CITY OF NEEDLES

## UPPER ZONE RESERVOIR SITING STUDY DRAFT

**PREPARED BY:** TKE ENGINEERING 5-23-2023

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#### **1.0 INTRODUCTION**

The purpose of this report is to evaluate existing site conditions, development feasibility and constraints, and preliminary cost for the construction and installation of a new potable water reservoir in City of Needles (City); more specifically, within the City's upper pressure zone. The existing fire flow capacity in the culinary water system upper zone are not able meet the requirements for proposed developments in the area. As such, the City desires to evaluate potential site locations for the new reservoir. Site considerations for each option includes soils, drainage, elevation, land ownership, constructability, cost, and performance. The following sections include the background of the City's existing culinary water system, location alternatives for a new reservoir, evaluations of each alternative, and a conclusion on the recommended alternative based on the findings presented herein.

#### 2.0 BACKGROUND

The City's existing culinary water system consists of two pressures zones, an upper and lower pressure zone. All culinary water is currently supplied by Well No. 15, located at the low end of the lower zone. In addition, the City is in the process of rehabilitating Well No. 11, also in the low zone, and adding a water treatment system to bring the well back online. The Lillyhill Booster Station delivers water from the low zone into a pair of reservoirs at the west end of the system to serve the high zone. The existing upper zone storage tanks have a combined capacity of 1.6 million gallons (MG); with one 1.5 MG tank and one 0.1 MG tank. The main purpose of the 0.1 MG tank is for emergency and relief service; allowing for the larger tank to undergo periodic maintenance and repairs. The existing upper reservoirs have a floor elevation of approximately 760 feet above sea level.

According to the hydraulic modeling completed as part of the City's 2019 Culinary Water Capital Facilities Master Plan (2019 Master Plan), all nodes tested in the Upper Zone for California Fire Code flow analysis resulted in failures. The Master Plan noted that while the Upper Zone has sufficient storage capacity to meet current average daily demand, it did not meet fire flow pressure requirements, with several areas registering negative pressures. This is concerning as it could potentially lead to contamination in the culinary system and inability to fight fires.

One area in particular, the Gates Subdivision development area located on the far east side and higher end of the upper pressure zone, exhibited these deficiencies. The existing transmission and distribution piping between the existing upper zone reservoirs and the Gates Subdivision is more than 3 miles in length and ranges from 6 inches to 12 inches in diameter. The Master Plan found that these pipeline constrictions are also contributing to the pressure deficiencies in the upper zone.

As such, the master plan concluded that providing 1.25 MG of additional storage to the Upper Zone near the Gates Subdivision is a high priority; as well as upsizing the existing Lillyhill Booster Pump Station and select portions of the existing upper zone waterlines.

#### **3.0 POTENTIAL RESERVOIR SITES**

A detailed description of each potential reservoir site location is provided below. Each description contains a preliminary geological siting investigation, as well as flood zone potential and expected site development requirements. All three sites were selected due to their proximity to existing reservoir floor elevation of 760 feet to be able to match the existing upper zone hydraulics. **Figure 1** highlights the location for all three site alternatives.

Of note, the City owns a disassembled 1.5 MG bolted steel tank with a standing height of 24 feet. However, as presented in the Master Plan, the tank is not an ideal candidate for new upper zone storage as the existing height of the upper zone reservoirs are 40 feet. As such, it's not included in this analysis.

#### Potential Upper Reservoir Site 1:

Site 1 is located approximately 2,800 feet west along the prolongation of Schulz Road. According to the Geologic Map of Needles 7.5' Quadrangle, as shown in **Figure 2**, the proposed project location lies upon soil comprised of map units Qao, which is an older intermediate-age piedmont gravel from the upper and (or) middle Pleistocene Era. As seen in **Figure 3**, this area is located on an inactive alluvial fan that is not prone to flooding. Construction of a reservoir in this location would require the construction of approximately 3,200 feet of access road, with access coming from Schulz Road, as well as about 3,200 feet of 16" waterline to connect the proposed reservoir to the existing upper zone distribution system. As shown in **Figure 4**, the proposed site is located in a large undivided parcel of government land, with a Assessor Parcel Number (APN) 650-291-01. This location is straddled by the 760-foot contour line to require minimal grading for the site pad. The closest existing power pole is located at the end of Schulz Road and would require an extension of the electrical line of approximately 3,000 feet.





Figure 2: Reservoir Alternative Locations on USGS Geologic Map of Needles 7.5' Quadrangle, California and Arizona



**Figure 3:** Reservoir Alternative Locations on the USGS Map of Needles 7.5' quadrangle, showing distribution of flood-prone, potentially flood-prone, and not flood-prone areas mapped on basis of geologic mapping.



