Subject:	**Post-Construction Land Reclamation (Final Draft)**
Project feature:	Projectwide
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1. Introduction and Purpose

The Delta Conveyance Project (Project) would include intakes along the Sacramento River between the confluences with American River and Sutter Slough, and a tunnel from the intakes to a pumping plant that discharges to a forebay at the downstream terminus of the main tunnel, referred to as the Southern Forebay. Water would either flow by gravity or be lifted by the pumping plant from the tunnel into the Southern Forebay. Discharge from the Southern Forebay would occur at the southern end of the reservoir, through the Southern Forebay Outlet Structure, and flow into the South Delta Conveyance Facilities (SDCF) for connection to the existing State Water Project (SWP) Harvey O. Banks (Banks) Pumping Plant and possibly the Central Valley Project (CVP) C.W. Bill Jones (Jones) Pumping Plant.

There are two tunnel alignments being considered between the intakes and the Southern Forebay: the Central and Eastern corridors. The project would include construction of several permanent features along the length of the final selected corridor, including:

- Intakes
- Tunnel launch, reception, and maintenance shafts
- A new pumping plant and Southern Forebay
- A main connection structure to the SWP
- Optional structures for the CVP connection

Some of these sites would require more than 5 acres of land to be used as temporary construction areas that would not have permanent features within them after construction is completed. This technical memorandum (TM) describes the land reclamation treatments and equipment to be used to return temporary construction areas exceeding 5 acres to productive uses, where applicable. This TM would be used to support site planning and environmental analyses.

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 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.

3. Overview of Project Sites

The project would consist of four major site types. Note that smaller sites with temporary construction areas of less than 5 acres are not included in this TM. Examples of temporary construction areas that are smaller than 5 acres are the maintenance and reception shaft sites. 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 are as follows:

1) **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: vertical flat-plate screens and cylindrical tee screens. The size of the temporary construction area varies slightly, depending on the type of fish screen used at each intake; however, the acreages used in this TM assume cylindrical tee screens are constructed.
2) **Launch Shaft Sites:** There are four tunnel launch shafts along each corridor that would serve as locations to assemble and launch the tunnel boring machine (TBM). Two locations are stand-alone launch shaft sites, whereas the other two launch shafts are connected to the Southern Forebay as parts of the inlet and outlet components but would initially operate as tunnel launch sites. There would also potentially be a fifth smaller-diameter tunnel launch site adjacent to the SDCF connection structure if water is diverted to the CVP (Options 9 and 10 only). Excavated material from the tunnel bore, referred to as reusable tunnel material (RTM), would be brought to the surface through these shafts, processed, and either stockpiled onsite or transported to other project locations or offsite via rail, barge, or truck. As a result, these sites require several hundred acres of land for temporary use associated with equipment, supplies, offices, parking, and RTM handling. Permanent features would include elevated shaft pads, access roads, and RTM stockpiles.
3) **Southern Forebay:** The Southern Forebay would facilitate conveyance of water to the SDCF. Water from the tunnel would flow into the Southern Forebay through the new pumping plant structure located on the northern side of the forebay and then be discharged to the SDCF through the outlet at the downstream end of the forebay. The Southern Forebay would also include two tunnel launch shaft sites, as previously described: one on the northern end and one on the southern end of the forebay. Temporary construction areas would be required as follows:
    - Topsoil storage
    - Tunnel segment storage
    - Retention ponds
    - Railroad spurs
    - Parking areas
    - Concrete and grout batch plants
    - Access roads
    - Facilities and trailers for owners, contractors, and crew

Permanent features would include the following:

- Above-ground forebay with surrounding embankments
- Pumping plant and outlet structures
- A spillway into Italian Slough
- Stockpiles for peat, topsoil, and potentially surplus RTM (depending on the project option)
- Access roads

Most of the RTM treatment and storage areas would be within the footprint of the permanent forebay; therefore, they would not require reclamation.

4) **SDCF Connection Structures:** Up to four structures would be constructed for the project. These structures would manage flows between the Southern Forebay and the SWP (Banks Pumping Plant), and possibly CVP (Jones Pumping Plant), facilities. The options including connection to the CVP would also include a tunnel launch shaft site along the Banks Pumping Plant channel. Temporary construction areas would include land designated for the following uses:

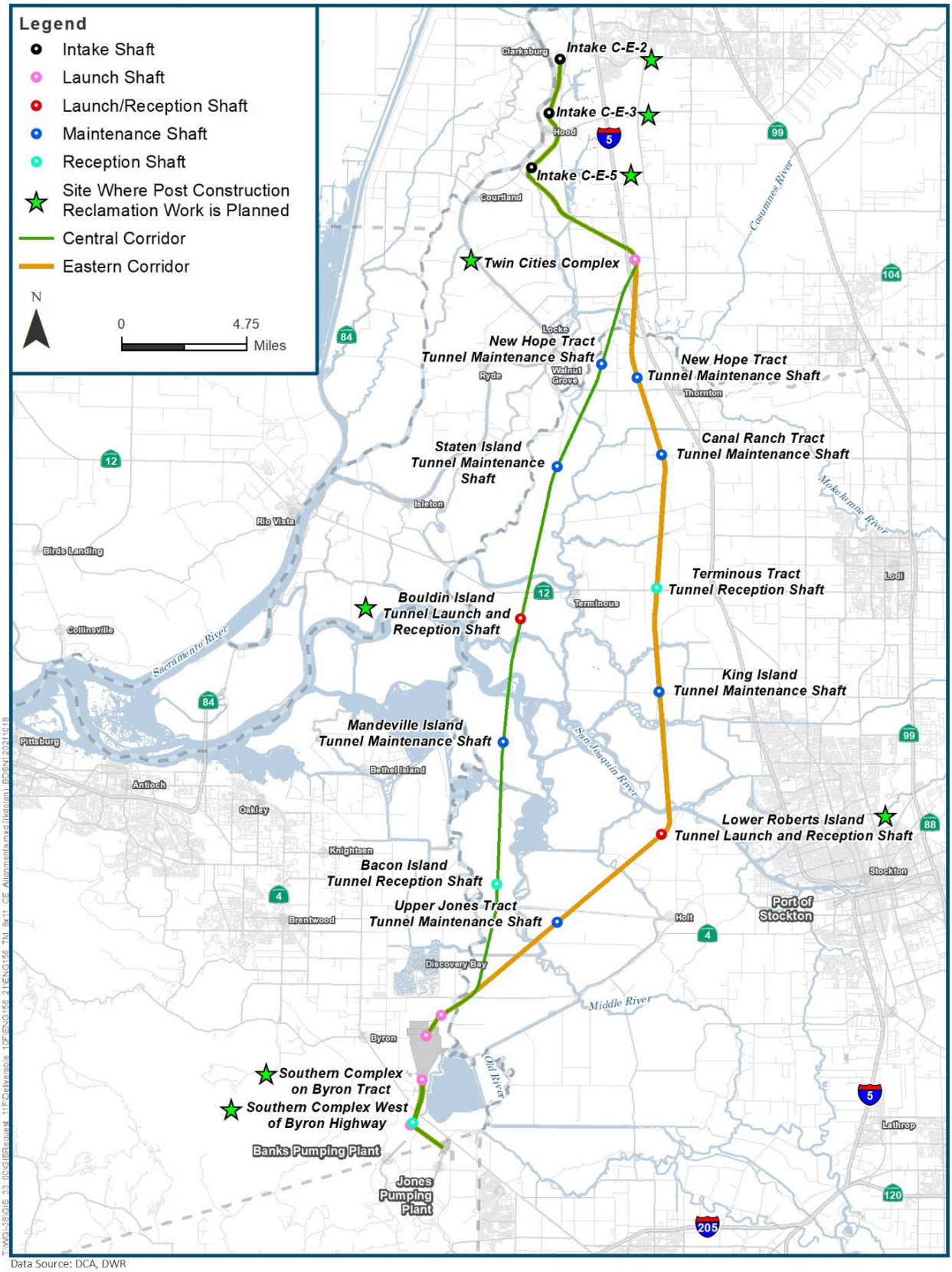
- Material storage
- Equipment storage
- Water treatment
- Access roads
- A temporary bypass canal
- Parking areas
- Facilities and trailers for owners and contractors, shipping and receiving offices, and crew

Permanent features would include concrete outlet and control structures, and access roads.

Table 3-1 lists the specific project sites, organized from north to south. Note that all of the project sites included in this analysis are common to both corridors, with the exception of one of the tunnel launch sites. Figure 3-1 is a project overview map and identifies each of the project sites where reclamation work is planned.

