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1. Introduction and Purpose

This technical memorandum (TM) is a supplement to the previously submitted *Post-Construction Land Reclamation TM* (DCA 2021a). DCA (2021a) was prepared to address planned land reclamation steps for project sites associated with the Central and Eastern corridors of the Delta Conveyance Project (project) but is being supplemented to include elements of the project Bethany Reservoir Alternative that were not previously evaluated.

The Bethany Reservoir Alternative alignment is similar to the Eastern corridor alignment from the intake sites along the Sacramento River to the Lower Roberts Island tunnel shaft site. From there, the Bethany Reservoir Alternative alignment diverges south from the Eastern corridor alignment to maintenance shafts on Upper Jones Tract and Union Island, and a tunnel reception shaft at the Bethany Reservoir Pumping Plant (BRPP) and Surge Basin located on the southern side of Byron Highway, east of Mountain House Road. The Bethany Reservoir Alternative would not include a Southern Forebay and would instead deliver project water directly to Bethany Reservoir via buried pipelines from the BRPP to a discharge structure on the bank of Bethany Reservoir.

The Twin Cities Complex and Lower Roberts Island sites were reconfigured from the original Eastern corridor option for the Bethany Reservoir Alternative to accommodate only two tunnel launch locations for the entire project and to eliminate the offsite transport and mechanical drying of reusable tunnel material (RTM) at the Twin Cities site. For the Bethany Reservoir Alternative, both the Twin Cities Complex and Lower Roberts Island would be used as double launch locations for tunnel boring machines (TBMs) boring in two directions. These two sites are included in this TM based on differences in RTM handling, as well as the total site size, permanent RTM stockpile size and location, and borrow areas associated with the Bethany Reservoir Alternative, as discussed in the *Soil Balance and Reusable Tunnel Material Supplement – Bethany Reservoir Alternative TM* (DCA 2021b).

This supplemental evaluation of postconstruction land reclamation for the Bethany Reservoir Alternative considers a range of site conditions that would vary, depending on the project design capacities of 3,000, 4,500, 6,000, and 7,500 cubic feet per second (cfs). This TM only considers sites that are new or altered for the Bethany Reservoir Alternative as compared to the Eastern corridor option, so project features unchanged from the Central and Eastern Corridor *Post-Construction Land Reclamation TM* (DCA 2021a) will not be repeated. The proposed treatments, equipment types, and equipment production rates used to estimate the required equipment, duration, and vehicle traffic associated with site reclamation in this TM are identical to those used in DCA (2021a) and will not be repeated. This evaluation of

post-construction land reclamation activities and effort is based on concept-level designs and would be subject to refinement during future stages of design.

1.1 Organization

This TM is organized as follows:

- Methodology
- Overview of Project Sites
- Preliminary Site Reclamation Plan
- References
- Document History and Quality Assurance

2. Methodology

The following methodology was used to evaluate and determine the appropriate post-construction treatments for temporary construction areas:

- Review existing site conditions to determine what the land is currently used for (for example, agricultural use, crop type, or natural habitat) at each site.
- Review temporary construction areas at each site location to determine quantity and extent of temporary construction impacts to the land to inform what reclamation actions would be required.
- Determine the desired end land-use at each site and recommend treatments and required equipment to reclaim sites to desired end-use.
- Calculate the equipment demand and on-road truck and commuter traffic and estimate the duration of the reclamation work for each site.

This methodology is the same as was described in the *Post-Construction Land Reclamation TM* (DCA 2021a).

3. Overview of Project Sites

The Bethany Reservoir Alternative would consist of four major site types. Note, smaller sites with temporary construction areas of less than 5 acres are not currently considered for post-construction reclamation. Examples of temporary construction areas that are smaller than 5 acres are the maintenance and reception shaft sites and the Bethany Reservoir Discharge Structure site. This section provides a general overview of the types of sites that would require post-construction reclamation. Section 4.2 describes the specific elements of each site in more detail.

The four major site types that would be considered for post-construction reclamation are as follows:

 Intakes: Up to three intakes would be constructed at the northern end of the tunnel. These intakes would include intake and control structures, sedimentation basins, and vertical shafts to divert water from the Sacramento River into the tunnel. Two intake fish screen types were selected for further consideration: (1) vertical flat plate screens and (2) cylindrical tee screens. The size of the temporary construction area would vary slightly, depending on the type of fish screen used at each intake. The option requiring the larger post-construction reclamation area was used at each intake for this analysis. Post-Construction Land Reclamation Supplement – Bethany Reservoir Alternative (Final Draft)

- 2) Launch Shaft Sites: Two tunnel launch shafts that serve as locations to assemble and launch the TBMs: (1) Twin Cities Complex and (2) Lower Roberts Island. Both sites would include double-tunnel launch shafts for tunnel drives in both the north and south directions. Excavated material from the tunnel bore, RTM, would be brought to the surface through these shafts, processed, and stockpiled onsite. As a result, these sites require several hundred acres for temporary use for equipment, supplies, offices, parking, borrow, and RTM handling, filling, and storage. Permanent features would include elevated shaft pads, access roads, and RTM stockpiles.
- 3) BRPP and Surge Basin: The BRPP would be used to convey water to Bethany Reservoir via the Bethany Reservoir Aqueduct (Aqueduct). An associated Surge Basin would be required to contain flow from a hydraulic surge event in the main tunnel during operations. Surge tanks would be used to manage hydraulic surge within the Aqueduct pipelines. To calculate reclamation areas in this TM, the BRPP and Surge Basin site would also include the areas for connections to the Central Valley Project (CVP) C.W. "Bill" Jones (Jones) Pumping Plant through the Jones Discharge and Control Structures, which would be constructed only for the 7,500-cfs project design capacity. Note, for the 7,500-cfs project design capacity, reclamation areas associated with the pipeline between the BRPP and the Jones Discharge Structure are included with the BRPP and Surge Basin reclamation areas. The Surge Basin would also include a tunnel reception shaft that would function as an overflow shaft during operations. This reception shaft area is completely encapsulated in the area required for the land reclamation requirements. Temporary construction areas would include access roads, parking areas, facilities and trailers for owners, contractors, and crew. Permanent features would include the surge basin, BRPP, material stockpiles, and buildings for operations.
- 4) Bethany Reservoir Aqueduct: The Aqueduct would convey water from the BRPP to Bethany Reservoir (and for the project design capacity of 7,500 cfs, an additional pipeline would convey flows to the Jones Pumping Plant approach canal). The Aqueduct would consist of large-diameter pipelines, pressurized by the BRPP. The Aqueduct would use 180-inch-diameter welded steel pipe materials and would include multiple pipelines within the trench as a function of the design flow rate. The Aqueduct feeding Bethany Reservoir would range from two to four parallel 180-inch-diameter pipelines (specifically, two pipelines for the 3,000-cfs project design capacity, three pipelines for the 4,500-cfs project design capacity, and four pipelines for the 6,000-cfs and 7,500-cfs project design capacities [with the addition of a single 180-inch-diameter pipeline feeding the Jones Approach Channel for the 7,500-cfs project design capacity]). Note, for the 7,500-cfs project design capacity, the reclamation area associated with the pipeline between the BRPP and the Jones Discharge Structure is included with the reclaimed land identified for the BRPP and Surge Basin as summarized previously. Temporary construction areas would include access roads, parking areas, excavated material stockpiles, and facilities and trailers for owners and contractors. Permanent features would include the Aqueduct pipelines, pipeline appurtenant structures, grading at tunnel portals, and access roads.

Table 3-1 lists the specific project sites where post-construction land reclamation would be considered, organized from north to south. Figure 3-1 is a project overview map and identifies each of the project sites where reclamation work would be considered.