**Figure 4:** Reservoir Alternative Location 1 (Site 1) on the San Bernardino County Assessor Map, Aerial View.

**Figure 5** shows the potential site access and layout including the proposed access road, site pad, transmission line, and electrical. The proposed 73' diameter storage reservoir is located along the 760' contour line, therefore the extents of the 125' by 125' building pad would require very minimal grading. Access to the site would include a 12' wide graded access road, leading from the end of the existing Schulz Road to the proposed site. In addition, the proposed 16" water main that would follow the centerline of the access road; with the proposed overhead electrical line that would need to be extended from the existing line at the end of Schulz Road. Due to its relatively remote location, the City may consider solar power for on-site electrical needs (i.e., SCADA, lighting, grounding, etc.).



SCALE: 1" = 100 FEET





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#### CITY OF NEEDLES FIGURE 6 SITE 1 CONCEPTUAL SITE PLAN

#### Potential Upper Reservoir Site 2:

Site 2 is located between mile marker 55 and 56 along U.S. Route 95, approximately 2,000 feet west of the roadway. According to the Geologic Map of Needles 7.5' Quadrangle, as shown in **Figure 2**, the proposed project location lies upon soil comprised of map units QTas, which is a boulder conglomerate from the Sacramento Mountains. As seen in **Figure 3**, this area is located on an inactive alluvial fan that is not prone to flooding. Construction of a reservoir in this location would require the construction of approximately 2,900 feet of access road, as well as 7,700 feet of 16" waterline to connect the proposed reservoir to the existing upper zone distribution system near the Gates Subdivision. As shown in **Figure 6**, the proposed site is located on a large undivided parcel of government land, with the APN 650-291-14. The proposed Site 2 is located near the 760-foot contour line to require minimal grading for the proposed site pad. The closest existing power pole is located to the East within an easement belonging to Sothern California Edison (SCE) and would require an extension of the electrical line of approximately 5,100 feet.

**Figure 7** shows the potential site access and layout including the proposed access road, site pad, transmission line, and electrical. The proposed 73' diameter storage reservoir is located along the 760' contour line, therefore the extents of the 125' by 125' building pad would require minimal grading; however, due to its location near steep slopes, there will be areas of grading stretching up to 30 feet from the edge of the site pad. Access to the site would include a 12' wide graded access road, leading from U.S. Route 95 to the proposed site. In addition, the proposed 16" water main that would follow the centerline of the access road; with the proposed overhead electrical line that would need to be extended from the existing line approximately 2,300 feet east of U.S. Route 95. at the end of Schulz Road. As noted on Site 1, due to its relatively remote location, the City may consider solar power for on-site electrical needs (i.e., SCADA, lighting, grounding, etc.).



Figure 6: Reservoir Alternative Location 2 on the San Bernardino County Assessor Map, Aerial View.





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#### CITY OF NEEDLES FIGURE 7 SITE 2 CONCEPTUAL SITE PLAN

#### Potential Upper Reservoir Site 3:

Similar to Site 2, Site 3 is located between mile marker 55 and 56 along U.S. Route 95. However, in lieu of constructing a 2,900 foot access road, an elevated site pad would be constructed adjacent to U.S. Route 95. According to the Geologic Map of Needles 7.5' Quadrangle, as shown in **Figure 2**, the proposed project location lies upon soil comprised of map units QTas, which is a boulder conglomerate from the Sacramento Mountains. As seen in Figure 3, this area is located on an inactive alluvial fan that is not prone to flooding. Construction of a reservoir in this location would require the construction of 4,800 feet of waterline to connect the proposed reservoir to the existing upper zone distribution system near the Gates Subdivision. Compared to Site 2, this alternative would shortens the required transmission line by nearly 3,000 feet. As shown in Figure 8, the proposed site is located in a large undivided parcel of government land, with the APN 650-291-03. This location is on the 710-foot contour line, which would require the construction of an elevated pad of approximately 40-50 feet in elevation. The closest existing power pole is located to the East within an easement belonging to SCE and would require an extension of the electrical line of approximately 2,600 feet.

**Figure 9** shows the potential site access and layout including the proposed access road, elevated site pad, transmission line, and electrical. The proposed 73' diameter storage reservoir is not located along the 760' contour line; thus, the extents of the 125' by 125' building pad requires substantial grading, with areas of grading stretching up to 100' from the edge of the pad. Access to the site would include a 640 foot long and 12' wide graded access road with a maximum slope of 10%, leading from U.S. Route 95 to the proposed site. In addition, the proposed 16" water main that would follow the centerline of the access road; with the proposed overhead electrical line that would need to be extended from the existing line approximately 2,300 feet east of U.S. Route 95. As noted on Site 1, due to its relatively remote location, the City may consider solar power for on-site electrical needs (i.e., SCADA, lighting, grounding, etc.).