Table 3-1. Overview of Project Sites by Corridor

Central Corridor	Eastern Corridor
Intake C-E-2	
Intake C-E-3	
Intake C-E-5	
Twin Cities Complex	
Bouldin Island Launch Shaft	Lower Roberts Island Launch Shaft
Southern Forebay	
SDCF at California Aqueduct – SWP	
SDCF at Delta-Mendota Canal – CVP (Optional)	



Data Source: DCA, DWR

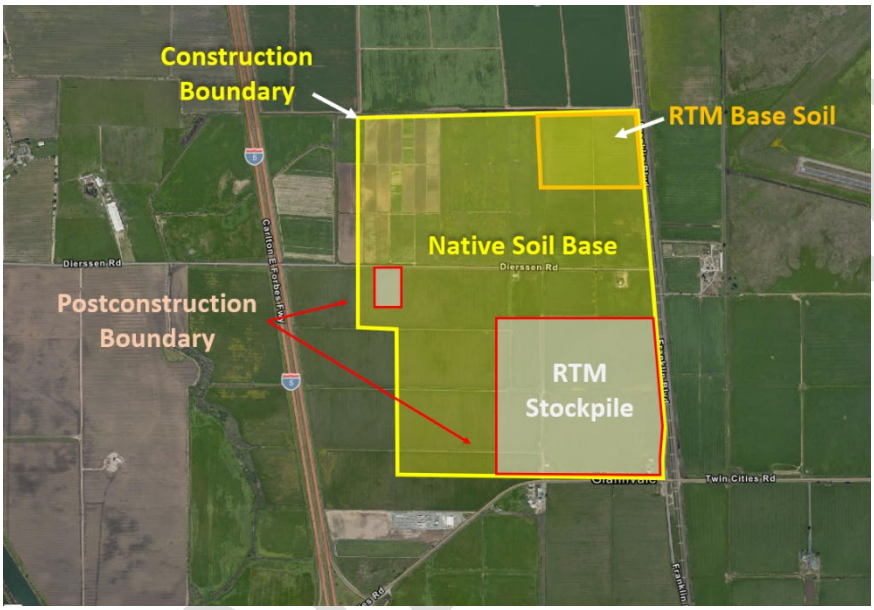
Figure 3-1. Project Overview

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: native soil base, RTM base, and RTM stockpiles. Figure 4-1 shows an example of a site with all types of temporary construction areas. As described in the following sections, the majority of the project sites and associated acres of reclaimed land would likely consist of native soil base or RTM stockpile.



Source: DCA

Figure 4-1. Example Land Reclamation Treatment Areas

The recommended treatments for reclamation of 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 in such a way that they could be accessible for future stockpile use as borrow material.

The sizes of the land reclamation areas at some sites would vary based on design flow, tunnel diameter, or tunnel alignment, or some combination of these factors. At some sites, the temporary construction area would not become larger or smaller with these variables; however, the post-construction site size could change. In some scenarios, a smaller post-construction site could result in a larger land reclamation area.

The treatments for each of the base soil types are described in more detail in the following subsections.

4.1.1 Native Soil Base

Approximately 60 percent of the temporary construction areas to be reclaimed would consist of native soil base with a variety of construction-phase impacts. These impacts would range from minimal, where little work occurred on an area, to highly compacted or otherwise disturbed soils. The initial reclamation tasks would include:

- Demolition of concrete slabs from temporary material storage areas
- Removal of temporary stockpiles and embankments
- Removal of other construction materials or structures
- Removal of project-related temporary haul routes
- Grading and leveling of the site

Initial soil treatments would depend on the actual disturbance, but for soils with more than minimal impact, the work would be expected to include ripping the soil and incorporating amendments (for example, gypsum) to address compaction. This would be followed by spreading topsoil, cross discing, and grading and leveling to prepare the soil surface for future use. At this point, if an end-user (for example, agricultural or conservation entities) is ready to take over activities at the site to transition it to long-term use, the project reclamation steps would be complete. However, if an end-user is not ready, then the areas would be drill-seeded to provide erosion and dust control with a grass seed mix appropriate for the desired end-use. Areas to be restored to natural habitat would be seeded with a native grass mix, whereas areas to be restored to agricultural use would be seeded with an erosion control seed mix.

Table 4-1 summarizes the recommended steps for reclamation of temporary construction areas with a native soil base, and the equipment and estimated production rates for each step.

Table 4-1. Recommended Post-construction Treatments for Reclamation of Native Soil Base

Step	Task	Equipment	Daily Rate	Unit
1	Slab demolition	CAT 330 excavator with hydraulic hammer	250	cy
2	Ring levee removal (Twin Cities only)	CAT 12G grader	5,000	cy
		CAT D8 bulldozer		
		CAT 623 scraper		
		CAT CS68B compactor		
		Water truck		
3	Grade and level site	CAT 12G grader	20	acres
4	Rip to 3-foot depth	CAT D8 bulldozer	5	acres
5	Spread amendments to address compaction	CAT 930K loader to load trailers	200	tons
		Case Magnum 280 farm tractor with spreader trailer	100	tons
6	Incorporate amendments and cross rip	Case Magnum 280 farm tractor with disc	5	acres
7	Spread topsoil	CAT 623 scraper	5,000	cy
		CAT D6 dozer		
8	Cross disc	Case Magnum 280 farm tractor with disc	20	acres

Table 4-1. Recommended Post-construction Treatments for Reclamation of Native Soil Base

Step	Task	Equipment	Daily Rate	Unit
9	Final grade and level	Case Magnum 280 farm tractor with land plane	25	acres
10	Drill seeding	Case Magnum 280 farm tractor with drill-seeder	60	acres

Notes:

cy = cubic yard(s)

4.1.2 Reusable Tunnel Material Base

The RTM soil base condition would exist in areas where the native soil was excavated to create borrow pits that would later be backfilled with RTM to bring the area back to existing grade. RTM soil base would likely only exist at portions of the Twin Cities Complex, on Glanville Tract. In some cases, other temporary excavation could be refilled with excavated material other than RTM, though it would still receive the same treatment. Treatments for reclamation of RTM base soil would be similar to those recommended for native soils, as described in Section 4.1.1; however, additional treatments could be required to address soil conditions (for example, high or low pH).

Lime and soil sulfur were assumed to be appropriate amendments for addressing soil pH; however, the actual amendments used would be based on soil tests performed at each of the sites post-construction. Amendments to address nutrient deficiencies would be handled by the end-user because the choice and quantity of amendments could be dependent on the crop type or specific habitat plan. Topsoil would be re-spread to a depth of 1 foot over the RTM base soil. For crops, the top 1 foot is most important to the farmer and where they typically focus fertilizer application to address the specific needs of the crop.

Table 4-2 summarizes the recommended steps for reclamation of temporary construction areas with an RTM base and the equipment and estimated production rates for each step.

Table 4-2. Recommended Post-construction Treatments for Reclamation of Reusable Tunnel Material Soil Base

Step	Task	Equipment	Daily Rate	Unit
1	Grade and level site	CAT 12G grader	20	acres
2	Rip to 3-foot depth	CAT D8 bulldozer	5	acres
3	Spread amendments to address compaction	CAT 930K loader to load trailers	200	tons
		Case Magnum 280 farm tractor with spreader trailer	100	tons
4	Incorporate amendments and cross rip	Case Magnum 280 farm tractor with disc	5	acres
5	Spread topsoil	CAT 623 scraper	5,000	cy
		CAT D6 dozer		
6	Spread amendments to address RTM soil suitability	CAT 930K loader to load trailers	2,880	cy
		Case Magnum 280 farm tractor with spreader trailer	360	cy
7	Cross disc	Case Magnum 280 farm tractor with disc	20	acres

Table 4-2. Recommended Post-construction Treatments for Reclamation of Reusable Tunnel Material Soil Base

Step	Task	Equipment	Daily Rate	Unit
8	Final grade and level	Case Magnum 280 farm tractor with land plane	25	acres
9	Drill seeding	Case Magnum 280 farm tractor with drill-seeder	60	acres

4.1.3 Reusable Tunnel Material Stockpile

Permanent RTM stockpiles would be expected at some of the tunnel launch sites. These stockpiles would be elevated above the surrounding grades and would be planted with native grasses primarily for erosion control, but also to create a natural habitat area while the stockpile is not in use. Recommended treatments for permanent RTM stockpiles include spreading topsoil, cross discing, and planting native grasses. An access road would also be constructed from the existing paved road nearest to the stockpile to facilitate future use of the stockpile.

Ground improvement would be required to support concrete slabs at the Bouldin Island and Lower Roberts Island Launch Shaft Sites. These ground improvement elements would likely permanently impact the quality of the near-surface soil; therefore, reclamation of these areas for agricultural use would be more challenging. Areas that contain temporary slabs supported by ground improvement elements would be prepared with the same treatments described for the RTM stockpile implemented after the slabs are removed.

Table 4-3 summarizes the recommended steps for stabilization of permanent RTM stockpiles and the equipment and estimated production rates for each step.

Table 4-3. Recommended Post-construction Treatments for Permanent Reusable Tunnel Material Stockpiles

Step	Task	Equipment	Daily Rate	Unit
1	Spread topsoil	CAT 623 scraper	5,000	cy
		CAT D6 dozer		
2	Cross disc	Case Magnum 280 farm tractor with disc	20	acres
3	Hydroseed native grasses, apply straw mulch, apply tackifier	Diesel truck (separate truck for each step)	20	acres
4	Establish access road to stockpile	CAT 12G grader	7,500	sf
		CAT 623 scraper		
		CAT CS68B compactor		
		Water truck		

Notes:

cy = cubic yards

sf = square foot (feet)

4.2 Project Site Treatments

This section includes descriptions of each project site where post-construction reclamation is planned, and provides summaries of the sequence, equipment required, and total expected duration of the reclamation work. It was assumed that reclamation work would need to be completed in one construction season or less, with a maximum duration of approximately 147 working days (April 15 to November 15 = 7 months x 21 working days per month = 147 working days). The quantity of equipment to be used for each task was adjusted until the total duration was less than approximately 147 working days. Note that this duration and the estimated quantity of equipment required are only approximations. Contractor-specific production rates, final acreages of temporary construction areas, equipment mobilization times, soil testing, and other factors would likely all affect these estimates and would be required to produce more refined estimates as part of future design phases.

