, locations which comply with both the Truckee River Operating Agreement (TROA) and the Martis Valley Groundwater Management Plan (MVGMP) will rank higher than those which do not.

Proximity to Private or Public Wells

Interference between groundwater sources is "Very Important" consideration when evaluating a new water source and it will play an equal role in determining an alternative's final surface condition criterion score. It is assumed that the closer the new well is drilled to an existing public or private well, the more negative influence the new well may have on that existing source. Locations in remote areas will rank higher than those in highly developed areas. Well locations will also be assessed for the need of an operational plan to minimize its impact on an existing source. Wells which do not require mitigation will rank higher than those that do require an operational plan.

Distance from Sources of Possible Groundwater Contamination

The benefit of a surface condition assessment is the ability to accurately pinpoint sources of potential contamination caused by either natural or anthropogenic conditions. Alternative locations will be ranked according to their proximity to these contaminant locations, with a further distance ranking higher than that of a closer distance. Since many of the proposed well locations

are large areas as shown on Figure 3-2, it would be in the best interest of the District to relocate the well to a location which would not be under the threat of groundwater contamination. For this reason, this subcriterion will only have an "Important" weight on an alternative's subsurface condition criterion score.

C. Water Quality

The District currently provides groundwater to its customers which is non-chlorinated and of excellent quality. Current water treatment in District sources includes the addition of sodium hydroxide for pH adjustment and corrosion control. The District places a "Critical" importance on the quality of any potential water source entering their system and water quality shall have the same importance on an alternative's final score.

Water Quality Compared to Squaw Valley

The water quality of a new source will be assessed across three separate metrics: primary standards, secondary standards and radionuclides. All three metrics will have equal weight in its score with sources which have standards above the maximum contaminant level (MCL) scoring lower than those which pass all MCL's. This subcriterion shall be of "Critical" importance to an alternative's final water quality criterion score.

Level of Treatment Required

Water treatment is not a preferred plan of action by the District. However, a subcriterion which addressed the treatment needs of the new groundwater source is needed in the case that treatment is unavoidable. Well locations which do not need any chlorination, pH adjustment, or treatment of any form will rank higher in this subcriterion than alternatives which require a greater level of treatment.

D. Environmental

Any new well location will impact local waters, biological and cultural resources, and land uses by way of construction activities and the permanent presence of an underground well and a well house. The environmental considerations play a "Very Important" role in the evaluation of a source well location. The subcriterion and metrics for the source location are identical to those discussed in Section 6.1 for the pipeline evaluation, and will therefore not be discussed in any further detail in this section.

E. Public and Regional Impacts

It is important to acknowledge the political sensitivity and concerns of the general public throughout the Truckee area. These concerns generally center on the import of water to Squaw Valley from Martis Valley and are the same for all project alternatives. The issues of political sensitivity and public perception will continue to be mitigated throughout the project through public outreach and education. Therefore, political sensitivity and public perception issues are not considered as evaluation criteria at this phase of the project.

So, these criteria acknowledge the potential aesthetic impacts to the public as well as regional benefits associated with the project and are considered "Important" to the evaluation.

Potential for Opposition

This subcriteria evaluates the potential for public opposition as it relates to the consideration of traffic, noise and air quality impacts, the proximity of the well house and appurtenances to private and commercial properties, and potential impacts to private property. Alternatives that are within private property and residential/commercial corridors will be given lower scores since they are more likely to receive opposition from local landowners. This criterion is considered "Critical" for the evaluation.

Aesthetic Impacts

This subcriteria evaluates the short and long term impacts that will exist during and after construction and is considered "Very Important" in the evaluation. Short term impacts include construction related tasks such as well drilling and testing, clearing and grubbing, grading, material and equipment staging areas, and construction vehicle access. Construction related aesthetic impacts will be higher when in close proximity to residential areas. Long term impacts include those realized after construction is complete, and include changes in topography, removal of vegetation, visibility of the well building and appurtenances, and maintenance related activities. These impacts will also be higher when in close proximity to residential areas.