Figure 8: Reservoir Alternative Location 3 on the San Bernardino County Assessor Map, Aerial View.





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### CITY OF NEEDLES

FIGURE 9 SITE 3 CONCEPTUAL SITE PLAN

### 4.0 ALTERNATIVES EVALUATION

With the cost of construction for all on-site reservoir construction similar for each site, the primary differences come down to proximity to the existing roadway, earthwork, and proximity to existing 12" water mains for hydraulic efficiency.

Both Sites 1 and 2 are substantially off the existing roadway, in an undeveloped open space area. As such, they both require new access roads. This is required to meet the hydraulic needs for the Upper Pressure Zone (i.e., base reservoir elevation of 760'). Alternatively, Site 3 would require the shortest access road; however, it would require import of 142,000 cubic yards of dirt to construction of an elevated pad to meet the hydraulic requirements of the Upper Pressure Zone. Therefore, Sites 1 and 2 are more favorable with respect to site access.

All three Sites require 16" water mains to tie into the existing system, with Site 1 being the closest to the existing system at 3,200 feet. Sites 2 requires 7,700 feet and Site 3 requires 4,800 feet to 16" water main to reach the existing system. Additionally, all three sites require upsizing to the existing water mains to remove hydraulic restrictions. Site 1 would require the upsizing of approximately 2,500 feet of 6" waterline along Schulz Road and E. Spikes Road, 115 feet of 8" and 150 feet of 2" waterlines along E. Broadway Street, with an additional construction of 2,300 feet of waterline at Safari Drive. Sites 2 and 3 would require the upsizing of approximately 1,000 feet of 8" waterline, 150 feet of 2" waterline and the additional construction of 2,300 feet of et and 3 waterline at Safari Drive. While Site 1 requires 1,500 feet more upsizing, it will provide a grater benefit to the existing and future developed areas based on its location. Therefore, Sites 1 is most favorable with respect to water main improvements.

Preliminary cost estimates were developed for each site and included in **Appendix A**. A summary of alternative costs is presented below in **Table 1**.

Alternative Cost Summary										
Construction Admin., Design, Const. Total Project										
Description	Costs	Mgmt., & Insp. Costs	Cost							
Site 1	\$10,120,000	\$1,520,000	\$11,640,000							
Site 2	\$10,730,000	\$1,610,000	\$12,340,000							
Site 3	\$12,400,000	\$1,860,000	\$14,260,000							

Table 1								
Alternative	Cost	Summary						

Site 1 is the lowest cost alternative at \$11.64 million; over \$700,000 cheaper than Site 2 and \$2.6 million cheaper than Site 3. As described, Site 1 will require 2,900 linear feet of access road with approximately 60 feet of elevation gain, together with 3,200 linear feet of 16" waterline. The primary cost increases with Sites 2 and 3 are their distance (close to 5,000 linear feet) from the existing water system; thus requiring additional transmission main and pavement repair.

#### 5.0 CONCLUSION

Consistent with the 2019 Master Plan, the proposed reservoir shall have a 1.25 MG capacity. The proposed upper zone reservoir shall match the existing upper zone reservoirs in elevation and high-water level to maintain efficient system hydraulics. Therefore, the proposed 1.25 MG reservoir shall be 40 feet high with a 73 feet diameter. TKE recommends a welded tank with an internal mixing system. Based on the analysis presented herein, Site 1 is the preferred site due to the lower cost to develop compared to Sites 2 and 3.

The costs presented herein for the proposed upper zone reservoir are significantly higher than what was identified in the 2019 Master Plan. The 2019 Mater Plan included \$2,381,000 for the Upper Zone Reservoir, \$1,764,000 for the new transmission main from the new reservoir to Schultz Road, and \$964,000 to upsize 2,500 linear feet of waterlines in Shultz Road, Spikes Road, and E. Broadway Street. The total cost presented in the 2019 Master Plan of \$5.1 million is less than half of the proposed Site 1 Reservoir project presented herein at \$11.6 million.

It's been well documents that impacts of the Covid-19 pandemic and supply chain disruptions caused significant increases in material and labor costs between 2020 and 2022; with some reports identifying up to 40% increase in overall construction costs over this period (per a September 2022 report from Associated Builders & Contractors, Inc.). Thereafter, inflation impacts in 2022 and 2023 resulted in an additional 17% increase in construction costs per Engineering News-Record.

Additionally, this siting study includes a more in-depth analysis of developing a new reservoir site, with 2023 market pricing, than what was including in the previous planning document. For instance, the 2019 Master Plan identified 2,500 linear feet of waterline upsizing improvements, whereas over 5,000 linear feet will be required. In addition, the 2019 Master Plan did not include the cost of construction administration (estimated at 5% of construction costs).