Table 3-1. Overview of Project Reclamation Sites for Bethany Reservoir Alternative

Intake 2

Intake 3

Intake 5

Twin Cities Double-launch Shaft Site

Lower Roberts Island Double Launch Shaft Site

BRPP and Surge Basin (includes Jones Discharge and Delta-Mendota Canal Control Structures and pipeline between BRPP and Jones Discharge Structure for 7,500-cfs option)

Bethany Reservoir Aqueduct

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Figure 3-1. Project Overview

4. Preliminary Site Reclamation Plan

4.1 Proposed Treatments

The near-surface native soil within the temporary construction areas could be compacted from construction equipment, consolidated beneath material stockpiles, or have properties less suitable for agriculture or habitat restoration due to construction activities. The main goals of the land reclamation efforts would be to restore the soil quality and condition, to the extent practical, in these temporary construction areas.

The temporary construction areas at each of the sites were separated into three cases: (1) native soil base, (2) RTM base, and (3) RTM stockpiles. The recommended treatments to reclaim each of the temporary construction areas would vary slightly depending on the base soil type. Based on the current and previous land uses at each of the sites, the reclamation treatments were tailored to return the land to conditions suitable for agricultural use or to be natural habitat areas planted with a mixture of native materials. RTM stockpiles would be seeded with grasses for erosion control and prepared so the stockpiles would be accessible for future use as borrow material. Refer to the *Post-Construction Land Reclamation TM* (DCA 2021a) for additional discussion of proposed land reclamation treatments by base soil type.

The land reclamation acreages at most sites would vary based on project design capacity, but not necessarily at all sites and not as a linear relationship between capacity and magnitude of reclamation. For instance, the temporary construction area at the Twin Cities Complex was assumed to be constant for all potential project design capacities based on the space required for managing RTM during construction, but the size of the post-construction site was adjusted based on varying RTM stockpile quantities. As such, a smaller post-construction site associated with a smaller project design capacity and associated smaller permanent RTM stockpile would result in a larger land reclamation area. Additionally, at the BRPP and Surge Basin, the stockpile acreages would be reduced slightly for the larger project design capacities to provide more space for the Aqueducts located adjacent to the stockpiles instead of based on project design capacity. Proposed site reclamation treatments discussed in the following sections would occur after completion of tunnel construction and do not include activities associated with drying and processing RTM or backfilling onsite borrow pits. Those activities would occur during tunnel boring and RTM processing and management operations, as described in the *Reusable Tunnel Material TM* (DCA 2021c).

4.2 Project Site Treatments

4.2.1 Intakes

The site treatments at the intakes are consistent with those presented in the *Post-Construction Land Reclamation TM* (DCA 2021a). No further discussion of site reclamation steps at the intakes are included in this supplemental TM.

4.2.2 Twin Cities Complex Double Launch Shaft Site

4.2.2.1 Site Description

The Twin Cities Complex, located on Glanville Tract, would serve as a double-launch shaft site. The site for the Bethany Reservoir Alternative would be similar to the site for the Eastern corridor; however, the required RTM processing areas, borrow pit size, permanent RTM stockpiles, and total site size would be

different, based on the RTM handling and processing requirements. Land at the existing site area is used for pasture and for growing multiple types of row crops (DWR 2019).

Four scenarios are being considered (one for each tunnel diameter) and have different temporary construction areas at the Twin Cities Complex, as described in Table 4-1. Note, the total site acreage was not adjusted based on tunnel diameter; however, the size of the remaining permanent RTM stockpile differs. Table 4-1 summarizes the acreage at the site delineated by base soil type and proposed post-construction use for all tunnel diameter scenarios.

Tunnel Diameter	Project Design Capacity (cfs)	Base Soil	Proposed Post- Construction Use	Acres
		Native Soil	Agriculture	292
26 ft	3,000	RTM Base	Agriculture	40
		RTM Stockpile	Stockpile	95
		Native Soil	Agriculture	320
31 ft	4,500	RTM Base	Agriculture	40
		RTM Stockpile	Stockpile	157
		Native Soil	Agriculture	324
36 ft	6,000	RTM Base	Agriculture	40
		RTM Stockpile	Stockpile	214
		Native Soil	Agriculture	222
40 ft	7,500	RTM Base	Agriculture	40
		RTM Stockpile	Stockpile	303

Table 4-1. Summary of Land Reclamation Areas at the Twin Cities Complex (Glanville Tract)

Notes:

ft = foot (feet)

4.2.2.2 Construction Methods and Equipment

Tables 4-2 through 4-9 summarize the equipment, durations, and expected on-road truck and commuter traffic that would be required to complete the reclamation work for all scenarios summarized in Table 4-1.

Step	Tasks	Equipment ^a	Equipment- Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	207	7	30	32
		Scrapers	46	5		
	Ring levee removal (Twin Cities only)	Dozer large	46	5		
2		Graders	46	5	10	29
		Compactor	46	5		
		Water truck	46	5		
3	Grade and level site	Grader small	17	5	4	332 ^b
4	Rip to 3-ft depth	Dozer large	67	6	12	332 ^b
5	Spread amendments to	Rubber-tire loader medium	4	2	2	332 ^b
		Farm tractor large	7	4		
6	Incorporate amendments to address compaction and cross rip	Farm tractor large	68	6	12	332 ^b
7	Correct tensoil	Scraper	138	6	22	437 b
/	Spread topson	Dozer medium	138	6	23	427*
8	Spread amendments to address fertility (RTM base	Rubber-tire loader medium	2	1	2	40 ^b
	only)	Farm tractor large	2	1		
9	Cross disc	Farm tractor large	22	4	6	427 ^b
10	Final grade and level	Farm tractor large	14	4	4	332 ^b
11	Drill-seed grasses	Farm tractor large	6	1	6	332
12	Hydroseed (RTM stockpile only)	Diesel truck	5	1	5	95
Total Duration 116 da						days

 Table 4-2. Summary of Required Equipment for Reclamation Work at the Twin Cities Complex

 (Glanville Tract) – 26-foot-diameter Tunnel (3,000-cfs Project Design Capacity)

Table 4-3. Summary of On-road Truck and Commuter Traffic for Reclamation Work at the Twin Cities
Complex (Glanville Tract) – 26-foot-diameter Tunnel (3,000-cfs Project Design Capacity)

		On-roa	ad Truck Tr	affic	Com	muter Traffic
Step	Tasks	On-road Vehicle	Truck Trips per Day	Miles per Round Trip	Personnel per Day	Miles per Round- trip Commute, per Person
1	Slab demolition	Tri-axle Dump Truck	172	50	9	50
2	Ring levee removal (Twin Cities only)	-	-	-	27	50
3	Grade and level site	-	-	-	7	50
4	Rip to 3-ft depth	-	-	-	8	50
5	Spread amendments to address compaction	Semi-truck	9	76	8	50
6	Incorporate amendments to address compaction and cross rip	-			8	50
7	Spread topsoil	-	-	-	14	50
8	Spread amendments to address fertility (RTM base only)	Semi-truck	3	76	4	50
9	Cross disc	-	-	-	6	50
10	Final grade and level	-	-	-	6	50
11	Drill-seed grasses	Semi-Truck	2	50	3	50
12	Hydroseed (RTM Stockpile only)	Semi-Truck	2	50	3	50

Step	Tasks	Equipment ^a	Equipment- Days	Pieces of Equipment	Duration (days)	Acres	
1	Slab demolition	Excavators medium	241	7	35	37	
		Scrapers	48	5			
		Dozer large	48	5			
2	Ring levee removal (Twin Cities only)	Graders	48	5	10	29	
		Compactor	48	5			
		Water truck	48	5			
3	Grade and level site	Grader small	19	5	4	360 ^b	
4	Rip to 3-ft depth	Dozer large	73	6	13	360 ^b	
5	Spread amendments to	Rubber-tire loader medium	5	2	3	360 ^b	
	address compaction	Farm tractor large	8	4			
6	Incorporate amendments to address compaction and cross rip	Farm tractor large	74	6	13	360 ^b	
7	Correct topooil	Scraper	165	6	20	517 b	
/	spread topson	Dozer medium	165	6	28	517°	
8	Spread amendments to address fertility (RTM	Rubber-tire loader medium	2	1	2	40 ^b	
	base only)	Farm tractor large	2	1			
9	Cross disc	Farm tractor large	27	4	7	517 ^b	
10	Final grade and level	Farm tractor large	15	4	4	360 ^b	
11	Drill-seed grasses	Farm tractor large	7	1	7	360	
12	Hydroseed (RTM stockpile only)	Diesel truck	8	1	8	157	
	Total Duration						