Potential Regional Benefits

Construction of a new municipal production well in the Martis Valley area may have the added regional benefit of providing a supplemental water source for the existing NCSD, Zone 4, and/or TDPUD water systems. The District will use a new production well as an emergency redundant water supply. When not in use by the District, a new well may provide added operational flexibility to one or all of the area water systems. Water source areas that are more conducive to providing these regional benefits will be given higher scores. Potential regional benefits are considered to play an "Important" role in the evaluation.

Agency Cooperation/Dependence

Construction of a new water source requires close coordination and cooperation with NCSD and TDPUD and therefor this subcriterion is "Very Important". Reliance on NCSD and TDPUD will be required for potential use of existing infrastructure to wheel water to Squaw Valley. Water source alternatives that minimize this reliance will be given higher scores.

F. Right of Way Requirements

The acquisition of ROW by the District for a new source location will include the purchase of land for the source itself and an easement for the linear pipeline portion which will connect the new source to existing system infrastructure. In many cases the linear portion will be small, 100 to 500 feet long; however Areas C and D in Figure 3-2 may require pipelines up to one mile in length. The two subcriteria selected for evaluation are identical to those discussed in the pipeline portion of this memorandum and will not be detailed any further in this section. Source alternatives which

require shorter lengths of easements with a fewer number of land owners will rank higher than those which involve a more easements with more land owners. The ROW requirements for the source location will play an "Important" role in determining the highest rated source alternative.

G. Operations and Maintenance

The operations and maintenance criteria for the new groundwater source has been broken into two subcriteria which carry a "Very Important" weight on an alternative's final score in this evaluation. This analysis will evaluate the accessibility of the new locations and provide an estimate of parties affected by an operations or repair activity.

Accessibility

The new well location will require routine inspections and maintenance activities. Therefore, they should have long term accessibility, preferably via paved or dirt roads. Access to the well site and its associated pipeline, will have a "Very Important" effect on an alternative's score in this subcriterion. Wells that are located in remote areas, difficult to access by vehicle, without existing roadways, will receive lower scores than those that are easily accessible by vehicle, either within or near existing roads.

Impacts from Repair and Maintenance

Repair and maintenance activities often require large equipment and construction material staging in order to replace failing infrastructure. This subcriterion is considered "Important" and attempts to evaluate the impacts to the public which may be required during maintenance activities. Areas adjacent to the proposed well locations are used by pedestrians, motorists, bicyclists, hikers and residents. Any location which will impact or limit access to the use of existing facilities will be ranked lower than those which do not.

H. Engineering

The design and constructability of the new groundwater well is a "Critical" criterion to consider when selecting alternative locations. Construction challenges have the potential to cause significant increases in project costs and/or delays in schedule. Due to the unknown nature of potential construction challenges beneath the surface, this criterion will only evaluate ground level conditions/infrastructure. A well location alternative which lends itself well to accommodating well drilling equipment, well drilling materials and has an available power source will score much higher than one which does not. The following two subcriteria are used to determine the final score for each source alternative in the engineering criterion.

Constructability

Constructability plays a "Critical" role in the evaluation and selection of a water source alternative. Well drilling involves large drill rigs which need horizontal and vertical clearance to construct the well. A well location which provides adequate open space for equipment and the staging of materials will be preferable to one which does not. Finally, a location which can accommodate water disposal during well development and testing without impacting adjacent parcels would be

the most preferred as well. Well locations which rank high in these categories will score higher than those which do not.

Power Supply

The availability of power supply is "Critical" to the location of a new water source. A dedicated power supply to the well house location and well will be required regardless of the well location alternative selected as the most preferable. This subcriterion will evaluate each location for proximity to existing power lines, with closer being preferable to further away; and will evaluate the size and phase of the existing power source for its compatibility with an underground well application.

8.0 DETAILED EVALUATION CRITERIA AND METHOD – TERMINAL WATER STORAGE TANK

The detailed evaluation of the terminal tank location is based upon the assumption that the District will create a new pressure zone at the east end of the Valley. Water modeling has been completed as part of the Water Master Plan to define the hydraulic grade requirement for the new tank and the new pressure zone boundary. Based on this, two alternative tank locations have been identified and will be evaluated as part of the project.