Based on these factors, the cost presented in the 2019 Master Plan would escalate to approximately \$9.8 million, or to within 20% of the Site 1 Alternative costs presented herein.

Lastly, TKE evaluated a lower cost alternative for Site 1, including only the required improvements (i.e., deferring the cathodic protection, mixing system, tank drainage system, and on-site gravel to a later date), that brought Site 1 costs down by \$320,000. The City may elect to explore these and additional cost savings opportunities based on available budgets.

### **APPENDIX A** SITE ALTERNATIVE COST ESTIMATES

# City of Needles Upper Zone Reservoir Siting Study Engineers Estimate Site 1 Reservoir May 23, 2023

No.	Description	Quantity	Unit		Unit Cost		Amount
Genera							
1	Mobilization/Demobilization	1	LS	\$	420,000	\$	420,000
2	SWPPP, Best Management Practice and	1	LS	\$	25,000	\$	25,000
3	Trench Protection (Sheeting, Shoring, and	1	LS	\$	15.000	\$	15.000
J	Bracing) in accordance with CAL-OSHA	-	20	Ŧ	10,000	Ŧ	10,000
4	Traffic Control and Safety	1	LS	\$	25,000	\$	25,000
5	Utilities Verification (Potholing)	1	LS	\$	15,000	\$	15,000
Site In	Inrovements				Subiotal:	⇒	500,000
6	Clearing and Grubbing	1	LS	\$	25,000	\$	25,000
7	Access Road Earthwork, Excavation, and	21,356	CY	\$	12	\$	256,267
	Grading						
8	Design of Reservoir and Appurtenances	1	LS	\$	25,000	\$	25,000
9	Construct 1,250,000 Gallon Welded Steel	1	LS	\$	2,500,000	\$	2,500,000
	Access Manways Overflow Drain Hose Bibs						
	Pressure Transducer, Sampling Station,						
	Piping, Fittings, Valves, Connections,						
10	Testing and Disinfection	4	10		1 1 2 5 0 0 0		1 1 2 5 0 0 0
10	Construct Reservoir Concrete Foundation	1	LS	\$	1,125,000	\$	1,125,000
11	Furnish all labor materials and equipment	1	15	\$	25.000	\$	25.000
	to Install CorrPro Cathotic Protection System	_		т		т	
	······································						
12	Furnish all labor, materials, and equipment	1	LS	\$	1,250,000	\$	1,250,000
	to Coat the Tank Interior and Exterior						
13	Construct Reconvoir Inlat/Outlat Dining	1	15	¢	43.000	¢	43 000
15	System with 16" CMI &EC Steel Pine and	1	LJ	Ψ	45,000	₽	45,000
	Fittings, Valves, Connections, Thrust Blocks,						
	Expansion Joint, Testing, and Disinfection						