The expected on-road truck and commuter traffic for post-construction reclamation at each project site was also estimated and is summarized in the following sections. The following assumptions were used to determine the on-road truck and commuter traffic distances:

- Concrete slab disposal locations:
  - Port of West Sacramento: Intakes, Twin Cities Complex
  - Port of Stockton: Bouldin Island Launch Shaft, Lower Roberts Island Launch Shaft
  - Vernalis: Southern Forebay, SDCF (SWP), SDCF (CVP)
- Ring levee material disposal (for Twin Cities Complex): Onsite
- Soil amendment source location: Lathrop, California
- Average round-trip commute distance: 50 miles

4.2.1 Intake C-E-2 – Both Corridors

4.2.1.1 Site Description

Intake C-E-2 is the northernmost intake and would be located on the eastern bank of the Sacramento River east of Clarksburg. The existing site is used for growing multiple row and tree crops, including wheat, grain, hay, tomatoes, and pears (DWR, 2019).

Permanent features would include the following:

- Concrete intake structure
- Outlet shaft
- Sedimentation basins
- Sedimentation drying lagoons
- Control structures
- Operations buildings
- Realigned State Route 160 along the Sacramento River

Temporary construction areas would include areas for the following activities:

- Material and equipment laydown and staging
- Material stockpiles
- Slurry batch plant
- Retention ponds

- Parking areas
- Bus drop-off and pick-up
- Access roads
- Facilities and trailers for owners, contractors, and crew

Table 4-4 summarizes the acreage at the site delineated by base soil type and proposed post-construction use.

Table 4-4. Summary of Land Reclamation Areas at Intake C-E-2

Base Soil	Proposed Post-Construction Use	Acres
Native Soil	Agriculture	88

4.2.1.2 Construction Methods and Equipment

Reclamation work would consist of reclaiming approximately 88 acres of temporary construction areas with native soil base to agriculture use following the methods described in Section 4.1. Tables 4-5 and 4-6 summarize the equipment, durations, and expected on-road truck and commuter traffic that would be required to complete the reclamation work, assuming all 88 acres are impacted.

Table 4-5. Summary of Required Equipment for Reclamation Work at Intake C-E-2

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Grade and level site	Grader small	5	1	5	88[b]
2	Rip to 3-foot depth	Dozer large	18	2	9	88[b]
3	Spread amendments to address compaction	Rubber-tire loader medium	1	1	2	88[b]
		Farm tractor large	2	1		
4	Incorporate amendments to address compaction and cross rip	Farm tractor large	18	2	9	88[b]
5	Spread topsoil	Scraper	33	2	17	88[b]
		Dozer medium	33	2		
6	Cross disc	Farm tractor large	5	1	5	88[b]
7	Final grade and level	Farm tractor large	4	1	4	88[b]
8	Drill-seed grasses	Farm tractor large	2	1	2	88
Total Duration					**53 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

[b] Indicates the number of acres of soil that would be disturbed and would likely generate dust for the given task.

Table 4-6. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at Intake C-E-2

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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-foot depth	-	-	-	4	50
3	Spread amendments to address compaction	Semi-truck	3	96	4	50
4	Incorporate amendments to address compaction and cross rip	-	-	-	4	50
5	Spread topsoil	-	-	-	6	50
6	Cross disc	-	-	-	3	50
7	Final grade and level	-	-	-	3	50
8	Drill-seed grasses	-	-	-	3	50

Notes:

- = not applicable

4.2.2 Intake C-E-3 – Both Corridors

4.2.2.1 Site Description

Intake C-E-3 is the middle intake and would be located on the eastern bank of the Sacramento River north of Hood. The existing site is used for growing multiple tree crops, including grapes, pears, apples, cherries, and citrus (DWR, 2019).

Permanent features would include the following:

- Concrete intake structure
- Outlet shaft
- Sedimentation basins
- Sedimentation drying lagoons
- Control structures
- Realigned State Route 160 along the Sacramento River

Temporary construction areas to be restored to agricultural usage would include the following activities:

- Material and equipment laydown and staging
- Material stockpiles
- Slurry batch plant
- Retention ponds
- Parking areas
- Bus drop-off and pick-up
- Access roads
- Facilities and trailers for owners, contractors, and crew

Table 4-7 summarizes the acreage at the site delineated by base soil type and proposed post-construction use.

Table 4-7. Summary of Land Reclamation Areas at Intake C-E-3

Base Soil	Proposed Post-Construction Use	Acres
Native Soil	Agriculture	119

4.2.2.2 Construction Methods and Equipment

Reclamation work would consist of reclaiming approximately 122 acres of temporary construction areas with native soil base to agriculture use following the methods described in Section 4.1. Tables 4-8 and 4-9 summarize the equipment, durations, and expected on-road truck and commuter traffic that would be required to complete the reclamation work, assuming all 122 acres would be impacted.

Table 4-8. Summary of Required Equipment for Reclamation Work at Intake C-E-3

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Grade and level site	Grader small	6	1	6	119[b]
2	Rip to 3-foot depth	Dozer large	24	2	12	119[b]
3	Spread amendments to address compaction	Rubber-tire loader medium	2	1	2	119[b]
		Farm tractor large	3	2		
4	Incorporate amendments to address compaction and cross rip	Farm tractor large	24	2	12	119[b]
5	Spread topsoil	Scraper	41	2	21	119[b]
		Dozer medium	41	2		
6	Cross disc	Farm tractor large	6	1	6	119[b]
7	Final grade and level	Farm tractor large	5	1	5	119[b]
8	Drill-seed grasses	Farm tractor large	2	1	2	119
Total Duration					**66 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-9. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at Intake C-E-3

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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-foot depth	-	-	-	4	50
3	Spread amendments to address compaction	Semi-truck	3	92	5	50
4	Incorporate amendments to address compaction and cross rip	-	-	-	4	50
5	Spread topsoil	-	-	-	6	50
6	Cross disc	-	-	-	3	50
7	Final grade and level	-	-	-	3	50
8	Drill-seed grasses	-	-	-	3	50

4.2.3 Intake C-E-5 – Both Corridors

4.2.3.1 Site Description

Intake C-E-5 is the southernmost intake and would be located on the eastern bank of the Sacramento River south of Hood. Land at the existing site area is used for growing multiple row and tree crops, including tomatoes, safflower, grapes, pears, and cherries (DWR, 2019).

Permanent features would include the following:

- Concrete intake structure
- Outlet shaft
- Sedimentation basins
- Sedimentation drying lagoons
- Control structures
- Realigned State Route 160 along the Sacramento River

Temporary construction areas would include areas for the following activities:

- Material and equipment laydown and staging
- Material stockpiles
- Slurry batch plant
- Retention ponds
- Parking areas
- Bus drop-off and pick-up
- Access roads
- Facilities and trailers for owners, contractors, and crew

Two design capacities are being considered for Intake C-E-5: 3,000 cfs and 1,500 cfs. The size of both the temporary construction area and the remaining permanent structures vary slightly between options, which affects the size of the post-construction reclamation areas. Table 4-10 summarizes the acreage at the site delineated by base soil type and proposed post-construction use for both capacity options.

Table 4-10. Summary of Land Reclamation Areas at Intake C-E-5

Intake Capacity (cfs)	Base Soil	Proposed Post-construction Use	Acres
3,000	Native Soil	Agriculture	130
1,500	Native Soil	Agriculture	134

4.2.3.2 Construction Methods and Equipment

Tables 4-11 through 4-14 summarize the equipment, durations, and expected on-road truck and commuter traffic that would be required to complete the reclamation work for both of the intake capacities summarized in Table 4-10.