Similar to the pipeline analysis, this section includes the non-economic matrix evaluation method as well as a presentation of the evaluation criteria and subcriteria.

8.1 TANK EVALUATION METHOD

With careful consideration given to the goals and objectives of the project and the needs of District, the project team initially developed the evaluation criteria, subcriteria, and weighting convention assigned to each. The District was then solicited for review, input and acceptance of these parameters.

Five evaluation criteria will be used to compare the tank location alternatives:

1. Operations and Maintenance
2. Engineering
3. Public and Regional Impacts
4. Environmental
5. Right-of-Way Requirements

Each criterion was assigned a weight based on the criterion's importance to the project as a whole, with a maximum of ten (10), which represents critical importance, and a minimum of zero (0), which represents no importance. The tank location evaluation uses the same weighting scale as presented in Table 4.

Table 11 applies the weighting scale to each of the five evaluation criteria and represents a normalization of the weighting, which reflects the relative contribution that a particular criterion has on the overall ranking relative to the other criteria. This is expressed as a percentage of the

sum of all criterion weights. In this case there are eight criteria categories that were weighted separately. These priorities reflect the total criteria scoring equaling 100 percent.

Table 11 – Tank Criteria Weights and Priorities

Criteria	Weight	Priority
Operations and Maintenance	5	15.4
Engineering	10	30.8
Public/Regional Impacts	5	15.4
Environmental	7.5	23.1
Right-of-Way Requirements	5	15.4
Total	**32.5**	**100**

The five main criteria listed above were broken down into a total of fifteen (15) subcriteria, which are specific characteristics used to compare how well each alternative meets each criterion. The non-economic evaluation method proceeds in the same manner detailed previously in the pipeline and source evaluations. ***Alternative scoring will be completed as the next task of the project***.

Table 12 below summarizes the subcriteria weights, priorities, and matrix weights for the tank evaluation. A summary of criteria, subcriteria, and metric weights, priorities and matrix weights is provided in Table 13.

Table 12 – Tank Subcriteria Weights, Priorities, and Matrix Weights

Subcriteria		Weight	Priority	Matrix Weight
Operation & Maintenance Weight = 5, Priority = 15.4%				
Accessibility		7.5	50%	7.7
Impacts from Repair and Maintenance		5	33%	5.1
Impacts from Natural Disaster		2.5	17%	2.6
	Subtotal	15	100%	15.4
Engineering Weight = 10, Priority - 30.8%				
Constructability		10	50%	15.4
Accessibility		5	25%	7.7
Connection to Existing System		5	25%	7.7
	Subtotal	20	100%	30.8
Public Impacts Weight = 5, Priority = 15.4%				
Potential for Opposition		10	57%	8.8
Aesthetic Impacts		7.5	43%	6.6
	Subtotal	17.5	100%	15.4
Environmental Weight = 7.5, Priority = 23.1%				
Waters		2.5	9%	2.1
Biological Resources		10	36%	8.4
Cultural Resources		7.5	27%	6.3
Land Use		7.5	27%	6.3
	Subtotal	27.5	100%	23.1
Right of Way Requirements Weight = 5, Priority = 15.4%				
Permanent Easements		10	80%	12.3
Temporary Construction Easements		2.5	20%	3.1
	Subtotal	12.5	100%	15.4