	p						
13.1	16" CML&EC Steel Pipe and Fittings	20	LF	\$	400	\$	8,000
13.2	16" Butterriy Valve	1	EA FA	\$ ¢	20,000	\$ ¢	20,000
14	Install Hydrodynamic Mixing System, Tide-	1	LA	<i>₽</i> \$	60.000	₽ \$	60.000
	Flex or Approved Equal	-	10	Ŧ	00,000	Ŧ	00,000
15	Construct Site Drainage Protection	1	LS	\$	25,000	\$	25,000
16	Construct Reservoir Drainage System with	1	LS	\$	72,000	\$	72,000
	Grated Inlet Catch Basin, 24" HDPE, 48"						
	Mannoles, Outlet Headwall and Energy						
16.1	Construct Energy Dissipator with 12"	1	LS	\$	10,000	\$	10,000
	Medium Rock Sized, 150 lbs, with Sand						
	Beddina						
16.2	Install 3'x4'x4' (LxWxD) Precast	1	LS	\$	15,000	\$	15,000
16.3	24" HDPE	100	1 F	¢	250	¢	25 000
16.4	48" Storm Drain Manhole	100	EA	\$	12,000	\$	12,000
16.5	48" Drop Inet Manhole	1	EA	\$	10,000	\$	10,000
17	Construct 8" CML&EC Steel Pipe and Fittings	50	LF	\$	200	\$	10,000
	for Reservoir Drain, including Connections to						
10	Catch Basin	1	10	÷	840.000	÷	840.000
10	including Thrust Blocks Valves Connections	1	LS	₽	840,000	₽	840,000
	Testing, and Disinfection						
18.1	16" PVC Pipe and Fittings	3,200	LF	\$	250	\$	800,000
18.2	16" Butterfly Valve	2	EA	\$	15,000	\$	30,000
18.3	Connect to Existing Walterline	1	EA	\$ ¢	<u>10,000</u>	\$ ¢	<u>10,000</u>
19	Strand Barbed Wire and 24' Double Swing	1	LJ	₽	55,000	₽	55,000
	Gate					L	
19.1	Construct 6' High Chain Link Fence	500	LF	\$	100	\$	50,000
19.2	Construct 6' Chain Link Swing Gate	1	EA	\$	5,000	\$	5,000
20	Construct 3/4" rock, 4" deep, with Weed	15,625	SF	\$	2.50	\$	39,063
21	Construct Off-Site Waterline Improvements	1	LS	\$	1,580.050	\$	1,580.050
	with 12" PVC Pipe and Fittings, including	-		T	_,_00,000	Ŧ	_,_ 30,000
	Thrust Blocks, Valves, Connections, Testing,						
26.4	and Disinfection	E 6 6 5 5					1 265 255
21.1	12" PVC Pipe and Fittings	5,065	LF	\$ ¢	12 500	\$ ¢	1,266,250
21.2	Water Service Tie-Overs	15	FA	⊅ \$	2 500	\$ \$	37 500
21.4	Connect to Existing Walterline	5	EA	\$	10,000	\$	50,000
21.5	Construct 3" Asphalt Concrete	25,325	SF	\$	4.00	\$	101,300
	Pavement on 4" Class II Aggregate						
	Base				CrikTatal	*	7 030 370
L			C	stru	SUDIOTAI:	¢	8 430 379
		Constru	uction Cor	ntina	encies (20%):	.₽ \$	1,686.076