 Table 4-4. Summary of Required Equipment for Reclamation Work at the Twin Cities Complex

 (Glanville Tract) – 31-foot-diameter Tunnel (4,500-cfs Project Design Capacity)

Table 4-5. Summary of On-road Truck and Commuter Traffic for Reclamation Work at the Twin Cities
Complex (Glanville Tract) – 31-foot-diameter Tunnel (4,500-cfs Project Design Capacity)

		On-roa	ad Truck Tr	Commuter Traffic		
Step	Tasks	On-road Vehicle	Truck Trips per Day	Miles per Round Trip	Personnel per Day	Miles per Round- trip Commute, per Person
1	Slab demolition	Tri-axle Dump Truck	171	50	9	50
2	Ring levee removal (Twin Cities only)	-	-	-	27	50
3	Grade and level site	-	-	-	7	50
4	Rip to 3-ft depth	-	-	-	8	50
5	Spread amendments to address compaction	Semi-truck	7	76	8	50
6	Incorporate amendments to address compaction and cross rip	-	-	-	8	50
7	Spread topsoil	-	-	-	14	50
8	Spread amendments to address fertility (RTM base only)	Semi-truck	3	76	4	50
9	Cross disc	-	-	-	6	50
10	Final grade and level	-	-	-	6	50
11	Drill-seed grasses	Semi-truck	2	50	3	50
12	Hydroseed (RTM stockpile only)	Semi-truck	2	50	3	50

Step	Tasks	Equipment ^a	Equipment- Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	264	7	38	41
		Scrapers	53	5		
2		Dozer large	53	5		
	Ring levee removal (Twin Cities only)	Graders	53	5	11	29
		Compactor	53	5		
		Water truck	53	5		
3	Grade and level site	Grader small	19	5	4	364 ^b
4	Rip to 3-ft depth	Dozer large	74	6	13	364 ^b
5	Spread amendments to	Rubber-tire loader medium	5	2	3	364 ^b
address compaction		Farm tractor large	8	4		
6	Incorporate amendments to address compaction and cross rip	Farm tractor large	75	6	13	364 ^b
_	Connect to meetil	Scraper	184	6	24	578 ^b
/	Spread topsoli	Dozer medium	184	6	31	
8	Spread Amendments to address fertility (RTM Base	Rubber-tire loader medium	2	1	2	40 ^b
	only)	Farm Tractor Large	2	1		
9	Cross disc	Farm tractor large	30	4	8	578 ^b
10	Final grade and level	Farm tractor large	15	4	4	364 ^b
11	Drill-seed grasses	Farm tractor large	7	1	7	364
12	Hydroseed (RTM stockpile only)	Diesel truck	11	1	11	214
			Тс	otal Duration	145	days

 Table 4-6. Summary of Required Equipment for Reclamation Work at the Twin Cities Complex

 (Glanville Tract) – 36-foot-diameter Tunnel (6,000-cfs Project Design Capacity)

Table 4-7. Summary of On-road Truck and Commuter Traffic for Reclamation Work at the Twin Cities
Complex (Glanville Tract) – 36-foot-diameter Tunnel (6,000-cfs Project Design Capacity)

		On-road Truck Traffic			Com	muter Traffic
Step	Tasks	On-road Vehicle	Truck Trips per Day	Miles per Round Trip	Personnel per Day	Miles per Round- trip Commute, per Person
1	Slab demolition	Tri-axle Dump Truck	173	50	9	50
2	Ring levee removal (Twin Cities only)	-	-	-	27	50
3	Grade and level site	-	-	-	7	50
4	Rip to 3-ft depth	-	-	-	8	50
5	Spread amendments to address compaction	Semi-truck	7	76	8	50
6	Incorporate amendments to address compaction and cross rip	-	•	-	8	50
7	Spread topsoil	-	-	-	14	50
8	Spread Amendments to address fertility (RTM Base only)	Semi-truck	3	76	4	50
9	Cross disc	-	-	-	6	50
10	Final grade and level	-	-	-	6	50
11	Drill-seed grasses	Semi-truck	2	50	3	50
12	Hydroseed (RTM stockpile only)	Semi-truck	2	50	3	50

Step	Tasks	Equipment ^a	Equipment- Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	288	7	42	45
		Scrapers	53	5		
	Ring levee removal (Twin Cities only)	Dozer large	53	5		
2		Graders	53	5	11	29
		Compactor	53	5		
		Water truck	53	5		
3	Grade and level site	Grader small	14	5	3	262 ^b
4	Rip to 3-ft depth	Dozer large	53	6	9	262 ^b
5	Spread amendments to	Rubber-tire loader medium	4	2	2	262 ^b
		Farm tractor large	6	4		
6	Incorporate amendments to address compaction and cross rip	Farm tractor large	54	6	9	262 ^b
7	Corroad topsail	Scraper	183	6	21	гсгр
/	Spread topson	Dozer medium	183	6	31	565°
8	Spread Amendments to address fertility (RTM Base	Rubber-tire loader medium	2	1	2	40 ^b
	only)	Farm Tractor Large	2	1		
9	Cross disc	Farm tractor large	30	4	8	565 ^b
10	Final grade and level	Farm tractor large	11	4	3	262 ^b
11	Drill-seed grasses	Farm tractor large	5	1	5	262
12	Hydroseed (RTM stockpile only)	Diesel truck	16	1	16	303
			Тс	tal Duration	141 c	lays

 Table 4-8. Summary of Required Equipment for Reclamation Work at the Twin Cities Complex

 (Glanville Tract) – 40-foot-diameter Tunnel (7,500-cfs Project Design Capacity)

		On-road Truck Traffic			Commuter Traffic		
Step	Tasks	On-road Vehicle	Truck Trips per Day	Miles per Round Trip	Personnel per Day	Miles per Round- trip Commute, per Person	
1	Slab demolition	Tri-axle Dump Truck	171	50	9	50	
2	Ring levee removal (Twin Cities only)	-	-	-	27	50	
3	Grade and level site	-	-	-	7	50	
4	Rip to 3-ft depth	-	-	-	8	50	
5	Spread amendments to address compaction	Semi-truck	7	76	8	50	
6	Incorporate amendments to address compaction and cross rip	-	•	-	8	50	
7	Spread topsoil	-	-	-	14	50	
8	Spread Amendments to address fertility (RTM Base only)	Semi-truck	3	76	4	50	
9	Cross disc	-	-	-	6	50	
10	Final grade and level	-	-	-	6	50	
11	Drill-seed grasses	Semi-truck	2	50	3	50	
12	Hydroseed (RTM stockpile only)	Semi-truck	2	50	3	50	

Table 4-9. Summary of On-road Truck and Commuter Traffic for Reclamation Work at the Twin Cities Complex (Glanville Tract) – 40-foot-diameter Tunnel (7,500-cfs Project Design Capacity)

4.2.3 Lower Roberts Island Double-launch Shaft Site

4.2.3.1 Site Description

The Lower Roberts Island Launch Shaft would be altered for the Bethany Reservoir Alternative to include a double-launch shaft instead of a single launch shaft as was planned for the Eastern Corridor Option. The addition of a second launch shaft and differences in RTM processing and storage requirements would result in a modified site layout to accommodate the processing of additional RTM generated at the site and additional space for tunnel liner segment storage and a larger permanent shaft pad.

Four scenarios (one for each tunnel diameter based on the project design capacity) are being considered and have different temporary construction areas at the Lower Roberts Island Launch Shaft Site, as described in Table 4-10. Note, the total site acreage was not adjusted based on tunnel diameter; however, the size of the remaining permanent RTM stockpile differs. Table 4-10 summarizes the acreage at the site delineated by base soil type and proposed post-construction use for all tunnel diameter options.