TABLE 13 - NON ECONOMIC EVALUATION - TANK

Criteria			Subcriteria			Subcriteria Metric			
Criteria	**Weight**	**Priority (%)**	**Subcriteria**	**Weight**	**Priority (%)**	**Metric**	**Weights**	**Priority (%)**	**Matrix Weight**
O & M	5	15.4%	**Accessibility**	7.5	50.0 %	Length of Access Road	7.5	75%	5.8
						Type of Vehicle Access: Snow Cat, ATV, Light Truck, etc.	2.5	25%	1.9
						Sub-total	**10**	**100%**	**7.7**
			Impacts from Repair and Maintenance	5	33.3 %	Property Owner Impacts	5	100%	5.1
						Sub-total	**5**	**100%**	**5.1**
			Impacts from Natural Disaster	2.5	16.7 %	Avalanche	5	50%	1.3
						Landslides	5	50%	1.3
						Sub-total	**10**	**100%**	**2.6**
			Sub-total	**15**	**100.0%**				
Engineering	10	30.8%	**Constructability**	10	50.0 %	Standard v. Non-Standard Methods	10	27%	4.1
						Material Staging	5	13%	2.1
						Construction Vehicle Access	5	13%	2.1
						Slope	10	27%	4.1
						Rock Excavation	7.5	20%	3.1
						Sub-total	**37.5**	**100%**	**15.4**
			Accessibility	5	25.0 %	Length of Access Road	5	50%	3.8
						Existing/New Access Road	5	50%	3.8
						Sub-total	**10**	**100%**	**7.7**
			Connection to Existing System	5	25.0 %	Length of Pipeline	5	40%	3.1
						Difficulty of Construction	7.5	60%	4.6
						Sub-total	**12.5**	**100%**	**7.7**
			Sub-total	**20**	**100.0%**				
Public Impacts	5	15.4%	**Potential for Opposition**	10	57.1 %	Consideration to traffic, noise, air quality impacts	5	25%	2.2
						Proximity to residences	10	50%	4.4
						Potential impacts to private property	5	25%	2.2
						Sub-total	**20**	**100%**	**8.8**
			Aesthetic Impacts	7.5	42.9 %	Short term construction impacts (grading, staging areas)	5	33%	2.2
						Long term impacts (change in topography, removal of vegetation, visibility of tank)	10	67%	4.4
						Sub-total	**15**	**100%**	**6.6**
			Sub-total	**17.5**	**100.0%**				
Environmental	7.5	23.1%	**Waters**	2.5	9.1 %	Waters of US	10	44%	0.9
						Waters of State	10	44%	0.9
						Stream Crossings	2.5	11%	0.2
						Sub-total	**22.5**	**100%**	**2.1**
			Biological Resources	10	36.4 %	Listed Species	10	40%	3.4
						Critical Habitat	10	40%	3.4
						Species of Concern	2.5	10%	0.8
						Woodlands	2.5	10%	0.8
						Sub-total	**25**	**100%**	**8.4**
			Cultural Resources	7.5	27.3 %	Proximity to Water	2.5	11%	0.7
						Slopes	10	44%	2.8
						Known Resources	10	44%	2.8
						Sub-total	**22.5**	**100%**	**6.3**
			Land Use	7.5	27.3 %	USFS Lands	10	31%	1.9
						Private Property	7.5	23%	1.5
						Sensitive Receptors	7.5	23%	1.5
						Traffic	2.5	8%	0.5
						Air Quality/Green House Gases	5	15%	1.0
						Sub-total	**32.5**	**100%**	**6.3**
			Sub-total	**27.5**	**100.0%**				
ROW Requirements	5	15.4%	**Permanent Easements**	10	80.0 %	Probability of Obtaining an Easement	10	33%	4.1
						Cost of Obtaining an Easement	10	33%	4.1
						% within Existing ROW/PUE Easement	5	17%	2.1
						Public or Private easement	5	17%	2.1
						Sub-total	**30**	**100%**	**12.3**
			Temporary Construction Easements	2.5	20.0 %	Ability to secure temporary construction easements	2.5	100%	3.1
						Sub-total	**2.5**	**100%**	**3.1**
			Sub-total	**12.5**	**100.0%**				
Total	**32.5**	**100%**							**Total**

Weight = value assigned to given criterion (or subcriterion) with respect to other criteria (or subcriteria).

Priority = the value of weights after normalization.

Matrix Weight = the metric priority multiplied by the criterion priority.

8.2 TANK NON-ECONOMIC CRITERIA AND SUBCRITERIA

Detailed descriptions and assigned weightings for the criteria and subcriteria are discussed in the sections below. Any subcriterion which is also applicable to the pipeline or source evaluation and has already been detailed will not be replicated in this section. The weight assigned to each of the criteria has significant bearing on the final score for each alternative. Weights reflect the judgment of the project team.