Construction Total: \$ 10,116,455 Administration, Design, CM, Insp., Materials Testing (15%): <u>\$ 1,517,468</u> Rounded Project Total: \$ 11,640,000

# City of Needles Upper Zone Reservoir Siting Study Engineers Estimate Site 2 Reservoir May 23, 2023

No.	Description	Quantity	Unit		Unit Cost		Amount
Genera	al Mobilization (Domobilization	4		¢	445.000	ć	445 000
2	SWPPP Best Management Practice and	1	LS	\$ ¢	445,000 25 000	\$	445,000
2	NPDES Requirements, PM10	-	LJ	Ψ	25,000	Ψ	25,000
3	Trench Protection (Sheeting, Shoring, and	1	LS	\$	15,000	\$	15,000
	Bracing) in accordance with CAL-OSHA						
- 1		1		*	25.000	<i>*</i>	25.000
4	Iraffic Control and Safety	1		\$ ¢	25,000	\$	25,000
	ounces vernication (Fotholing)			φ	SubTotal:		525.000
Site In	nprovements						
6	Clearing and Grubbing	1	LS	\$	25,000	\$	25,000
7	Access Road Earthwork, Excavation, and	4,772	CY	\$	12	\$	57,267
8	Grading Design of Reservoir and Appurtenances	1	15	\$	25 000	\$	25 000
9	Construct 1,250,000 Gallon Welded Steel	1	LS	\$	2,500,000	\$	2,500,000
	Reservoir, including Tank, Ladder, Stairway,					· ·	
	Access Manways, Overflow Drain, Hose Bibs,						
	Pressure Transducer, Sampling Station,						
	Piping, Fittings, Valves, Connections,						
10	Construct Reservoir Concrete Foundation	1	LS	\$	1,125,000	\$	1,125,000
	(Ring Wall)						
11	Furnish all labor, materials, and equipment	1	LS	\$	25,000	\$	25,000
	to Install CorrPro Cathotic Protection System						
12	Furnish all labor, materials, and equipment	1	LS	\$	1,250.000	\$	1,250.000
	to Coat the Tank Interior and Exterior	-		-	_,_00,000	7	_,,00,000
13	Construct Reservoir Inlet/Outlet Piping	1	LS	\$	43,000	\$	43,000
	System with 16" CML&EC Steel Pipe and						
	Fittings, Valves, Connections, Inrust Blocks,						
	Expansion Joint, Testing, and Disinfection						
13.1	16" CML&EC Steel Pipe and Fittings	20	LF	\$	400	\$	8,000
13.2	16" Butterfly Valve	1	EA	\$	15,000	\$	15,000
13.3	Install Hydrodynamic Mixing System Tide-	1	LS EA	\$	60,000	\$	60,000
14	Flex or Approved Equal	-	LJ	Ψ	00,000	Ψ	00,000
15	Construct Site Drainage Protection	1	LS	\$	25,000	\$	25,000
16	Construct Reservoir Drainage System with	1	LS	\$	72,000	\$	72,000
	Grated Inlet Catch Basin, 24" HDPE, 48"						
	Manholes, Outlet Headwall and Energy						
16.1	Construct Energy Dissipator with 12"	1	LS	\$	10,000	\$	10,000
	Medium Rock Sized, 150 lbs, with Sand						
16.2	Beddina		10	-	15.000	4	15.000
16.2	Install 3'x4'x4' (LxWxD) Precast	1	LS	\$	15,000	\$	15,000
16.3	24" HDPE	100	LF	\$	250	\$	25.000
16.4	48" Storm Drain Manhole	1	EA	\$	12,000	\$	12,000
16.5	48" Drop Inet Manhole	1	EA	\$	10,000	\$	10,000
17	Construct 8" CML&EC Steel Pipe and Fittings	50	LF	\$	200	\$	10,000
	for Reservoir Drain, including Connections to						
18	Construct 16" PVC Pipe and Fittings,	1	LS	\$	2,091,000	\$	2,091,000
	including Thrust Blocks, Valves, Connections,	_		т	_,,	Ŧ	_,
	Testing, and Disinfection						
18.1	16" PVC Pipe and Fittings	7,700	LF	\$	250	\$	1,925,000
18.2	16" BUTTERTIV VAIVE	4	EA EA	\$ ¢	10,000	\$	10 000
18.4	Construct 3" Asphalt Concrete	24,000	SF	\$	4.00	\$	96.000
	Pavement on 4" Class II Aggregate	,					,
	Base						
19	Construct 6' High Chain Link Fencing with 3-	1	LS	\$	55,000	\$	55,000
	Strand Barbed Wire and 24' Double Swing						
19.1	Construct 6' High Chain Link Fence	500	LF	\$	100	\$	50.000
19.2	Construct 6' Chain Link Swing Gate	1	EA	\$	5,000	\$	5,000
20	Construct 3/4" rock, 4" deep, with Weed	15,625	SF	\$	2.50	\$	39,063
21	Barrier	1	10	*	1 000 000	*	1 000 000
21	with 12" PVC Pipe and Fittings including	1	LS	≯	1,009,000	≯	1,009,000
	Thrust Blocks, Valves, Connections, Testing						
	and Disinfection						
21.1	12" PVC Pipe and Fittings	3,450	LF	\$	250	\$	862,500
21.2	12" Gate Valve	4	EA	\$	12,500	\$	50,000
21.3	Connect to Existing Walterline	2	ΕA FΔ	\$ \$	2,500	\$	20.000
21.5	Construct 3" Asphalt Concrete	17,250	SF	\$	4.00	\$	69,000
	Pavement on 4" Class II Aggregate	,					,
	Base					<u> </u>	
L			<b>C</b>	otres -	SubTotal:	\$	8,411,329
		Constru	uction Cor	ntina	encies (20%)	¢ ¢	0,329
		constru		Cons	truction Total:	- ¢	10 723 595