Tunnel Diameter	Project Design Capacity (cfs)	Base Soil	Proposed Post-construction Use	Acres
		Native Soil	Agriculture	208
26 ft	3,000	RTM Base	Agriculture	26
		RTM Stockpile	Stockpile	125
		Native Soil	Agriculture	239
31 ft	4,500	RTM Base	Agriculture	26
		RTM Stockpile	Stockpile	174
		Native Soil	Agriculture	243
36 ft	6,000	RTM Base	Agriculture	26
		RTM Stockpile	Stockpile	230
		Native Soil	Agriculture	184
40 ft	7,500	RTM Base	Agriculture	26
		RTM Stockpile	Stockpile	290

4.2.3.2 Construction Methods and Equipment

Tables 4-11 through 4-18 summarize the equipment, durations, and expected on-road truck and commuter traffic that would be required to complete the reclamation work for all project design capacity scenarios summarized in Table 4-10.

Step	Tasks	Equipment ^a	Equipment- Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	207	5	42	32
2	Grade and level site	Grader small	12	3	4	234
3	Rip to 3-ft depth	Dozer large	48	5	10	234 ^b
4	Spread amendments to	Rubber-tire loader medium	4	2	2	234 ^b
	address compaction	Farm tractor large	6	3		
5	Incorporate amendments to address compaction and cross rip	Farm tractor large	48	5	10	234 ^b
6	Spread topsoil	Scraper	77	4	20	359 ^b
D		Dozer medium	77	4	20	
7	Spread Amendments to address fertility (RTM Base only)	Rubber-tire loader medium	1	1	2	26 ^b
		Farm tractor large	2	1		
8	Cross disc	Farm tractor large	20	2	10	359 ^b
9	Final grade and level	Farm tractor large	11	4	3	234 ^b
10	Drill-seed grasses	Farm tractor large	5	2	3	234 ^b
11	Hydroseed (RTM stockpile only)	Diesel truck	7	1	7	125
		Grader small	1	1		
12	Establish access road to RTM	Scraper	1	1	2	0.2
12	stockpile	Compactor	1	1		
		Water truck	1	1		
Total Duration						days

 Table 4-11. Summary of Required Equipment for Reclamation Work at the Lower Roberts Island

 Launch Shaft – 26-foot-diameter Tunnel (3,000-cfs Project Design Capacity)

Table 4-12. Summary of On-road Truck and Commuter Traffic for Reclamation Work at the Lower
Roberts Island Launch Shaft – 26-foot-diameter Tunnel (3,000-cfs Project Design Capacity)

		On-road Truck Traffic			Commuter Traffic			
Step	Tasks	On-road Vehicle	Truck Trips per Day	Miles per Round Trip	Personnel per Day	Miles per Round- trip Commute, per Person		
1	Slab demolition	Tri-axle Dump Truck	123	18	7	50		
2	Grade and level site	-	-	-	5	50		
3	Rip to 3-ft depth	-	-	-	7	50		
4	Spread amendments to address compaction	Semi-truck	7	38	7	50		
5	Incorporate amendments to address compaction and cross rip	-	-	-	7	50		
6	Spread topsoil	-	-	-	10	50		
7	Spread Amendments to address fertility (RTM Base only)	Semi-truck	2	38	4	50		
8	Cross disc	-	-	-	4	50		
9	Final grade and level	-	-	-	6	50		
10	Drill-seed grasses	Semi-truck	2	50	4	50		
11	Hydroseed (RTM stockpile only)	Semi-truck	2	50	3	50		
12	Establish access road to RTM stockpile		-	-	6	50		

Table 4-13. Summary of Required Equipment for Reclamation Work at the Lower Roberts Island
Launch Shaft – 31-foot-diameter Tunnel (4,500-cfs Project Design Capacity)

Step	Tasks	Equipment ^a	Equipment- Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	241	5	49	37
2	Grade and level site	Grader small	14	3	5	265
3	Rip to 3-ft depth	Dozer large	54	5	11	265 ^b
4	Spread amendments to	Rubber-tire loader medium	4	2	2	265 ^b
		Farm tractor large	6	3		
5	Incorporate amendments to address compaction and cross rip	Farm tractor large	55	5	11	265 ^b
6	Spread topsoil	Scraper	96	4	24	440 ^b
0		Dozer medium	96	4	24	
7	Spread Amendments to address fertility (RTM Base only)	Rubber-tire loader medium	1	1	2	26 ^b
		Farm tractor large	2	1		
8	Cross disc	Farm tractor large	23	2	12	440 ^b
9	Final grade and level	Farm tractor large	12	4	3	265 ^b
10	Drill-seed grasses	Farm tractor large	5	2	3	265 ^b
11	Hydroseed (RTM stockpile only)	Diesel truck	9	1	9	174
		Grader small	1	1		
12	Establish access road to RTM	Scraper	1	1	2	0.2
12	stockpile	Compactor	1	1	2	
		Water truck	1	1		
	133 days					

Table 4-14. Summary of On-road Truck and Commuter Traffic for Reclamation Work at the Lower
Roberts Island Launch Shaft – 31-foot-diameter Tunnel (4,500-cfs Project Design Capacity)

		On-road Truck Traffic			Commuter Traffic			
Step	Tasks	On-road Vehicle	Truck Trips per Day	Miles per Round Trip	Personnel per Day	Miles per Round- trip Commute, per Person		
1	Slab demolition	Tri-axle Dump Truck	122	18	7	50		
2	Grade and level site	-	-	-	5	50		
3	Rip to 3-ft depth	-	-	-	7	50		
4	Spread amendments to address compaction	Semi-truck	8	38	7	50		
5	Incorporate amendments to address compaction and cross rip	-		·	7	50		
6	Spread topsoil	-	-	-	10	50		
7	Spread Amendments to address fertility (RTM Base only)	Semi-truck	2	38	4	50		
8	Cross disc	-	-	-	4	50		
9	Final grade and level	-	-	-	6	50		
10	Drill-seed grasses	Semi-truck	2	50	4	50		
11	Hydroseed (RTM stockpile only)	Semi-truck	2	50	3	50		
12	Establish access road to RTM stockpile	-	-	-	6	50		

Table 4-15. Summary of Required Equipment for Reclamation Work at the Lower Roberts Island
Launch Shaft – 36-foot-diameter Tunnel (6,000-cfs Project Design Capacity)

Step	Tasks	Equipment ^a	Equipment- Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	264	5	53	41
2	Grade and level site	Grader small	14	3	5	269
3	Rip to 3-ft depth	Dozer large	55	5	11	269 ^b
4	Spread amendments to	Rubber-tire loader medium	4	2	2	269 ^b
		Farm tractor large	6	3		
5	Incorporate amendments to address compaction and cross rip	Farm tractor large	56	5	12	269 ^b
6	Spread topsoil	Scraper	109	4	29	499 ^b
0		Dozer medium	109	4	28	
7	Spread Amendments to address fertility (RTM Base only)	Rubber-tire loader medium	1	1	2	26 ^b
		Farm tractor large	2	1		
8	Cross disc	Farm tractor large	27	2	14	499 ^b
9	Final grade and level	Farm tractor large	12	4	3	269 ^b
10	Drill-seed grasses	Farm tractor large	6	2	3	269 ^b
11	Hydroseed (RTM stockpile only)	Diesel truck	12	1	12	230
		Grader small	1	1		
12	Establish access road to RTM	Scraper	1	1	2	0.2
	stockpile	Compactor	1	1	2	
		Water truck	1	1		
Total Duration						days

Table 4-16. Summary of On-road Truck and Commuter Traffic for Reclamation Work at the LowerRoberts Island Launch Shaft – 36-foot-diameter Tunnel (6,000-cfs Project Design Capacity)