A. Operations & Maintenance

The operations and maintenance of the water tank is a somewhat important consideration in the overall project evaluation. Only certain operational subcriteria are pertinent to a comparative evaluation of tank locations and ultimately the selection of the most preferable site. For these reasons, this criterion gives an "Important" consideration to the operational advantages of any one tank site over another. This criterion attempts to evaluate for each alternative the degree of maintenance, operation and how well the tank site accommodates long term accessibility for maintenance purposes.

Accessibility

Water storage tanks require routine inspections and/or maintenance. Therefore, they should have long term accessibility, preferably via paved or dirt roads. Access to the tank is weighted "Very Important" under the operations and maintenance criterion. This subcriterion evaluates the ability for maintenance crews to access the tank for the purpose of long term maintenance. Lengthy access roads, difficult to access by vehicle, will receive lower scores than those that are easily accessible by vehicle, either within or near existing roads.

Impacts from Repair and Maintenance

Repair and maintenance activities often require large equipment and construction material staging in order to replace segments of failing infrastructure. For this reason, this subcriterion is considered "Important" to the evaluation process. This subcriterion evaluates the additional impacts which may be required during maintenance activities. Items such as property owner impacts will be evaluated for each alternative site. Those alternatives which necessitate additional considerations will be ranked lower than those which do not.

Impacts from Natural Disaster

The water storage tank sites selected to be evaluated as part of this project are somewhat vulnerable to various natural disasters. The tank locations are both located in potentially unstable mountain slopes, potentially subject to landslides and avalanche hazards. This subcriteria is considered generally "Less Important" and attempts to estimate the threat posed by these natural impacts to each tank site alternative.

B. Engineering

The design and constructability of the tank is a "Critical" criterion to consider when selecting alternative sites since construction challenges have the potential to cause a significant increase in

project costs and/or delay in schedule. The engineering criterion considers the potential ease of construction relative to the geology (soils), topography, accessibility and work conditions. If alternative tank sites are located on steep slopes, special construction methods will likely be necessary which will increase construction costs and make for difficult work conditions. The following subcriteria are used to determine the overall score for engineering for each alternative.

Constructability

Constructability in comparing tank site alternatives will be primarily evaluated based on construction methods and type of tank. It is preferable to construct a typical welded steel tank on a site that has favorable topography, soil conditions, and accessibility. Steep topography and soil conditions can require special construction methods materials for a tank including a concrete or steel tank cut into a hillside. This subcriterion is considered "Critical" to the evaluation. Sites with good access and an opportunity to construct a typical at grade welded steel storage tank will be ranked more favorable.

Accessibility

Accessibility plays an "Important" role, since heavy equipment and large trucks will need access to the work site. Poor accessibility due long and narrow access roads and private property will slow the construction progress and significantly impact/increase the mobilization constraints. Within this subcriterion, the alternative is assessed for how accessible it is during construction, such as the relative ease associated with getting construction equipment and materials in and out of the work site. Alternatives that are entirely or almost entirely accessible by way of existing public roadways are given the highest scores and those that are accessed by way of private roads are given the lowest scores. Also, alternatives with shorter access roads are rated more favorably.

Connection to Existing Facilities

Location of the tank will dictate the difficulty in connecting the tank to the existing water system with the construction of waterline. This subcriterion is considered "Important" and relates to the length of the connecting pipeline and its difficulty of construction. Shorter pipeline lengths as well as those that can be constructed within existing roadways or easements, and less steep terrain, will be ranked more favorable.

C. Public and Regional Impacts

These criteria acknowledge the potential aesthetic impacts to the public and are considered "Important" to the evaluation.

Potential for Opposition

This subcriteria is considered "Critical" and evaluates the potential for public opposition as it relates to the consideration of traffic, noise and air quality impacts, the proximity of the tank and appurtenances to private properties, and potential impacts to private property. Alternatives that

are within private property and residential/commercial corridors will be given lower scores since they are more likely to receive opposition from local landowners.