Administration, Design, CM, Insp., Materials Testing (15%): \$ 1,608,539 Rounded Project Total: \$ 12,340,000

# City of Needles Upper Zone Reservoir Siting Study Engineers Estimate Site 3 Reservoir May 23, 2023

No.	Description	Quantity	Unit		Unit Cost		Amount
Genera	al Mobilization / Demobilization	4		*	E10.000	+	E10.000
1 2	SWPPP, Best Management Practice and	11	LS	\$ \$	25 000	\$	25 000
Ĺ	NPDES Requirements. PM10	1	23	٩	23,000	₽	25,000
3	Trench Protection (Sheeting, Shoring, and	1	LS	\$	15,000	\$	15,000
1	Bracing) in accordance with CAL-OSHA		1	1		1	
4	Traffic Control and Safety	1	19	¢	22 000	¢	25 000
5	Utilities Verification (Potholing)	1	LS	\$	15.000	.₽ \$	15.000
					SubTotal:	\$	590,000
Site In	nprovements						
6	Clearing and Grubbing	1 142 200	LS	\$	15,000	\$	15,000
	Excavation, and Grading	172,300	Cr	₽	15	P	2,134,300
8	Design of Reservoir and Appurtenances	1	LS	\$	25,000	\$	25,000
9	Construct 1,250,000 Gallon Welded Steel	1	LS	\$	2,500,000	\$	2,500,000
	Reservoir, including Tank, Ladder, Stairway,		1	1			
	Pressure Transducer, Sampling Station		1	1			
	Piping, Fittings, Valves, Connections,		1	1			
10	Testing and Disinfection	1	10	*	1 135 000	*	1 135 000
10	Construct Reservoir Concrete Foundation	Ţ	LS	\$	1,125,000	\$	1,125,000
11	Furnish all labor, materials, and equipment	1	LS	\$	25,000	\$	25,000
	to Install CorrPro Cathotic Protection System		1			. 	
10	Eurnich all labor materials and environ	1		*	1 350 000	*	1 350 000
12	to Coat the Tank Interior and Exterior	T	LS	≯	1,250,000	≯	1,200,000
		L					
13	Construct Reservoir Inlet/Outlet Piping	1	LS	\$	43,000	\$	43,000
	System with 16" CML&EC Steel Pipe and		1	1			
	Expansion Joint, Testing, and Disinfection		1	1			
	,			L		-	
13.1	16" CML&EC Steel Pipe and Fittings	20	LF	\$ ¢	400	\$ ¢	8,000
<u>13.2</u>	Flex-Tend Expansion Joint	1	EA	\$	20,000	\$	20,000
14	Install Hydrodynamic Mixing System, Tide-	1	LS	\$	60,000	\$	60,000
1 -	Flex or Approved Equal		10	*	25.000	+	25.000
15 16	Construct Site Drainage Protection	1	LS	\$ \$	25,000 72 000	\$	25,000 72 000
	Grated Inlet Catch Basin, 24" HDPE, 48"	-		*	, 2,000	4	. 2,000
	Manholes, Outlet Headwall and Energy		1	1		1	
16.1	Construct Energy Dissingtor with 12"	1	15	¢	10 000	¢	10.000
	Medium Rock Sized, 150 lbs, with Sand			Ŷ	20,000	Ť	10,000
	Beddina						
16.2	Install 3'x4'x4' (LxWxD) Precast	1	LS	\$	15,000	\$	15,000
16.3	24" HDPE	100	LF	\$	250	\$	25.000
16.4	48" Storm Drain Manhole	1	EA	\$	12,000	\$	12,000
16.5	48" Drop Inet Manhole	1	EA	\$	10,000	\$	10,000
17	for Reservoir Drain, including Connections	50	LF	\$	200	\$	10,000
	Catch Basin		<u> </u>	L			
18	Construct 16" PVC Pipe and Fittings,	1	LS	\$	1,351,000	\$	1,351,000
	Including Thrust Blocks, Valves, Connections,		1	1		1	
18.1	16" PVC Pipe and Fittinas	4.800	LF	\$	250	\$	1,200.000
18.2	16" Butterfly Valve	3	EA	\$	15,000	\$	45,000
18.3	Connect to Existing Walterline	1	EA	\$	10,000	\$	10,000
18.4	Construct 3" Asphalt Concrete	24,000	SF	\$	4.00	\$	96,000
	Base Base						
19	Construct 6' High Chain Link Fencing with 3-	1	LS	\$	55,000	\$	55,000
	Strand Barbed Wire and 24' Double Swing		1	1		1	
19.1	Construct 6' High Chain Link Fence	500	LE	\$	100	\$	50.000
19.2	Construct 6' Chain Link Swing Gate	1	EA	\$	5,000	\$	5,000
20	Construct 3/4" rock, 4" deep, with Weed	15,625	SF	\$	2.50	\$	39,063
21	Construct Off-Site Waterline Improvements	1	15	\$	1.009.000	¢	1,009,000
	with 12" PVC Pipe and Fittings, including	÷		*	_,,	۳	_,000,000
	Thrust Blocks, Valves, Connections, Testing,		1	1			
21.1	and Disinfection	3 150	15	¢	250	¢	862 500
21.1	12 FVC Fipe and Fittings 12" Gate Valve	4	EA	⊅ \$	12.500	⊅ _\$	50,000
21.3	Water Service Tie-Overs	3	EA	\$	2,500	\$	7,500
21.4	Connect to Existing Walterline	2	EA	\$	10,000	\$	20,000
21.5	Construct 3" Asphalt Concrete Pavement on 4" Class II Aggregate	17,250	SF	\$	4.00	\$	69,000
	Base						
					SubTotal:	\$	9,738,563
		Constru	Con uction Con	struc	tion Subtotal:	\$ ¢	10,328,563
	Construction Contingencies (20%):						2,005,/13

Administration, Design, CM, Insp., Materials Testing (15%): <u>\$ 1,859,141</u> Rounded Project Total: \$ 14,260,000