		On-road Truck Traffic			Commuter Traffic		
Step	Tasks	On-road Vehicle	Truck Trips per Day	Miles per Round Trip	Personnel per Day	Miles per Round- trip Commute, per Person	
1	Slab demolition	Tri-axle Dump Truck	124	18	7	50	
2	Grade and level site	-	-	-	5	50	
3	Rip to 3-ft depth	-	-	-	7	50	
4	Spread amendments to address compaction	Semi-truck	8	38	7	50	
5	Incorporate amendments to address compaction and cross rip	-		-	7	50	
6	Spread topsoil	-	-	-	10	50	
7	Spread Amendments to address fertility (RTM Base only)	Semi-truck	2	38	4	50	
8	Cross disc	-	-		4	50	
9	Final grade and level	-	-	-	6	50	
10	Drill-seed grasses	Semi-truck	2	50	4	50	
11	Hydroseed (RTM stockpile only)	Semi-truck	2	50	3	50	
12	Establish access road to RTM stockpile		-	-	6	50	

Table 4-17. Summary of Required Equipment for Reclamation Work at the Lower Roberts Island
Launch Shaft – 40-foot-diameter Tunnel (7,500-cfs Project Design Capacity)

Step	Tasks	Equipment ^a	Equipment- Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	288	5	58	45
2	Grade and level site	Grader small	11	3	4	210
3	Rip to 3-ft depth	Dozer large	43	5	9	210 ^b
4	Spread amendments to	Rubber-tire loader medium	3	2	2	210 ^b
	address compaction	Farm tractor large	5	3		
5	Incorporate amendments to address compaction and cross rip	Farm tractor large	44	5	9	210 ^b
G	Spread topsoil	Scraper	109	4	29	499 ^b
0		Dozer medium	109	4	28	
7	Spread Amendments to address fertility (RTM Base only)	Rubber-tire loader medium	1	1	2	26 ^b
		Farm tractor large	2	1		
8	Cross disc	Farm tractor large	27	2	14	499 ^b
9	Final grade and level	Farm tractor large	10	4	3	210 ^b
10	Drill-seed grasses	Farm tractor large	5	2	3	210 ^b
11	Hydroseed (RTM stockpile only)	Diesel truck	15	1	15	290
		Grader small	1	1		
12	Establish access road to RTM	Scraper	1	1	2	0.2
12	stockpile	Compactor	1	1	2	0.2
		Water truck	1	1		
Total D	Duration				149	days

		On-road Truck Traffic			Commuter Traffic		
Step	Tasks	On-road Vehicle	Truck Trips per Day	Miles per Round Trip	Personnel per Day	Miles per Round- trip Commute, per Person	
1	Slab demolition	Tri-axle Dump Truck	124	18	7	50	
2	Grade and level site	-	-	-	5	50	
3	Rip to 3-ft depth	-	-	-	7	50	
4	Spread amendments to address compaction	Semi-truck	6	38	7	50	
5	Incorporate amendments to address compaction and cross rip	-	-		7	50	
6	Spread topsoil	-		-	10	50	
7	Spread Amendments to address fertility (RTM Base only)	Semi-truck	2	38	4	50	
8	Cross disc	-	-	-	4	50	
9	Final grade and level	-	-	-	6	50	
10	Drill-seed grasses	Semi-truck	2	50	4	50	
11	Hydroseed (RTM stockpile only)	Semi-truck	2	50	3	50	
12	Establish access road to RTM stockpile	-	-	-	6	50	

Table 4-18. Summary of On-road Truck and Commuter Traffic for Reclamation Work at the Lower Roberts Island Launch Shaft – 40-foot-diameter Tunnel (7,500-cfs Project Design Capacity)

4.2.4 Bethany Reservoir Pumping Plant and Surge Basin

4.2.4.1 Site Description

The BRPP would function to convey water to the Bethany Reservoir via the Aqueduct. An associated Surge Basin would be required to contain flow in the main tunnel resulting from a hydraulic surge event during operations, such as a power failure. The site area associated with the BRPP and Surge Basin also includes Aqueduct surge tanks. For the 7,500-cfs project design capacity, outlet and control structures would also be constructed to connect to the Jones Pumping Plant approach channel. Land at the existing BRPP and Surge Basin site area is used for growing grain, hay, and alfalfa and land at the existing Jones Pumping Plant approach channel site area currently has native grass (DWR 2019).

Temporary construction areas would be required as follows:

- Concrete batch plants
- Access roads
- Facilities and trailers for owners, contractors, and crew

Permanent features would include the following:

- Belowground Surge Basin
- Belowground BRPP
- Aqueduct surge tanks
- Electrical substation
- Equipment storage, electrical, and generator buildings
- Stockpiles for surplus excavated material for potential future use
- Access roads and parking areas
- Concrete outlet and control structures (40-ft tunnel diameter option only)

Four scenarios (one for each tunnel diameter) are being considered and have different temporary construction areas at the BRPP and Surge Basin, as described in Table 4-19. Table 4-19 summarizes the acreage at the site delineated by base soil type and proposed post-construction use for all project design capacity scenarios. Note that for the 40-ft-diameter tunnel scenario, the acreages summarized in Table 4-19 include the areas at the CVP connection site.

Table 4-19. Summary of Land Reclamation Areas at the Bethany Reservoir Pumping Plant and SurgeBasin

Tunnel Diameter	Project Design Capacity (cfs)	Base Soil	Proposed Post- Construction Use	Acres
26 #	2 000	Native Soil	Agriculture	53
26 ft 3,000	3,000	Excavated Material Stockpile	Stockpile	61
21.6	4 500	Native Soil	Agriculture	53
31 ft	4,500	Excavated Material Stockpile	Stockpile	61
26 #	6 000	Native Soil	Agriculture	53
36 11	6,000	Excavated Material Stockpile	Stockpile	59
40 ft (includes		Native Soil	Agriculture	84
connection to Jones Pumping Plant approach channel)	7,500	Excavated Material Stockpile	Stockpile	69

4.2.4.2 Construction Methods and Equipment

Tables 4-20 through 4-27 summarize the equipment, durations, and expected on-road truck and commuter traffic that would be required to complete the reclamation work for all project design capacity scenarios summarized in Table 4-19.

Step	Tasks	Equipment ^a	Equipment- Days	Pieces of Equipment	Duration (days)	Acres			
1	Grade and level site	Grader small	3	1	3	53 ^b			
2	Rip to 3-ft depth	Dozer large	11	3	4	53 ^b			
3	Spread amendments to address compaction	Rubber-tire loader medium	1	1	1	53 ^b			
		Farm tractor large	2	2					
4	Incorporate amendments to address compaction and cross rip	Farm tractor large	11	3	4	53 ^b			
_	Spread topsoil	Scraper	47	3	10	114 ^b			
5		Dozer medium	47	3	10				
6	Cross disc	Farm tractor large	7	2	4	114 ^b			
7	Final grade and level	Farm tractor large	3	1	3	53 ^b			
8	Drill-seed grasses	Farm tractor large	1	1	1	53			
9	Hydroseed (Excavated Material Stockpile only)	Diesel Truck	4	1	4	61			
	Total Duration 40 days								

Table 4-20. Summary of Required Equipment for Reclamation Work at the BRPP and Surge Basin –
26-foot-diameter Tunnel (3,000-cfs Project Design Capacity)

^b Indicates the number of acres of soil that would be disturbed for the given task.