Table 4-11. Summary of Required Equipment for Reclamation Work at Intake C-E-5 – 3,000 cfs Option

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Grade and level site	Grader small	7	1	7	130[b]
2	Rip to 3-foot depth	Dozer large	27	2	14	130[b]
3	Spread amendments to address compaction	Rubber-tire loader medium	2	1	2	130[b]
		Farm tractor large	3	2		
4	Incorporate amendments to address compaction and cross rip	Farm tractor large	27	2	14	130[b]
5	Spread topsoil	Scraper	37	2	19	130[b]
		Dozer medium	37	2		
6	Cross disc	Farm tractor large	7	1	7	130
7	Final grade and level	Farm tractor large	6	1	6	130[b]
8	Drill-seed grasses	Farm tractor large	3	1	3	130
Total Duration					**72 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-12. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at Intake C-E-5 – 3,000 cfs Option

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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-foot depth	-	-	-	4	50
3	Spread amendments to address compaction	Semi-truck	4	92	5	50
4	Incorporate amendments to address compaction and cross rip	-	-	-	4	50
5	Spread topsoil	-	-	-	6	50
6	Cross disc	-	-	-	3	50
7	Final grade and level	-	-	-	3	50
8	Drill-seed grasses	-	-	-	3	50

Table 4-13. Summary of Required Equipment for Reclamation Work at Intake C-E-5 – 1,500 cfs Option

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Grade and level site	Grader small	7	1	7	134[b]
2	Rip to 3-foot depth	Dozer large	28	2	14	134[b]
3	Spread amendments to address compaction	Rubber-tire loader medium	2	1	2	134[b]
		Farm tractor large	3	2		
4	Incorporate amendments to address compaction and cross rip	Farm tractor large	28	2	14	134[b]
5	Spread topsoil	Scraper	32	2	16	134[b]
		Dozer medium	32	2		
6	Cross disc	Farm tractor large	7	1	7	134[b]
7	Final grade and level	Farm tractor large	6	1	6	134[b]
8	Drill-seed grasses	Farm tractor large	3	1	3	134
Total Duration					**69 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-14. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at Intake C-E-5 – 1,500 cfs Option

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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-foot depth	-	-	-	4	50
3	Spread amendments to address compaction	Semi-truck	4	92	5	50
4	Incorporate amendments to address compaction and cross rip	-	-	-	4	50
5	Spread topsoil	-	-	-	6	50
6	Cross disc	-	-	-	3	50
7	Final grade and level	-	-	-	3	50
8	Drill-seed grasses	-	-	-	3	50

4.2.4 Twin Cities Complex (Glanville Tract) – Both Corridors

4.2.4.1 Site Description

The Twin Cities Complex, located on Glanville Tract, would serve as a double launch shaft and would be included in both of the potential corridor options. Land at the existing site area is used for pasture and for growing multiple types of row crops (DWR, 2019).

Permanent features would include the elevated pad for the tunnel shaft, permanent RTM stockpile, and access roads leading to the pad and RTM stockpile. Temporary construction areas would include areas for the following activities:

- Temporary RTM storage
- RTM mechanical drying
- Topsoil storage
- Tunnel segment storage
- Retention ponds
- Ring levee
- Railroad spurs
- Parking areas
- Access roads
- Facilities and trailers for owners, contractors, and crew

A portion of this site would also be excavated as a borrow pit and then backfilled with RTM to bring the area back to existing grade.

A total of eight scenarios (four tunnel diameter options for each of the corridor options, Central and Eastern) are being considered and have different temporary construction areas, as described in Table 4-15. Note that for the Twin Cities Complex, the total site acreage does not change based on alignment or tunnel diameter; however, the size of the borrow area differs based on the alignment. Additionally, the size of the remaining permanent RTM stockpile differs based on both alignment and tunnel diameter.

Table 4-15 summarizes the acreage at the site delineated by base soil type and proposed post-construction use for all alignment and tunnel diameter scenarios.

Table 4-15. Summary of Land Reclamation Areas at the Twin Cities Complex (Glanville Tract)

Alignment / Tunnel Diameter	Base Soil	Proposed Post-Construction Use	Acres
Central / 26-ft Diameter	Native Soil	Agriculture	231
	RTM Base	Agriculture	65
	RTM Stockpile	Stockpile	15
Central / 31-ft Diameter	Native Soil	Agriculture	264
	RTM Base	Agriculture	65
	RTM Stockpile	Stockpile	52
Central / 36-ft Diameter	Native Soil	Agriculture	275
	RTM Base	Agriculture	65
	RTM Stockpile	Stockpile	130
Central / 40-ft Diameter	Native Soil	Agriculture	195
	RTM Base	Agriculture	65
	RTM Stockpile	Stockpile	275
Eastern / 26-ft Diameter	Native Soil	Agriculture	231
	RTM Base	Agriculture	65
	RTM Stockpile	Stockpile	15
Eastern / 31-ft Diameter	Native Soil	Agriculture	232
	RTM Base	Agriculture	65
	RTM Stockpile	Stockpile	84
Eastern / 36-ft Diameter	Native Soil	Agriculture	246
	RTM Base	Agriculture	65
	RTM Stockpile	Stockpile	159
Eastern / 40-ft Diameter	Native Soil	Agriculture	179
	RTM Base	Agriculture	65
	RTM Stockpile	Stockpile	291

Notes:

ft = foot (feet)

4.2.4.2 Construction Methods and Equipment

Tables 4-16 through 4-31 summarize the equipment, durations, and expected on-road truck and commuter traffic that would be required to complete the reclamation work for all alignment and diameter scenarios summarized in Table 4-15.

Table 4-16. Summary of Required Equipment for Reclamation Work at the Twin Cities Complex (Glanville Tract) – Central / 26-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	168	7	24	26
2	Ring levee removal (Twin Cities only)	Scrapers	44	5	9	29
		Dozer large	44	5		
		Graders	44	5		
		Compactor	44	5		
		Water truck	44	5		
3	Grade and level site	Grader small	15	4	4	296[b]
4	Rip to 3-foot depth	Dozer large	60	5	12	296[b]
5	Spread amendments to address compaction	Rubber-tire loader medium	4	2	2	296[b]
		Farm tractor large	7	4		
6	Incorporate amendments to address compaction and cross rip	Farm tractor large	61	5	13	296[b]
7	Spread topsoil	Scraper	103	7	15	311[b]
		Dozer medium	103	7		
8	Spread amendments to address fertility (RTM base only)	Rubber-tire loader medium	2	1	2	65[b]
		Farm tractor large	4	2		
9	Cross disc	Farm tractor large	17	4	5	311[b]
10	Final grade and level	Farm tractor large	13	4	4	296[b]
11	Drill-seed grasses	Farm tractor large	6	1	6	296[b]
12	Hydroseed (RTM stockpile only)	Diesel truck	1	1	1	15
				Total Duration	**97 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-17. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Twin Cities Complex (Glanville Tract) – Central / 26-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	175	50	9	50
2	Ring levee removal (Twin Cities only)	-	-	-	27	50
3	Grade and level site	-	-	-	6	50
4	Rip to 3-foot depth	-	-	-	7	50
5	Spread amendments to address compaction	Semi-truck	8	76	8	50
6	Incorporate amendments to address compaction and cross rip	-	-	-	7	50
7	Spread topsoil	-	-	-	16	50
8	Spread amendments to address fertility (RTM base only)	Semi-truck	6	76	5	50
9	Cross disc	-	-	-	6	50
10	Final grade and level	-	-	-	6	50
11	Drill-seed grasses	-	-	-	3	50
12	Hydroseed (RTM Stockpile only)	-	-	-	3	50

Table 4-18. Summary of Required Equipment for Reclamation Work at the Twin Cities Complex (Glanville Tract) – Central / 31-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	188	7	27	29
2	Ring levee removal (Twin Cities only)	Scrapers	44	5	9	29
		Dozer large	44	5		
		Graders	44	5		
		Compactor	44	5		
		Water truck	44	5		
3	Grade and level site	Grader small	17	4	5	329 [b]
4	Rip to 3-foot depth	Dozer large	67	5	14	329 [b]
5	Spread amendments to address compaction	Rubber-tire loader medium	4	2	2	329 [b]
		Farm tractor large	8	4		
6	Incorporate amendments to address compaction and cross rip	Farm tractor large	68	5	14	329 [b]
7	Spread topsoil	Scraper	127	6	22	381 [b]
		Dozer medium	127	6		
8	Spread amendments to address fertility (RTM base only)	Rubber-tire loader medium	2	1	2	65 [b]
		Farm tractor large	4	2		
9	Cross disc	Farm tractor large	21	4	6	381 [b]
10	Final grade and level	Farm tractor large	14	4	4	329 [b]
11	Drill-seed grasses	Farm tractor large	7	1	7	329 [b]
12	Hydroseed (RTM stockpile only)	Diesel truck	3	1	3	52
				Total Duration	**115 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-19. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Twin Cities Complex (Glanville Tract) – Central / 31-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	-	-	-	6	50
4	Rip to 3-foot depth	-	-	-	7	50
5	Spread amendments to address compaction	Semi-truck	9	76	8	50
6	Incorporate amendments to address compaction and cross rip	-	-	-	7	50
7	Spread topsoil	-	-	-	14	50
8	Spread amendments to address fertility (RTM base only)	Semi-truck	6	76	5	50
9	Cross disc	-	-	-	6	50
10	Final grade and level	-	-	-	6	50
11	Drill-seed grasses	-	-	-	3	50
12	Hydroseed (RTM stockpile only)	-	-	-	3	50