Aesthetic Impacts

This subcriteria is considered "Very Important" and evaluates the short and long term impacts that will exist during and after construction. Short term impacts include construction related tasks such as clearing and grubbing, grading, material and equipment staging areas, and construction vehicle access. Construction related aesthetic impacts will be higher when in close proximity to residential areas. Long term impacts include those realized after construction is complete, and include changes in topography, removal of vegetation, visibility of the tank, and maintenance related activities. These impacts will also be higher when in close proximity to residential areas.

D. Environmental

Any water tank location may impact local waters, biological and cultural resources, and land uses by way of construction activities and the permanent presence of an above ground storage tank. The environmental considerations play a "Very Important" role in the evaluation of a tank location. The subcriterion and metrics for the tank location are identical to those discussed in Section 6.1 for the pipeline evaluation, and will therefore not be discussed in any further detail in this section.

E. Right of Way Requirements

ROW is an "Important" criterion in determining the most feasible tank location. By locating the corridor in public ROW, it potentially reduces the environmental impacts, property owner opposition, and project costs. The required land acquisition and associated costs are also reduced by staying within public ROW or existing PUE's eliminating the need to purchase permanent easements. The acquisition of temporary construction easements is included as a subcriterion for the following reasons: construction easements in public ROW are deemed more probable, and both tank sites would likely require construction easements through private property. Finally, the terms of the easement carry significance since a permanent easement would be favorable over a renewable easement or a long term maintenance agreement.