		On-road Truck Traffic			Commuter Traffic		
Step	Tasks	On-road Vehicle	Truck Trips per Day	Miles per Round Trip	Personnel per Day	Miles per Round- trip Commute, per Person	
1	Grade and level site	-	-	-	3	50	
2	Rip to 3-ft depth	-	-	-	5	50	
3	Spread amendments to address compaction	Semi-truck	3	50	5	50	
4	Incorporate amendments to address compaction and cross rip	-	-	-	5	50	
5	Spread topsoil	-	-	-	8	50	
6	Cross disc	-	-	-	4	50	
7	Final grade and level	-	-	-	3	50	
8	Drill-seed grasses	Semi-truck	2	50	3	50	
9	Hydroseed (Excavated Material Stockpile only)	Semi-truck	2	50	3	50	

Table 4-21. Summary of On-road Truck and Commuter Traffic for Reclamation Work at the BRPP andSurge Basin – 26-foot-diameter Tunnel (3,000-cfs Project Design Capacity)

Step	Tasks	Equipment ^a	Equipment- Days	Pieces of Equipment	Duration (days)	Acres			
1	Grade and level site	Grader small	3	1	3	53 ^b			
2	Rip to 3-ft depth	Dozer large	11	3	4	53 ^b			
3	Spread amendments to address compaction	Rubber-tire loader medium	1	1	1	53 ^b			
		Farm tractor large	2	2	2				
4	Incorporate amendments to address compaction and cross rip	Farm tractor large	11	3	4	53 ^b			
-	Spread topsoil	Scraper	47	3	10	114 ^b			
5		Dozer medium	47	3	10				
6	Cross disc	Farm tractor large	7	2	4	114 ^b			
7	Final grade and level	Farm tractor large	3	1	3	53 ^b			
8	Drill-seed grasses	Farm tractor large	1	1	1	53			
9	Hydroseed (Excavated Material Stockpile only)	Diesel Truck	4	1	4	61			
	Total Duration 40 days								

Table 4-22. Summary of Required Equipment for Reclamation Work at the BRPP and Surge Basin –
31-foot-diameter Tunnel (4,500-cfs Project Design Capacity)

^b Indicates the number of acres of soil that would be disturbed for the given task.

		On-road Truck Traffic			Commuter Traffic		
Step	Tasks	On-road Vehicle	Truck Trips per Day	Miles per Round Trip	Personnel per Day	Miles per Round- trip Commute, per Person	
1	Grade and level site	-	-	-	3	50	
2	Rip to 3-ft depth	-	-	-	5	50	
3	Spread amendments to address compaction	Semi-truck	3	50	5	50	
4	Incorporate amendments to address compaction and cross rip	-	-	-	5	50	
5	Spread topsoil	-	-	-	8	50	
6	Cross disc	-	-	-	4	50	
7	Final grade and level	-	-	-	3	50	
8	Drill-seed grasses	Semi-truck	2	50	3	50	
9	Hydroseed (Excavated Material Stockpile only)	Semi-truck	2	50	3	50	

Table 4-23. Summary of On-road Truck and Commuter Traffic for Reclamation Work at the BRPP andSurge Basin – 31-foot-diameter Tunnel (4,500-cfs Project Design Capacity)

Step	Tasks	Equipment ^a	Equipment- Days	Pieces of Equipment	Duration (days)	Acres			
1	Grade and level site	Grader small	3	1	3	53 ^b			
2	Rip to 3-ft depth	Dozer large	11	3	4	53 ^b			
3	Spread amendments to address compaction	Rubber-tire loader medium	1	1	1	53 ^b			
		Farm tractor large	2	2					
4	Incorporate amendments to address compaction and cross rip	Farm tractor large	11	3	4	53 ^b			
_	Spread topsoil	Scraper	47	3	16	113 ^b			
5		Dozer medium	47	3	10				
6	Cross disc	Farm tractor large	6	2	3	113 ^b			
7	Final grade and level	Farm tractor large	3	1	3	53 ^b			
8	Drill-seed grasses	Farm tractor large	1	1	1	53			
9	Hydroseed (Excavated Material Stockpile only)	Diesel Truck	3	1	3	59			
	Total Duration 38 days								

Table 4-24. Summary of Required Equipment for Reclamation Work at the BRPP and Surge Basin –
36-foot-diameter Tunnel (6,000-cfs Project Design Capacity)

^b Indicates the number of acres of soil that would be disturbed for the given task.

		On-road Truck Traffic			Commuter Traffic		
Step	Tasks	On-road Vehicle	Truck Trips per Day	Miles per Round Trip	Personnel per Day	Miles per Round- trip Commute, per Person	
1	Grade and level site	-	-	-	3	50	
2	Rip to 3-ft depth	-	-	-	5	50	
3	Spread amendments to address compaction	Semi-truck	3	50	5	50	
4	Incorporate amendments to address compaction and cross rip	-	-	-	5	50	
5	Spread topsoil	-	-	-	8	50	
6	Cross disc	-	-	-	4	50	
7	Final grade and level	-	-	-	3	50	
8	Drill-seed grasses	Semi-truck	2	50	3	50	
9	Hydroseed (Excavated Material Stockpile only)	Semi-truck	2	50	3	50	

Table 4-25. Summary of On-road Truck and Commuter Traffic for Reclamation Work at the BRPP and Surge Basin – 36-foot-diameter Tunnel (6,000-cfs Project Design Capacity)

Step	Tasks	Equipment ^a	Equipment- Days	Pieces of Equipment	Duration (days)	Acres
1	Grade and level site	Grader small	5	1	5	84 ^b
2	Rip to 3-ft depth	Dozer large	17	3	6	84 ^b
3	Spread amendments to	Rubber-tire loader medium	1 1	1	1	84 ^b
		Farm tractor large	2	2		
4	Incorporate amendments to address compaction and cross rip	Farm tractor large	17	3	6	84 ^b
-	Spread topsoil	Scraper	63	3	21	150b
5		Dozer medium	63	3	21	155
6	Cross disc	Farm tractor large	9	2	5	153 ^b
7	Final grade and level	Farm tractor large	4	1	4	84 ^b
8	Drill-seed grasses	Farm tractor large	2	1	2	84
9	Hydroseed (Excavated Material Stockpile only)	Diesel Truck	4	1	4	69
		54 d	ays			

Table 4-26. Summary of Required Equipment for Reclamation Work at the BRPP and Surge Basin and
CVP Connection – 40-foot-diameter Tunnel (7,500-cfs Project Design Capacity)

^b Indicates the number of acres of soil that would be disturbed for the given task.

		On-road Truck Traffic			Commuter Traffic		
Step	Tasks	On-road Vehicle	Truck Trips per Day	Miles per Round Trip	Personnel per Day	Miles per Round- trip Commute, per Person	
1	Grade and level site	-	-	-	3	50	
2	Rip to 3-ft depth	-	-	-	5	50	
3	Spread amendments to address compaction	Semi-truck	5	50	5	50	
4	Incorporate amendments to address compaction and cross rip	-	-	-	5	50	
5	Spread topsoil	-	-	-	8	50	
6	Cross disc	-	-	-	4	50	
7	Final grade and level	-	-	-	3	50	
8	Drill-seed grasses	Semi-truck	2	50	3	50	
9	Hydroseed (Excavated Material Stockpile only)	Semi-truck	2	50	3	50	

Table 4-27. Summary of On-road Truck and Commuter Traffic for Reclamation Work at the BRPP and
Surge Basin and CVP Connection – 40-foot-diameter Tunnel (7,500-cfs Project Design Capacity)

4.2.5 Bethany Reservoir Aqueduct

4.2.5.1 Site Description

The Aqueduct would convey water from the BRPP to Bethany Reservoir via large-diameter pipelines, pressurized by the BRPP. The number of pipelines would vary as a function of the project design capacity. For the 7,500-cfs project design capacity, a pipeline from the BRPP to the Jones Discharge and Delta-Mendota Canal Control Structure area would be included; however, the reclamation area associated with construction of this pipeline is accounted for in the BRPP and Surge Basin areas, as described in Section 4.2.4. The Aqueduct pipelines and construction areas between the BRPP and the Bethany Reservoir are identical for the 6,000-cfs and 7,500-cfs project design capacities. Land at the existing site area is used for growing almonds, alfalfa, and native grass (DWR 2019).

Temporary construction areas would include areas for the following uses:

- Equipment storage
- Excavated material stockpile
- Water treatment
- Controlled low-strength material processing
- Access roads
- Load limiting crossings
- Parking areas
- Facilities and trailers for owners and contractors, shipping and receiving offices, and crew

Permanent features would include the Aqueduct pipelines, appurtenant pipeline structures, grading at tunnel portals, and access roads.

Three scenarios (one each for the 3,000- and 4,500-cfs project design capacities and one for the 6,000- and 7,500- cfs design capacities) are being considered and have different temporary construction areas at the Aqueduct, as described in Table 4-28. Table 4-28 summarizes the acreage at the site delineated by base soil type and proposed post-construction use for all project design capacity scenarios.