Table 4-20. Summary of Required Equipment for Reclamation Work at the Twin Cities Complex (Glanville Tract) – Central / 36-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	207	7	30	32
2	Ring levee removal (Twin Cities only)	Scrapers	44	5	9	29
		Dozer large	44	5		
		Graders	44	5		
		Compactor	44	5		
		Water truck	44	5		
3	Grade and level site	Grader small	17	4	5	340 [b]
4	Rip to 3-foot depth	Dozer large	69	5	14	340 [b]
5	Spread amendments to address compaction	Rubber-tire loader medium	4	2	2	340 [b]
		Farm tractor large	8	4		
6	Incorporate amendments to address compaction and cross rip	Farm tractor large	70	5	14	340 [b]
7	Spread topsoil	Scraper	151	5	31	470 [b]
		Dozer medium	151	5		
8	Spread Amendments to address fertility (RTM Base only)	Rubber-tire loader medium	2	1	2	65
		Farm Tractor Large	4	2		
9	Cross disc	Farm tractor large	25	4	7	470 [b]
10	Final grade and level	Farm tractor large	14	4	4	340 [b]
11	Drill-seed grasses	Farm tractor large	7	1	7	340 [b]
12	Hydroseed (RTM stockpile only)	Diesel truck	7	1	7	130
				Total Duration	**132 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-21. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Twin Cities Complex (Glanville Tract) – Central / 36-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	-	-	-	6	50
4	Rip to 3-foot depth	-	-	-	7	50
5	Spread amendments to address compaction	Semi-truck	10	76	8	50
6	Incorporate amendments to address compaction and cross rip	-	-	-	7	50
7	Spread topsoil	-	-	-	12	50
8	Spread Amendments to address fertility (RTM Base only)	Semi-truck	6	76	5	50
9	Cross disc	-	-	-	6	50
10	Final grade and level	-	-	-	6	50
11	Drill-seed grasses	-	-	-	3	50
12	Hydroseed (RTM stockpile only)	-	-	-	3	50

Table 4-22. Summary of Required Equipment for Reclamation Work at the Twin Cities Complex (Glanville Tract) – Central / 40-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	220	6	37	34
2	Ring levee removal (Twin Cities only)	Scrapers	50	5	11	29
		Dozer large	50	5		
		Graders	50	5		
		Compactor	50	5		
		Water truck	50	5		
3	Grade and level site	Grader small	14	4	4	260 [b]
4	Rip to 3-foot depth	Dozer large	53	5	11	260 [b]
5	Spread amendments to address compaction	Rubber-tire loader medium	3	2	2	260 [b]
		Farm tractor large	6	4		
6	Incorporate amendments to address compaction and cross rip	Farm tractor large	54	5	11	260 [b]
7	Spread topsoil	Scraper	173	5	35	535 [b]
		Dozer medium	173	5		
8	Spread Amendments to address fertility (RTM Base only)	Rubber-tire loader medium	2	1	2	65
		Farm Tractor Large	4	2		
9	Cross disc	Farm tractor large	28	4	7	535 [b]
10	Final grade and level	Farm tractor large	11	4	3	260 [b]
11	Drill-seed grasses	Farm tractor large	6	1	6	260 [b]
12	Hydroseed (RTM stockpile only)	Diesel truck	14	1	14	275
				Total Duration	**143 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-23. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Twin Cities Complex (Glanville Tract) – Central / 40-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	148	50	8	50
2	Ring levee removal (Twin Cities only)	-	-	-	27	50
3	Grade and level site	-	-	-	6	50
4	Rip to 3-foot depth	-	-	-	7	50
5	Spread amendments to address compaction	Semi-truck	7	76	8	50
6	Incorporate amendments to address compaction and cross rip	-	-	-	7	50
7	Spread topsoil	-	-	-	12	50
8	Spread Amendments to address fertility (RTM Base only)	Semi-truck	6	76	5	50
9	Cross disc	-	-	-	6	50
10	Final grade and level	-	-	-	6	50
11	Drill-seed grasses	-	-	-	3	50
12	Hydroseed (RTM stockpile only)	-	-	-	3	50

Table 4-24. Summary of Required Equipment for Reclamation Work at the Twin Cities Complex (Glanville Tract) – Eastern / 26-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	168	7	24	26
2	Ring levee removal (Twin Cities only)	Scrapers	44	5	9	29
		Dozer large	44	5		
		Graders	44	5		
		Compactor	44	5		
		Water truck	44	5		
3	Grade and level site	Grader small	15	4	4	296 [b]
4	Rip to 3-foot depth	Dozer large	60	5	12	296 [b]
5	Spread amendments to address compaction	Rubber-tire loader medium	4	2	2	296 [b]
		Farm tractor large	7	4		
6	Incorporate amendments to address compaction and cross rip	Farm tractor large	61	5	13	296 [b]
7	Spread topsoil	Scraper	104	6	18	311 [b]
		Dozer medium	104	6		
8	Spread Amendments to address fertility (RTM base only)	Rubber-tire loader medium	2	1	2	65 [b]
		Farm tractor large	4	2		
9	Cross disc	Farm tractor large	17	4	5	311 [b]
10	Final grade and level	Farm tractor large	13	4	4	296 [b]
11	Drill-seed grasses	Farm tractor large	6	1	6	296 [b]
12	Hydroseed (RTM stockpile only)	Diesel truck	1	1	1	15
				Total Duration	**100 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-25. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Twin Cities Complex (Glanville Tract) – Eastern / 26-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	175	50	9	50
2	Ring levee removal (Twin Cities only)	-	-	-	27	50
3	Grade and level site	-	-	-	6	50
4	Rip to 3-foot depth	-	-	-	7	50
5	Spread amendments to address compaction	Semi-truck	8	76	8	50
6	Incorporate amendments to address compaction and cross rip	-	-	-	7	50
7	Spread topsoil	-	-	-	14	50
8	Spread amendments to address fertility (RTM base only)	Semi-truck	6	76	5	50
9	Cross disc	-	-	-	6	50
10	Final grade and level	-	-	-	6	50
11	Drill-seed grasses	-	-	-	3	50
12	Hydroseed (RTM stockpile only)	-	-	-	3	50

Table 4-26. Summary of Required Equipment for Reclamation Work at the Twin Cities Complex (Glanville Tract) – Eastern / 31-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	188	7	27	29
2	Ring levee removal (Twin Cities only)	Scrapers	44	5	9	29
		Dozer large	44	5		
		Graders	44	5		
		Compactor	44	5		
		Water truck	44	5		
3	Grade and level site	Grader small	15	4	4	297[b]
4	Rip to 3-foot depth	Dozer large	60	5	12	297[b]
5	Spread amendments to address compaction	Rubber-tire loader medium	4	2	2	297[b]
		Farm tractor large	7	4		
6	Incorporate amendments to address compaction and cross rip	Farm tractor large	61	5	13	297[b]
7	Spread topsoil	Scraper	127	5	26	381[b]
		Dozer medium	127	5		
8	Spread Amendments to address fertility (RTM Base only)	Rubber-tire loader medium	2	1	2	65
		Farm tractor large	4	2		
9	Cross disc	Farm tractor large	21	4	6	381[b]
10	Final grade and level	Farm tractor large	13	4	4	297[b]
11	Drill-seed grasses	Farm tractor large	6	1	6	297[b]
12	Hydroseed (RTM stockpile only)	Diesel truck	5	1	5	84
Total Duration					**116 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-27. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Twin Cities Complex (Glanville Tract) – Eastern / 31-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	-	-	-	6	50
4	Rip to 3-foot depth	-	-	-	7	50
5	Spread amendments to address compaction	Semi-truck	8	76	8	50
6	Incorporate amendments to address compaction and cross rip	-	-	-	7	50
7	Spread topsoil	-	-	-	12	50
8	Spread Amendments to address fertility (RTM Base only)	Semi-truck	6	76	5	50
9	Cross disc	-	-	-	6	50
10	Final grade and level	-	-	-	6	50
11	Drill-seed grasses	-	-	-	3	50
12	Hydroseed (RTM stockpile only)	-	-	-	3	50

Table 4-28. Summary of Required Equipment for Reclamation Work at the Twin Cities Complex (Glanville Tract) – Eastern / 36-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	207	6	35	32
2	Ring levee removal (Twin Cities only)	Scrapers	44	5	9	29
		Dozer large	44	5		
		Graders	44	5		
		Compactor	44	5		
		Water truck	44	5		
3	Grade and level site	Grader small	16	4	4	311 [b]
4	Rip to 3-foot depth	Dozer large	63	5	13	311 [b]
5	Spread amendments to address compaction	Rubber-tire loader medium	4	2	2	311 [b]
		Farm tractor large	7	4		
6	Incorporate amendments to address compaction and cross rip	Farm tractor large	64	5	13	311 [b]
7	Spread topsoil	Scraper	151	5	31	470 [b]
		Dozer medium	151	5		
8	Spread Amendments to address fertility (RTM Base only)	Rubber-tire loader medium	2	1	2	65
		Farm tractor large	4	2		
9	Cross disc	Farm tractor large	25	4	7	470 [b]
10	Final grade and level	Farm tractor large	13	4	4	311 [b]
11	Drill-seed grasses	Farm tractor large	7	1	7	311 [b]
12	Hydroseed (RTM stockpile only)	Diesel truck	8	1	8	159
				Total Duration	**135 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-29. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Twin Cities Complex (Glanville Tract) – Eastern / 36-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	148	50	8	50
2	Ring levee removal (Twin Cities only)	-	-	-	27	50
3	Grade and level site	-	-	-	6	50
4	Rip to 3-foot depth	-	-	-	7	50
5	Spread amendments to address compaction	Semi-truck	9	76	8	50
6	Incorporate amendments to address compaction and cross rip	-	-	-	7	50
7	Spread topsoil	-	-	-	12	50
8	Spread Amendments to address fertility (RTM Base only)	Semi-truck	6	76	5	50
9	Cross disc	-	-	-	6	50
10	Final grade and level	-	-	-	6	50
11	Drill-seed grasses	-	-	-	3	50
12	Hydroseed (RTM stockpile only)	-	-	-	3	50