# City of Needles Upper Zone Reservoir Siting Study Engineers Estimate Site 1 Reservoir - REDUCED May 23, 2023

No.	Description	Quantity	Unit		Unit Cost		Amount
Genera							
1	Mobilization/Demobilization	1	LS	\$	410,000	\$	410,000
2	SWPPP, Best Management Practice and	1	LS	\$	25,000	\$	25,000
2	NPDES Requirements, PM10			*	15 000	÷	15.000
3	Trench Protection (Sneeting, Shoring, and	1	LS	\$	15,000	\$	15,000
	Bracing) in accordance with CAL-OSHA						
4	Traffic Control and Safety	1	15	\$	25.000	\$	25 000
5	Utilities Verification (Potholing)	1	15	\$	15.000	\$	15.000
	· · · · · · · · · · · · · · · · · · ·				SubTotal:	\$	490,000
Site In	nprovements						
6	Clearing and Grubbing	1	LS	\$	25,000	\$	25,000
7	Access Road Earthwork, Excavation, and	21,356	CY	\$	12	\$	256,267
	Grading						
8	Design of Reservoir and Appurtenances	1	LS	\$	25,000	\$	25,000
9	Construct 1,250,000 Gallon Welded Steel	1	LS	\$	2,500,000	\$	2,500,000
	Reservoir, including Tank, Ladder, Stairway,						
	Access Manways, Overflow Drain, Hose Bibs,						
	Pressure Transducer, Sampling Station,						
	Testing, and Disinfection						
10	Construct Reservoir Concrete Foundation	1	LS	\$	1,125,000	\$	1,125,000
	(Ring Wall)						
11	Furnish all labor, materials, and equipment	1	LS	\$	-	\$	-
	to Install CorrPro Cathotic Protection System						
12	Furnish all labor, materials, and equipment	1	LS	\$	1,250,000	\$	1,250,000
	to Coat the Tank Interior and Exterior						
12				*	42,000	÷	12 000
13	Construct Reservoir Inlet/Outlet Piping	1	LS	\$	43,000	\$	43,000
	System with 16" CML&EC Steel Pipe and						
	Fittings, Valves, Connections, Inrust Blocks,						
	Expansion Joint, Testing, and Disinfection						
13.1	16" CML&EC Steel Pipe and Fittings	20	LF	\$	400	\$	8.000
13.2	16" Butterfly Valve	1	EA	\$	15,000	\$	15,000
13.3	Flex-Tend Expansion Joint	1	EA	\$	20,000	\$	20,000
14	Install Hydrodynamic Mixing System, Tide-	1	LS	\$	-	\$	-
	Flex or Approved Equal						
15	Construct Site Drainage Protection	1	LS	\$	-	\$	-
16	Construct Reservoir Drainage System with	1	LS	\$	-	\$	
	Grated Inlet Catch Basin, 24" HDPE, 48"						
	Manholes, Outlet Headwall and Energy						
16.1	Dissipator Construct Energy Dissipator with 12"	1	15	¢	_	¢	_
10.1	Medium Rock Sized 150 lbs with Sand	1	25	Ψ		Ψ	
	Redding						
16.2	Install 3'x4'x4' (LxWxD) Precast	1	LS	\$	-	\$	-
	Concrete Catch Basin with Grate Inlet						
16.3	24" HDPE	100	LF	\$	-	\$	-
16.4	48" Storm Drain Manhole	1	EA	\$	-	\$	-
16.5	48" Drop Inet Manhole	1	EA	\$	-	\$	-
17	Construct 8" CML&EC Steel Pipe and Fittings	50	LF	\$	200	\$	10,000
	for Reservoir Drain, including Connections to						
10	Catch Basin	1	10	*	840.000	÷	840.000
10	including Thrust Blocks Valves Connections	T	LS	⇒	640,000	Þ	640,000
1	Testing and Disinfection			1			
18.1	16" PVC Pipe and Fittinas	3,200	LF	\$	250	\$	800.000
18.2	16" Butterfly Valve	2	EA	\$	15,000	\$	30,000
18.3	Connect to Existing Walterline	1	EA	\$	10,000	\$	10,000
19	Construct 6' High Chain Link Fencing with 3-	1	LS	\$	55,000	\$	55,000
1	Strand Barbed Wire and 24' Double Swing			1			
10.1	Gate	500					F0 00-
19.1	Construct 6' High Chain Link Fence	500	LF	\$	100	\$	50,000
19.2	Construct 6' Chain Link Swing Gate	15.625	EA	\$	5,000	\$	5,000
20	Barrier	13,023	эг	\$	-	⊅	-
21	Construct Off-Site Waterline Improvements	1	LS	\$	1,580.050	\$	1.580.050
	with 12" PVC Pipe and Fittings including	-		*	1,000,000	*	2,000,000
1	Thrust Blocks, Valves, Connections, Testing			1			
L	and Disinfection						
21.1	12" PVC Pipe and Fittings	5,065	LF	\$	250	\$	1,266,250
21.2	12" Gate Valve	10	EA	\$	12,500	\$	125,000
21.3	Water Service Tie-Overs	15	EA	\$	2,500	\$	37,500
21.4	Connect to Existing Walterline	5	ËA	\$	10,000	\$	50,000
21.5	Construct 3" Asphalt Concrete	25,325	SF	\$	4.00	\$	101,300
	Pavement on 4" Class II Aggregate						
	<i>⊭ase</i>				SubTotal	¢	7 709 317
L			Cor	stru	tion Subtotal	\$	8.199.317
		Constr	uction Co	ntina	encies (20%):	ŝ	1,639.863

Construction Total: \$ 9,839,180 Administration, Design, CM, Insp., Materials Testing (15%): \$ 1,475,877 Rounded Project Total: \$ 11,320,000