Tunnel Diameter	Project Design Capacity (cfs)	Base Soil	Proposed Post- Construction Use	Acres
26 ft (2 pipes)	3,000	Native Soil	Agriculture	79
31 ft (3 pipes)	4,500	Native Soil	Agriculture	77
36 ft (4 pipes)	6,000/7,500	Native Soil	Agriculture	75

Table 4-28. Summary of Land Reclamation Areas at the Aqueduct

4.2.5.2 Construction Methods and Equipment

Tables 4-29 through 4-34 summarize the equipment, durations, and expected on-road truck and commuter traffic that would be required to complete the reclamation work for all project design capacity scenarios summarized in Table 4-28.

Table 4-29. Summary of Required Equipment for Reclamation Work at the Aqueduct – 26-footdiameter Tunnel (3,000-cfs Project Design Capacity)

Step	Tasks	Equipment ^a	Equipment- Days	Pieces of Equipment	Duration (days)	Acres	
1	Grade and level site	Grader small	4	1	4	79 ^b	
2	Rip to 3-ft depth	Dozer large	16	3	6	79 ^b	
3	Spread amendments to	Rubber-tire loader medium	1	1	1	79 ^b	
	address compaction	Farm tractor large	2	2			
4	Incorporate amendments to address compaction and cross rip	Farm tractor large	16	2	8	79 ^b	
F	Spread topsoil	Scraper	27	3	0	ZOÞ	
5		Dozer medium	27	3	9	79-	
6	Cross disc	Farm tractor large	4	1	4	79 ^b	
7	Final grade and level	Farm tractor large	4	1	4	79	
8	Drill-seed grasses	Farm tractor large	2	1	2	79	
	Total Duration 38 days						

^a Refer to tables in Central and Eastern *Post-Construction Land Reclamation TM* (DCA 2021a) for specific make, model, and size of equipment.

		On-road Truck Traffic			Commuter Traffic		
Step	Tasks	On-road Vehicle	Truck Trips per Day	Miles per Round Trip	Personnel per Day	Miles per Round- trip Commute, per Person	
1	Grade and level site	-	-	-	3	50	
2	Rip to 3-ft depth	-	-	-	5	50	
3	Spread amendments to address compaction	Semi-truck	5	54	5	50	
4	Incorporate amendments to address compaction and cross rip	-	-	-	4	50	
5	Spread topsoil	-	-	-	8	50	
6	Cross disc	-	-	-	3	50	
7	Final grade and level	-	-	-	3	50	
8	Drill-seed grasses	Semi-truck	2	50	3	50	

Table 4-30. Summary of On-road Truck and Commuter Traffic for Reclamation Work at the Aqueduct –26-foot-diameter Tunnel (3,000-cfs Project Design Capacity)

Table 4-31. Summary of Required Equipment for Reclamation Work at the Aqueduct – 31-footdiameter Tunnel (4,500-cfs Project Design Capacity)

Step	Tasks	Equipment ^a	Equipment- Days	Pieces of Equipment	Duration (days)	Acres	
1	Grade and level site	Grader small	4	1	4	77 ^b	
2	Rip to 3-ft depth	Dozer large	16	3	6	77 ^b	
3	Spread amendments to	Rubber-tire loader medium	1	1	1	77 ^b	
	address compaction	Farm tractor large	2	2			
4	Incorporate amendments to address compaction and cross rip	Farm tractor large	16	2	8	77 ^b	
_	Correct tensoil	Scraper	29	3	10		
5	Spread topsoil	Dozer medium	29	3	10	//-	
6	Cross disc	Farm tractor large	4	1	4	77 ^b	
7	Final grade and level	Farm tractor large	4	1	4	77	
8	Drill-seed grasses	Farm tractor large	2	1	2	77	
	Total Duration 39 days						

^a Refer to tables in Central and Eastern *Post-Construction Land Reclamation TM* (DCA 2021a) for specific make, model, and size of equipment.

		On-road Truck Traffic			Commuter Traffic		
Step	Tasks	On-road Vehicle	Truck Trips per Day	Miles per Round Trip	Personnel per Day	Miles per Round- trip Commute, per Person	
1	Grade and level site	-	-	-	3	50	
2	Rip to 3-ft depth	-	-	-	5	50	
3	Spread amendments to address compaction	Semi-truck	4	54	5	50	
4	Incorporate amendments to address compaction and cross rip	-	-	-	4	50	
5	Spread topsoil	-	-	-	8	50	
6	Cross disc	-	-	-	3	50	
7	Final grade and level	-	-	-	3	50	
8	Drill-seed grasses	Semi-truck	2	50	3	50	

Table 4-32. Summary of On-road Truck and Commuter Traffic for Reclamation Work at the Aqueduct –31-foot-diameter Tunnel (4,500-cfs Project Design Capacity)

Table 4-33. Summary of Required Equipment for Reclamation Work at the Aqueduct – 36-footdiameter Tunnel (6,000- and 7,500-cfs Project Design Capacities)

Step	Tasks	Equipment ^a	Equipment- Days	Pieces of Equipment	Duration (days)	Acres	
1	Grade and level site	Grader small	4	1	4	75 ^b	
2	Rip to 3-ft depth	Dozer large	16	3	6	75 ^b	
3	Spread amendments to	Rubber-tire loader medium	1	1	1	75 ^b	
	address compaction	Farm tractor large	2	2			
4	Incorporate amendments to address compaction and cross rip	Farm tractor large	16	2	8	75 ^b	
_	Spread topsoil	Scraper	29	3	10	лгb	
5		Dozer medium	29	3	10	/5*	
6	Cross disc	Farm tractor large	4	1	4	75 ^b	
7	Final grade and level	Farm tractor large	3	1	3	75	
8	Drill-seed grasses	Farm tractor large	2	1	2	75	
	Total Duration 38 days						

^a Refer to tables in Central and Eastern *Post-Construction Land Reclamation TM* (DCA 2021a) for specific make, model, and size of equipment.

		On-roa	d Truck Tra	Commuter Traffic				
Step	Tasks	On-road Vehicle	Truck Trips per Day	Miles per Round Trip	Personnel per Day	Miles per Round- trip Commute, per Person		
1	Grade and level site	-	-	-	3	50		
2	Rip to 3-ft depth	-	-	-	5	50		
3	Spread amendments to address compaction	Semi-truck	4	54	5	50		
4	Incorporate amendments to address compaction and cross rip	-	-	-	4	50		
5	Spread topsoil	-	-	-	8	50		
6	Cross disc	-	-	-	3	50		
7	Final grade and level	-	-	-	3	50		
8	Drill-seed grasses	Semi-truck	2	50	3	50		

 Table 4-34. Summary of On-road Truck and Commuter Traffic for Reclamation Work at the Aqueduct –

 36-foot-diameter Tunnel (6,000- and 7,500-cfs Project Design Capacities)

4.3 Equipment Summary

Tables 4-35 and 4-36 summarize the estimated quantity of the equipment and duration required to complete reclamation of the temporary construction areas at each of the project sites.