Table 4-30. Summary of Required Equipment for Reclamation Work at the Twin Cities Complex (Glanville Tract) – Eastern / 40-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	220	6	37	34
2	Ring levee removal (Twin Cities only)	Scrapers	50	5	10	29
		Dozer large	50	5		
		Graders	50	5		
		Compactor	50	5		
		Water truck	50	5		
3	Grade and level site	Grader small	13	4	4	244 [b]
4	Rip to 3-foot depth	Dozer large	50	5	10	244 [b]
5	Spread amendments to address compaction	Rubber-tire loader medium	3	2	2	244 [b]
		Farm tractor large	6	4		
6	Incorporate amendments to address compaction and cross rip	Farm tractor large	51	5	11	244 [b]
7	Spread topsoil	Scraper	171	5	35	535 [b]
		Dozer medium	171	5		
8	Spread Amendments to address fertility (RTM Base only)	Rubber-tire loader medium	2	1	2	65
		Farm tractor large	4	2		
9	Cross disc	Farm tractor large	28	4	7	535 [b]
10	Final grade and level	Farm tractor large	11	4	3	244 [b]
11	Drill-seed grasses	Farm tractor large	5	1	5	244 [b]
12	Hydroseed (RTM stockpile only)	Diesel truck	15	1	15	291
				Total Duration	**141 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-31. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Twin Cities Complex (Glanville Tract) – Eastern / 40-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	148	50	8	50
2	Ring levee removal (Twin Cities only)	-	-	-	27	50
3	Grade and level site	-	-	-	6	50
4	Rip to 3-foot depth	-	-	-	7	50
5	Spread amendments to address compaction	Semi-truck	7	76	8	50
6	Incorporate amendments to address compaction and cross rip	-	-	-	7	50
7	Spread topsoil	-	-	-	12	50
8	Spread Amendments to address fertility (RTM Base only)	Semi-truck	6	76	5	50
9	Cross disc	-	-	-	6	50
10	Final grade and level	-	-	-	6	50
11	Drill-seed grasses	-	-	-	3	50
12	Hydroseed (RTM stockpile only)	-	-	-	3	50

4.2.5 Bouldin Island Launch Shaft – Central Corridor

4.2.5.1 Site Description

The Bouldin Island Launch Shaft would serve as a launch and reception shaft for the Central Corridor. Land at the existing site area is used for growing corn and alfalfa (DWR, 2019).

Permanent features would include the elevated pad for the tunnel shaft, access road leading to the pad, and permanent RTM stockpile. Repairs would be required to existing levees around the perimeter of the island. Temporary construction areas to be restored to agricultural usage would include areas for the following:

- Temporary RTM storage
- RTM mechanical drying
- Topsoil storage
- Tunnel segment storage
- Retention ponds
- Parking areas
- Access roads
- Facilities and trailers for owners, contractors, and crew

Ground improvement would be installed beneath the shaft pad, segment storage slab, and RTM temporary wet storage area.

Four tunnel diameter options are being considered and have different temporary construction areas, as described in Table 4-32. Note that for the Bouldin Island Launch Shaft Site, only the size of the remaining permanent RTM stockpile differs based on tunnel diameter. Table 4-32 summarizes the acreage at the site delineated by base soil type and proposed post-construction use for all tunnel diameter options.

Table 4-32. Summary of Land Reclamation Areas at the Bouldin Island Launch Shaft

Tunnel Diameter (ft)	Base Soil	Proposed Post-Construction Use	Acres
26	Native Soil	Agriculture	88
	RTM Stockpile	Stockpile	145
31	Native Soil	Agriculture	87
	RTM Stockpile	Stockpile	187
36	Native Soil	Agriculture	88
	RTM Stockpile	Stockpile	216
40	Native Soil	Agriculture	91
	RTM Stockpile	Stockpile	247

4.2.5.2 Construction Methods and Equipment

Tables 4-33 through 4-40 summarize the equipment, durations, and expected on-road truck and commuter traffic that would be required to complete the reclamation work for all alignment and diameter scenarios summarized in Table 4-32.

Table 4-33. Summary of Required Equipment for Reclamation Work at the Bouldin Island Launch Shaft – 26-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	104	5	21	16
2	Grade and level site	Grader small	5	1	5	88 [b]
3	Rip to 3-foot depth	Dozer large	18	2	9	88 [b]
4	Spread amendments to address compaction	Rubber-tire loader medium	1	1	1	88 [b]
		Farm tractor large	2	2		
5	Incorporate amendments to address compaction and cross rip	Farm tractor large	18	2	9	88 [b]
6	Spread topsoil	Scraper	42	2	21	233 [b]
		Dozer medium	42	2		
7	Cross disc	Farm tractor large	13	1	13	233 [b]
8	Final grade and level	Farm tractor large	4	1	4	88 [b]
9	Drill-seed grasses	Farm tractor large	2	1	2	88
10	Hydroseed (RTM stockpile only)	Diesel truck	8	1	8	145

Table 4-33. Summary of Required Equipment for Reclamation Work at the Bouldin Island Launch Shaft – 26-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
11	Establish access road to RTM stockpile	Grader small	3	1	3	0.4 [b]
		Scraper	3	1		
		Compactor	3	1		
		Water truck	3	1		
				Total Duration	**96 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-34. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Bouldin Island Launch Shaft – 26-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	54	7	50
2	Grade and level site	-	-	-	3	50
3	Rip to 3-foot depth	-	-	-	4	50
4	Spread amendments to address compaction	Semi-truck	5	68	5	50
5	Incorporate amendments to address compaction and cross rip	-	-	-	4	50
6	Spread topsoil	-	-	-	6	50
7	Cross disc	-	-	-	3	50
8	Final grade and level	-	-	-	3	50
9	Drill-seed grasses	-	-	-	3	50
10	Hydroseed (RTM stockpile only)	-	-	-	3	50
11	Establish access road to RTM stockpile	-	-	-	6	50

Table 4-35. Summary of Required Equipment for Reclamation Work at the Bouldin Island Launch Shaft – 31-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	123	5	25	19
2	Grade and level site	Grader small	5	1	5	87 [b]
3	Rip to 3-foot depth	Dozer large	18	2	9	87 [b]
4	Spread amendments to address compaction	Rubber-tire loader medium	1	1	1	87 [b]
		Farm tractor large	2	2		
5	Incorporate amendments to address compaction and cross rip	Farm tractor large	18	2	9	87 [b]
6	Spread topsoil	Scraper	51	2	26	274 [b]
		Dozer medium	51	2		
7	Cross disc	Farm tractor large	15	1	15	274 [b]
8	Final grade and level	Farm tractor large	4	1	4	87 [b]
9	Drill-seed grasses	Farm tractor large	2	1	2	87
10	Hydroseed (RTM stockpile only)	Diesel truck	10	1	10	187
11	Establish access road to RTM stockpile	Grader small	3	1	3	0.4 [b]
		Scraper	3	1		
		Compactor	3	1		
		Water truck	3	1		
Total Duration					**109 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-36. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Bouldin Island Launch Shaft – 31-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	54	7	50
2	Grade and level site	-	-	-	3	50
3	Rip to 3-foot depth	-	-	-	4	50
4	Spread amendments to address compaction	Semi-truck	5	68	5	50
5	Incorporate amendments to address compaction and cross rip	-	-	-	4	50
6	Spread topsoil	-	-	-	6	50
7	Cross disc	-	-	-	3	50
8	Final grade and level	-	-	-	3	50
9	Drill-seed grasses	-	-	-	3	50
10	Hydroseed (RTM stockpile only)	-	-	-	3	50
11	Establish access road to RTM stockpile	-	-	-	6	50

Table 4-37. Summary of Required Equipment for Reclamation Work at the Bouldin Island Launch Shaft – 36-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	130	5	26	20
2	Grade and level site	Grader small	5	1	5	88 [b]
3	Rip to 3-foot depth	Dozer large	18	2	9	88 [b]
4	Spread amendments to address compaction	Rubber-tire loader medium	1	1	1	88 [b]
		Farm tractor large	2	2		
5	Incorporate amendments to address compaction and cross rip	Farm tractor large	18	2	9	88 [b]
6	Spread topsoil	Scraper	58	2	29	304 [b]
		Dozer medium	58	2		
7	Cross disc	Farm tractor large	16	1	16	304 [b]
8	Final grade and level	Farm tractor large	4	1	4	88 [b]
9	Drill-seed grasses	Farm tractor large	2	1	2	88
10	Hydroseed (RTM stockpile only)	Diesel truck	11	1	11	216
11	Establish access road to RTM stockpile	Grader small	3	1	3	0.4 [b]
		Scraper	3	1		
		Compactor	3	1		
		Water truck	3	1		
Total Duration					**115 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-38. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Bouldin Island Launch Shaft – 36-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	54	7	50
2	Grade and level site	-	-	-	3	50
3	Rip to 3-foot depth	-	-	-	4	50
4	Spread amendments to address compaction	Semi-truck	5	68	5	50
5	Incorporate amendments to address compaction and cross rip	-	-	-	4	50
6	Spread topsoil	-	-	-	6	50
7	Cross disc	-	-	-	3	50
8	Final grade and level	-	-	-	3	50
9	Drill-seed grasses	-	-	-	3	50
10	Hydroseed (RTM stockpile only)	-	-	-	3	50
11	Establish access road to RTM stockpile	-	-	-	6	50