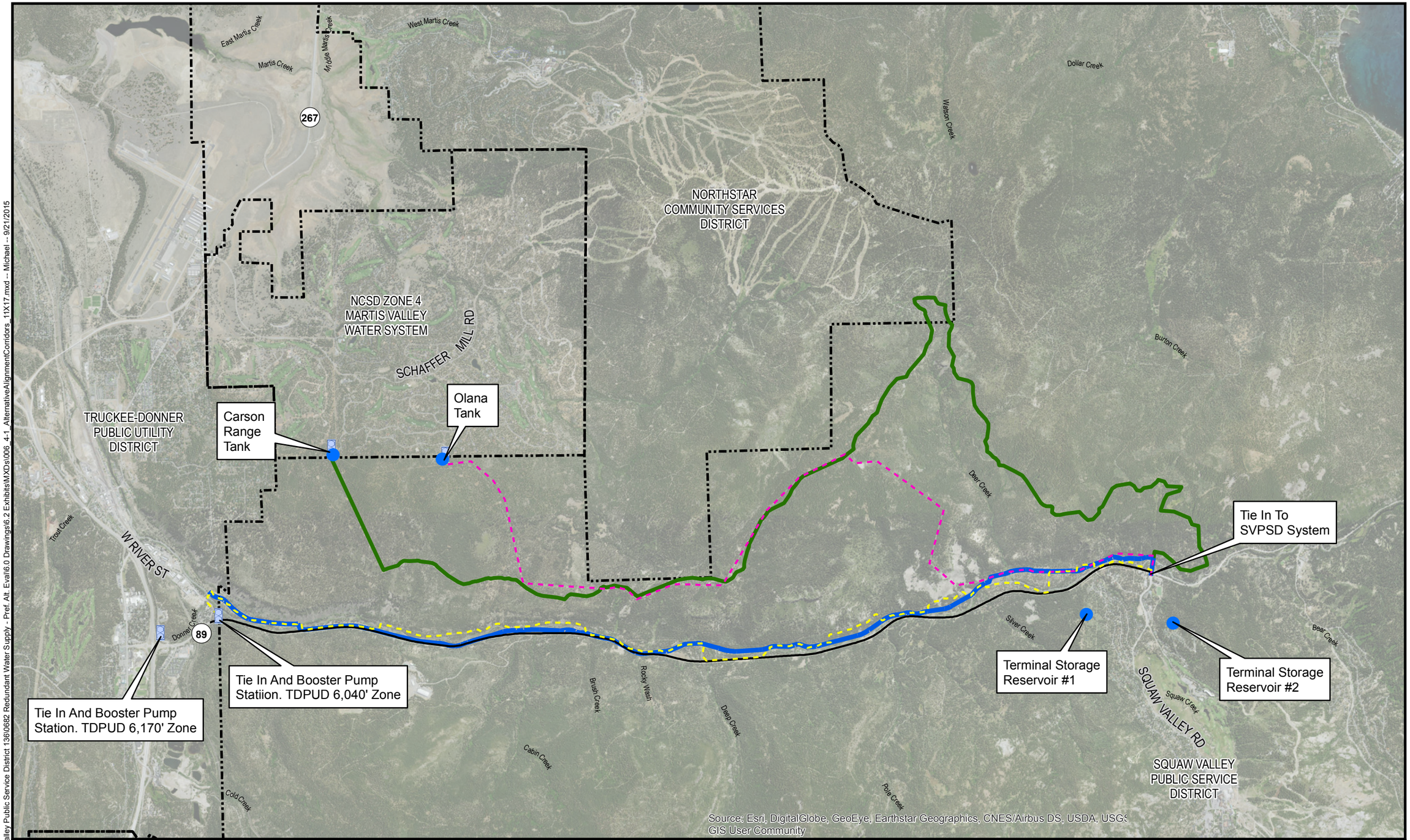
Permanent Easements

Due to the importance of easements, the probability of obtaining an easement becomes "Critical" to the feasibility of a tank site. Public entities, federal or state, are typically considered preferable to that of private land owners since they commonly deal in the granting of easements as opposed to private land owners. An existing easement is also preferred as it sets a precedent for this project to obtain an easement as well. Tank sites that are tied to the acquisition of a private easement will rank lower than those which do not.

Temporary Construction Easements

Temporary construction easements will be required to account for materials staging and equipment access during construction. It is not feasible to require a contractor to stay within the footprint of the permanent easement as the permanent width is sized for long term operation and maintenance activities. This evaluation will prioritize the type of owner, public or private, with whom the

easement is secured and will reward a shorter length of temporary easement over a longer one. This subcriteria carries “Less Than Important” weight in the overall evaluation due to the fact that all tank site alternatives will likely be equally scored in this category.



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LEGEND

- Storage Reservoir
- Booster Pump Station
- Bike Path Alignment
- Powerline Alignment
- USFS 06 Alignment
- Highway 89 Alignment
- TTSA TRI Alignment
- Water Purveyor Boundary

0 2,000 4,000 Feet

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SQUAW VALLEY PUBLIC SERVICE DISTRICT

REDUNDANT WATER SUPPLY - PREFERRED ALTERNATIVE EVALUATION PROJECT
PHASE 3 - FEASIBILITY STUDY UPDATE

SHEET TITLE:
ALTERNATIVE
ALIGNMENT CORRIDORS

FIGURE NUMBER:
4-1

P:\Client Projects\Squaw Valley Public Service District 136\0682 Redundant Water Supply - Pref. Alt. Eval\6.0 Drawings\6.2 Exhibits\MXDs\004_3-2_ExistingWells_PossibleLocations(ALT)_11X17.mxd -- Michael -- 10/19/2015

Trout Creek
Donner Creek
Cold Creek
Cabin Creek
Brush Creek
Rocky Wash
Martis Creek
East Martis Creek
West Martis Creek
Middle Martis Creek
Martis Camp Creek

80
89
267

Schaffer Mill #1
Schaffer Mill #4
Schaffer Mill #3
Lahontan Irrigation #1
Lahontan Irrigation #2
Lahontan #1
Lahontan #2
Martis Camp Irrigation #1
Siller Ranch #1
Martis Camp Irrigation #2

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

LEGEND

- Well Locations
- Water Purveyor Boundary
- Martis Valley Groundwater Basin

Potential Well Areas

- A
- B
- C
- D

0 1,000 2,000 Feet

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SQUAW VALLEY PUBLIC SERVICE DISTRICT

REDUNDANT WATER SUPPLY - PREFERRED ALTERNATIVE EVALUATION PROJECT
PHASE 3 - FEASIBILITY STUDY UPDATE

SHEET TITLE: EXISTING MVGB WELLS AND POSSIBLE PRODUCTION WELL LOCATIONS

FIGURE NUMBER: 3-2