-		Twin Cities 26' Tun (3,000 c	Complex - inel ID fs PDC)	Twin Cities 31' Tur (4,500 c	Complex - nnel ID fs PDC)	Twin Cities 36' Tui (6,000 c	: Complex - nnel ID cfs PDC)	Twin Cities Complex - 40' Tunnel ID (7,500 cfs PDC)		Lower Roberts Island - 26' Tunnel ID (3,000 cfs PDC)		Lower Roberts Island - 31' Tunnel ID (4,500 cfs PDC)		Lower Roberts Island - 36' Tunnel ID (6,000 cfs PDC)		Lower Roberts Island - 40' Tunnel ID (7,500 cfs PDC)	
Task	Equipment	Equipment (Qty)	Duration (days)	Equipment (Qty)	Duration (days)	Equipment (Qty)	Duration (days)	Equipment (Qty)	Duration (days)	Equipment (Qty)	Duration (days)	Equipment (Qty)	Duration (days)	Equipment (Qty)	Duration (days)	Equipment (Qty)	Duration (days)
Slab demolition	CAT 330 excavator	7	30	7	35	7	38	7	42	5	42	5	49	5	53	5	58
	CAT 623 scraper	5		5		5	- 11	5		1		1		1		1	Not
Ring levee removal (Twin	CAT D8 dozer	5		5 5	10	5		5		1	Not	1		1	Not	1	
	CAT 12G grader	5	10			5		5	11	1		1	Not Poquirod	1		1	
Cities only)	CAT CS68B compactor	5		5		5	5		1	Required	1	Not Required	1	Required	1	Required	
	Water truck	5		5			5		1		1		1		1		
Grade and level site	CAT 12G grader	5	4	5	4	5	4	5	3	3	4	3	5	3	5	3	4
Rip to 3-foot depth	CAT D8 dozer	6	12	6	13	6	13	6	9	5	10	5	11	5	11	5	9
	CAT 930K loader	2		2		2		2		2		2		2		2	
Spread amendments to address compaction	Case Magnum 280 farm tractor	4	2	4	3	4	3	4	2	3	2	3	2	3	2	3	2
Incorporate amendments to address compaction and cross rip	Case Magnum 280 farm tractor	6	12	6	13	6	13	6	9	5	10	5	11	5	12	5	9
	CAT 623 scraper	6		6		6	24	6		4		4		4	2.2	4	
Spread topsoil	CAT D6 dozer	6	23	6	28	6	31	6	31	4	20	4	24	4	28	4	28
Spread amendments to	CAT 930K loader	1		1		1		1		1		1		1		1	
address fertility (RTM base only)	Case Magnum 280 farm tractor	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Cross disc	Case Magnum 280 farm tractor	4	6	4	7	4	8	4	8	2	10	2	12	2	14	2	14
Final grade and level	Case Magnum 280 farm tractor	4	4	4	4	4	4	4	3	4	3	4	3	4	3	4	3
Drill-seed grasses	Case Magnum 280 farm tractor	1	6	1	7	1	7	1	5	2	3	2	3	2	3	2	3
Hydroseed (RTM stockpile only)	Diesel truck	1	5	1	8	1	11	1	16	1	7	1	9	1	12	1	15
	CAT 12G grader	1		1		1		1		1		1		1		1	
	CAT 623 scraper	1		1		1	1	1	.	1		1		1		1	
Establish access road to RTM stockpile	CAT CS68B compactor	1	Required	1	Required	1	Required	1	Required	1	2	1	2	1	2	1	2
	Water truck	1]	1		1		1	1	1]	1]	1		1	
		Total (days)	116	Total (days)	134	Total (days)	145	Total (days)	141	Total (days)	115	Total (days)	133	Total (days)	147	Total (days)	149

Table 4-35. Summary of Required Equipment for Reclamation Work at Twin Cities Complex and Lower Roberts Island

Notes:

ID = inner diameter; PDC = Project Design Capacity, Qty = quantity

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		BRPP - 26' ⁻ (3,000 cf	Tunnel ID s PDC)	BRPP - 31' (4,500 cl	Tunnel ID s PDC)	BRPP - 36' (6,000 c	Tunnel ID fs PDC)	BRPP - 40' Tunnel ID (7,500 cfs PDC)		Aqueduct - 2 Pipelin (3,000 cfs PDC)		'ipelinesAqueduct - 3 PipelinesPDC)(4,500 cfs PDC)		Aqueduct - 4Pipelines (6,000/7,500 cfs PDC)	
Task	Equipment	Equipment (Qty)	Duration (days)	Equipment (Qty)	Duration (days)	Equipment (Qty)	Duration (days)	Equipment (Qty)	Duration (days)	Equipment (Qty)	Duration (days)	Equipment (Qty)	Duration (days)	Equipment (Qty)	Duration (days)
Slab demolition	CAT 330 excavator	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	Not Required
	CAT 623 scraper	1		1	Not Required	1	Not Required	1	Not Required	1		1	-	1	Not Required
	CAT D8 dozer	1		1		1 1 1		1		1		1		1	
Ring levee removal (Twin Cities only)	CAT 12G grader	1	Not Required	1				1		1	Not Required	1	Not Required	1	
	CAT CS68B compactor	1		1				1		1	nequireu	1	nequireu	1	
	Water truck	1		1		1		1		1		1		1	
Grade and level site	CAT 12G grader	1	3	1	3	1	3	1	5	1	4	1	4	1	4
Rip to 3-foot depth	CAT D8 dozer	3	4	3	4	3	4	3	6	3	6	3	6	3	6
Spread amendments to address	CAT 930K loader	1	4	1	4	1		1		1	4	1	4	1	4
compaction	Case Magnum 280 farm tractor	2	L	2	L	2		2	L L	2	1	2	T	2	±
Incorporate amendments to address compaction and cross rip	Case Magnum 280 farm tractor	3	4	3	4	3	4	3	6	2	8	2	8	2	8
Concerning the second	CAT 623 scraper	3	10	3	10	3	15	3	24	3	0	3	10	3	10
Spread topsoli	CAT D6 dozer	3	10	3	10	3	16	3	21	3	9	3	10	3	10
Spread amendments to address	CAT 930K loader	1	Not	1	Not	1	Not	1	Not	1	Not	1	Not	1	Not
fertility (RTM base only)	Case Magnum 280 farm tractor	1	Required	1	Required	1	Required	1	Required	1	Required	1	Required	1	Required
Cross disc	Case Magnum 280 farm tractor	2	4	2	4	2	3	2	5	1	4	1	4	1	4
Final grade and level	Case Magnum 280 farm tractor	1	3	1	3	1	3	1	4	1	4	1	4	1	3
Drill-seed grasses	Case Magnum 280 farm tractor	1	1	1	1	1	1	1	2	1	2	1	2	1	2
Hydroseed (RTM stockpile only)	Diesel truck	1	4	1	4	1	3	1	4	1	Not Required	1	Not Required	1	Not Required
	CAT 12G grader	1		1		1		1		1	Not	1		1	Not
Establish access road to RTM	CAT 623 scraper	1	Not	1	Not	1	Not	1	Not	1		1	Not	1	
stockpile	CAT CS68B compactor	1	Required	1	Required	1	Required	1	Required	1 Required	1	Required	1	Required	
	Water truck	1		1			1	1		1	1	1	1	1	
		Total (days)	40	Total (days)	40	Total (days)	38	Total (days)	54	Total (days)	38	Total (days)	39	Total (days)	38

Table 4-36. Summary of Required Equipment for Reclamation Work at Project Sites at the Bethany Reservoir Pumping Plant and Aqueduct Sites

Notes:

ID = inner diameter

PDC = Project Design Capacity

Qty = quantity

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5. References

California Department of Water Resources (DWR). 2019. *CADWR Land Use Viewer*. <u>https://gis.water.ca.gov/app/CADWRLandUseViewer</u>.

Delta Conveyance Design and Construction Authority (DCA). 2021a. *Post-Construction Land Reclamation*. Final Draft.

Delta Conveyance Design and Construction Authority (DCA). 2021b. Soil Balance and Reusable Tunnel Material Supplement – Bethany Reservoir Alternative. Draft.

Delta Conveyance Design and Construction Authority (DCA). 2021c. *Reusable Tunnel Material (RTM) Technical Memorandum*. Final Draft.

6. Document History and Quality Assurance

Reviewers listed have completed an internal quality review check and approval process for deliverable documents that is consistent with procedures and directives identified by the Engineering Design Manager (EDM) and the DCA.

Approval Names and Roles									
Prepared by	Internal Quality Control review by	Consistency review by	Approved for submission by						
Alex Michaud / Project Engineer	Michael Conant / EDM Forebays and Levees Lead	Gwen Buchholz / DCA Environmental Consultant	Terry Krause / EDM Project Manager						
		Phil Ryan / EDM Design Manager							

This interim document is considered preliminary and was prepared under the responsible charge of Ernest Michael Conant, California Professional Engineering License C79228.