Table 4-39. Summary of Required Equipment for Reclamation Work at the Bouldin Island Launch Shaft – 40-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	142	5	29	22
2	Grade and level site	Grader small	5	1	5	91 [b]
3	Rip to 3-foot depth	Dozer large	19	2	10	91 [b]
4	Spread amendments to address compaction	Rubber-tire loader medium	1	1	1	91 [b]
		Farm tractor large	2	2		
5	Incorporate amendments to address compaction and cross rip	Farm tractor large	19	2	10	91 [b]
6	Spread topsoil	Scraper	65	2	33	338 [b]
		Dozer medium	65	2		
7	Cross disc	Farm tractor large	18	1	18	338 [b]
8	Final grade and level	Farm tractor large	4	1	4	91 [b]
9	Drill-seed grasses	Farm tractor large	2	1	2	91
10	Hydroseed (RTM stockpile only)	Diesel truck	13	1	13	247
11	Establish access road to RTM stockpile	Grader small	3	1	3	0.4 [b]
		Scraper	3	1		
		Compactor	3	1		
		Water truck	3	1		
Total Duration					**128 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-40. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Bouldin Island Launch Shaft – 40-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	54	7	50
2	Grade and level site	-	-	-	3	50
3	Rip to 3-foot depth	-	-	-	4	50
4	Spread amendments to address compaction	Semi-truck	5	68	5	50
5	Incorporate amendments to address compaction and cross rip	-	-	-	4	50
6	Spread topsoil	-	-	-	6	50
7	Cross disc	-	-	-	3	50
8	Final grade and level	-	-	-	3	50
9	Drill-seed grasses	-	-	-	3	50
10	Hydroseed (RTM stockpile only)	-	-	-	3	50
11	Establish access road to RTM stockpile	-	-	-	6	50

4.2.6 Lower Roberts Island Launch Shaft – Eastern Corridor

4.2.6.1 Site Description

The Lower Roberts Island Launch Shaft would serve as a launch and reception shaft for the Eastern Corridor. Land at the existing site area is used for growing corn (DWR, 2019).

Permanent features would include the following:

- Elevated pad for the tunnel shaft
- Access road leading to the pad
- Railroad spurs
- Permanent RTM stockpile

Repairs would be required to existing levees around the perimeter of the island. Temporary construction areas to be restored to agricultural usage would include areas for the following activities:

- Temporary RTM storage
- RTM mechanical drying

- Topsoil storage
- Tunnel segment storage
- Retention ponds
- Parking areas
- Access roads
- Facilities and trailers for owners, contractors, and crew

Ground improvement would be installed beneath the shaft pad, segment storage slab, and RTM temporary wet storage area.

Four tunnel diameter options are being considered and have different temporary construction areas, as described in Table 4-41. Note that for the Lower Roberts Island Launch Shaft Site, only the size of the remaining permanent RTM stockpile differs based on tunnel diameter.

Table 4-41 summarizes the acreage at the site delineated by base soil type and proposed post-construction use for all tunnel diameter options.

Table 4-41. Summary of Land Reclamation Areas at the Lower Roberts Island Launch Shaft

Tunnel Diameter (ft)	Base Soil	Proposed Post-Construction Use	Acres
26	Native Soil	Agriculture	155
	RTM Base	Agriculture	20
	RTM Stockpile	Stockpile	49
31	Native Soil	Agriculture	179
	RTM Base	Agriculture	20
	RTM Stockpile	Stockpile	69
36	Native Soil	Agriculture	191
	RTM Base	Agriculture	20
	RTM Stockpile	Stockpile	91
40	Native Soil	Agriculture	195
	RTM Base	Agriculture	20
	RTM Stockpile	Stockpile	115

4.2.6.2 Construction Methods and Equipment

Tables 4-42 through 4-49 summarize the equipment, durations, and expected on-road truck and commuter traffic that would be required to complete the reclamation work for all alignment and diameter scenarios summarized in Table 4-41.

Table 4-42. Summary of Required Equipment for Reclamation Work at the Lower Roberts Island Launch Shaft – 26-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	104	4	26	16
2	Grade and level site	Grader small	9	1	9	175 [b]
3	Rip to 3-foot depth	Dozer large	36	2	18	175 [b]
4	Spread amendments to address compaction	Rubber-tire loader medium	3	1	5	175 [b]
		Farm tractor large	5	1		
5	Incorporate amendments to address compaction and cross rip	Farm tractor large	37	2	19	175 [b]
6	Spread topsoil	Scraper	50	3	17	224 [b]
		Dozer medium	50	3		
7	Spread Amendments to address fertility (RTM Base only)	Rubber-tire loader medium	1	1	1	20
		Farm tractor large	1	1		
8	Cross disc	Farm tractor large	12	1	12	224 [b]
9	Final grade and level	Farm tractor large	8	1	8	175 [b]
10	Drill-seed grasses	Farm tractor large	4	1	4	175
11	Hydroseed (RTM stockpile only)	Diesel truck	3	1	3	49
12	Establish access road to RTM stockpile	Grader small	2	1	2	0.2 [b]
		Scraper	2	1		
		Compactor	2	1		
		Water truck	2	1		
Total Duration					**124 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-43. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Lower Roberts Island Launch Shaft – 26-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	99	18	6	50
2	Grade and level site	-	-	-	3	50
3	Rip to 3-foot depth	-	-	-	4	50
4	Spread amendments to address compaction	Semi-truck	2	38	4	50
5	Incorporate amendments to address compaction and cross rip	-	-	-	4	50
6	Spread topsoil	-	-	-	8	50
7	Spread Amendments to address fertility (RTM Base only)	Semi-truck	3	38	4	50
8	Cross disc	-	-	-	3	50
9	Final grade and level	-	-	-	3	50
10	Drill-seed grasses	-	-	-	3	50
11	Hydroseed (RTM stockpile only)	-	-	-	3	50
12	Establish access road to RTM stockpile	-	-	-	6	50

Table 4-44. Summary of Required Equipment for Reclamation Work at the Lower Roberts Island Launch Shaft – 31-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	123	4	31	19
2	Grade and level site	Grader small	10	1	10	199 [b]
3	Rip to 3-foot depth	Dozer large	41	2	21	199 [b]
4	Spread amendments to address compaction	Rubber-tire loader medium	3	1	5	199 [b]
		Farm tractor large	5	1		
5	Incorporate amendments to address compaction and cross rip	Farm tractor large	42	2	21	199 [b]
6	Spread topsoil	Scraper	61	3	21	268 [b]
		Dozer medium	61	3		
7	Spread Amendments to address fertility (RTM Base only)	Rubber-tire loader medium	1	1	1	20
		Farm tractor large	1	1		
8	Cross disc	Farm tractor large	14	1	14	268 [b]
9	Final grade and level	Farm tractor large	9	1	9	199 [b]
10	Drill-seed grasses	Farm tractor large	4	1	4	199
11	Hydroseed (RTM stockpile only)	Diesel truck	4	1	4	69
12	Establish access road to RTM stockpile	Grader small	2	1	2	0.2 [b]
		Scraper	2	1		
		Compactor	2	1		
		Water truck	2	1		
Total Duration					**143 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-45. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Lower Roberts Island Launch Shaft – 31-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	99	18	6	50
2	Grade and level site	-	-	-	3	50
3	Rip to 3-foot depth	-	-	-	4	50
4	Spread amendments to address compaction	Semi-truck	2	38	4	50
5	Incorporate amendments to address compaction and cross rip	-	-	-	4	50
6	Spread topsoil	-	-	-	8	50
7	Spread Amendments to address fertility (RTM Base only)	Semi-truck	3	38	4	50
8	Cross disc	-	-	-	3	50
9	Final grade and level	-	-	-	3	50
10	Drill-seed grasses	-	-	-	3	50
11	Hydroseed (RTM stockpile only)	-	-	-	3	50
12	Establish access road to RTM stockpile	-	-	-	6	50

Table 4-46. Summary of Required Equipment for Reclamation Work at the Lower Roberts Island Launch Shaft – 36-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	130	4	33	20
2	Grade and level site	Grader small	11	1	11	211 [b]
3	Rip to 3-foot depth	Dozer large	43	2	22	211 [b]
4	Spread amendments to address compaction	Rubber-tire loader medium	3	1	5	211 [b]
		Farm tractor large	5	1		
5	Incorporate amendments to address compaction and cross rip	Farm tractor large	44	2	22	211 [b]
6	Spread topsoil	Scraper	67	3	23	302 [b]
		Dozer medium	67	3		
7	Spread Amendments to address fertility (RTM Base only)	Rubber-tire loader medium	1	1	1	20
		Farm tractor large	1	1		
8	Cross disc	Farm tractor large	16	1	16	302 [b]
9	Final grade and level	Farm tractor large	9	1	9	211 [b]
10	Drill-seed grasses	Farm tractor large	5	1	5	211
11	Hydroseed (RTM stockpile only)	Diesel truck	5	1	5	91
12	Establish access road to RTM stockpile	Grader small	2	1	2	0.2 [b]
		Scraper	2	1		
		Compactor	2	1		
		Water truck	2	1		
Total Duration					**154 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-47. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Lower Roberts Island Launch Shaft – 36-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	98	18	6	50
2	Grade and level site	-	-	-	3	50
3	Rip to 3-foot depth	-	-	-	4	50
4	Spread amendments to address compaction	Semi-truck	2	38	4	50
5	Incorporate amendments to address compaction and cross rip	-	-	-	4	50
6	Spread topsoil	-	-	-	8	50
7	Spread Amendments to address fertility (RTM Base only)	Semi-truck	3	38	4	50
8	Cross disc	-	-	-	3	50
9	Final grade and level	-	-	-	3	50
10	Drill-seed grasses	-	-	-	3	50
11	Hydroseed (RTM stockpile only)	-	-	-	3	50
12	Establish access road to RTM stockpile	-	-	-	6	50

Table 4-48. Summary of Required Equipment for Reclamation Work at the Lower Roberts Island Launch Shaft – 40-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	142	4	36	22
2	Grade and level site	Grader small	11	1	11	215 [b]
3	Rip to 3-foot depth	Dozer large	44	2	22	215 [b]
4	Spread amendments to address compaction	Rubber-tire loader medium	3	1	5	215 [b]
		Farm tractor large	5	1		
5	Incorporate amendments to address compaction and cross rip	Farm tractor large	45	2	23	215 [b]
6	Spread topsoil	Scraper	75	3	25	330 [b]
		Dozer medium	75	3		
7	Spread Amendments to address fertility (RTM Base only)	Rubber-tire loader medium	1	1	1	20
		Farm tractor large	1	1		
8	Cross disc	Farm tractor large	17	1	17	330 [b]
9	Final grade and level	Farm tractor large	9	1	9	215 [b]
10	Drill-seed grasses	Farm tractor large	5	1	5	215
11	Hydroseed (RTM stockpile only)	Diesel truck	6	1	6	115
12	Establish access road to RTM stockpile	Grader small	2	1	2	0.2 [b]
		Scraper	2	1		
		Compactor	2	1		
		Water truck	2	1		
Total Duration					**162 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-49. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Lower Roberts Island Launch Shaft – 40-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	99	18	6	50
2	Grade and level site	-	-	-	3	50
3	Rip to 3-foot depth	-	-	-	4	50
4	Spread amendments to address compaction	Semi-truck	2	38	4	50
5	Incorporate amendments to address compaction and cross rip	-	-	-	4	50
6	Spread topsoil	-	-	-	8	50
7	Spread Amendments to address fertility (RTM Base only)	Semi-truck	3	38	4	50
8	Cross disc	-	-	-	3	50
9	Final grade and level	-	-	-	3	50
10	Drill-seed grasses	-	-	-	3	50
11	Hydroseed (RTM stockpile only)	-	-	-	3	50
12	Establish access road to RTM stockpile	-	-	-	6	50

4.2.7 Southern Forebay – Both Corridors

4.2.7.1 Site Description

The Southern Forebay would be part of a large complex at the southern terminus of the main tunnel and includes the new pumping plant structure, the Southern Forebay, and the outlet to the SDCF. The site includes multiple TBM launch sites and appurtenant facilities, as well as construction operations for the forebay and pumping plant. Land at the existing site area is used for growing alfalfa, grain, and hay (DWR, 2019).

Permanent features would include the following:

- Aboveground forebay with surrounding embankments
- Shaft pad
- Pumping plant
- Outlet structures
- A spillway into Italian Slough
- Stockpiles for peat and topsoil and surplus RTM
- Access roads

Temporary construction areas would include areas for the following activities:

- Topsoil storage
- Tunnel segment storage
- Retention ponds
- Railroad spurs
- Parking areas
- Access roads
- Facilities and trailers for owners, contractors, and crew

Most of the RTM treatment and storage areas would be within the footprint of the permanent forebay; therefore, the areas would not require reclamation.

A total of eight scenarios (four tunnel diameter options for both the Central and Eastern corridor options) are being considered and have different temporary construction areas, as described in Table 4-50. Note that for the Southern Forebay, only the size of the remaining permanent RTM stockpile differs based on tunnel diameter, and is sized to accommodate all of the RTM generated at the Southern Forebay in the event that it is not used for construction of the reservoir embankment.

Table 4-50 summarizes the acreage at the site delineated by base soil type and proposed post-construction use for all alignment and tunnel diameter scenarios.

Table 4-50. Summary of Land Reclamation Areas at the Southern Forebay

Alignment / Tunnel Diameter	Base Soil	Proposed Post-Construction Use	Acres
Central / 26-ft Diameter	Native Soil	Agriculture	229
	RTM/Peat Stockpile	Stockpile	60
Central / 31-ft Diameter	Native Soil	Agriculture	229
	RTM/Peat Stockpile	Stockpile	60
Central / 36-ft Diameter	Native Soil	Agriculture	229
	RTM/Peat Stockpile	Stockpile	60
Central / 40-ft Diameter	Native Soil	Agriculture	229
	RTM/Peat Stockpile	Stockpile	60
Eastern / 26-ft Diameter	Native Soil	Agriculture	229
	RTM/Peat Stockpile	Stockpile	60
Eastern / 31-ft Diameter	Native Soil	Agriculture	228
	RTM/Peat Stockpile	Stockpile	77
Eastern / 36-ft Diameter	Native Soil	Agriculture	227
	RTM/Peat Stockpile	Stockpile	90
Eastern / 40-ft Diameter	Native Soil	Agriculture	226
	RTM/Peat Stockpile	Stockpile	111

4.2.7.2 Construction Methods and Equipment

Tables 4-51 through 4-66 summarize the equipment, durations, and expected on-road truck and commuter traffic that would be required to complete the reclamation work for all alignment and diameter scenarios summarized in Table 4-50.

Table 4-51. Summary of Required Equipment for Reclamation Work at the Southern Forebay – Central/26-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	194	5	39	30
2	Grade and level site	Grader small	12	3	4	229 [b]
3	Rip to 3-foot depth	Dozer large	47	5	10	229 [b]
4	Spread amendments to address compaction	Rubber-tire loader medium	3	1	3	229 [b]
		Farm tractor large	5	2		
5	Incorporate amendments to address compaction and cross rip	Farm tractor large	47	4	12	229 [b]
6	Spread topsoil	Scraper	94	5	19	288 [b]
		Dozer medium	94	5		
7	Cross disc	Farm tractor large	15	2	8	288 [b]
8	Final grade and level	Farm tractor large	10	2	5	229 [b]
9	Drill-seed grasses	Farm tractor large	4	2	2	229
10	Hydroseed (RTM/Peat Stockpile only)	Diesel truck	3	2	2	60
Total Duration					**104 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-52. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Southern Forebay – Central / 26-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	50	7	50
2	Grade and level site	-	-	-	5	50
3	Rip to 3-foot depth	-	-	-	7	50
4	Spread amendments to address compaction	Semi-truck	4	56	5	50
5	Incorporate amendments to address compaction and cross rip	-	-	-	6	50
6	Spread topsoil	-	-	-	12	50
7	Cross disc	-	-	-	4	50
8	Final grade and level	-	-	-	4	50
9	Drill-seed grasses	-	-	-	4	50
10	Hydroseed (RTM/Peat Stockpile only)	-	-	-	4	50

Table 4-53. Summary of Required Equipment for Reclamation Work at the Southern Forebay – Central/ 31-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	201	5	41	31
2	Grade and level site	Grader small	12	3	4	229 [b]
3	Rip to 3-foot depth	Dozer large	47	5	10	229 [b]
4	Spread amendments to address compaction	Rubber-tire loader medium	3	1	3	229 [b]
		Farm tractor large	5	2		
5	Incorporate amendments to address compaction and cross rip	Farm tractor large	47	4	12	229 [b]
6	Spread topsoil	Scraper	94	5	19	288 [b]
		Dozer medium	94	5		
7	Cross disc	Farm tractor large	15	2	8	288 [b]
8	Final grade and level	Farm tractor large	10	2	5	229 [b]

Table 4-53. Summary of Required Equipment for Reclamation Work at the Southern Forebay – Central/ 31-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment -Days	Pieces of Equipment	Duration (days)	Acres
9	Drill-seed grasses	Farm tractor large	4	2	2	229
10	Hydroseed (RTM/Peat Stockpile only)	Diesel truck	3	2	2	60
				Total Duration	**106 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-54. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Southern Forebay – Central / 31-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	50	7	50
2	Grade and level site	-	-	-	5	50
3	Rip to 3-foot depth	-	-	-	7	50
4	Spread amendments to address compaction	Semi-truck	4	56	5	50
5	Incorporate amendments to address compaction and cross rip	-	-	-	6	50
6	Spread topsoil	-	-	-	12	50
7	Cross disc	-	-	-	4	50
8	Final grade and level	-	-	-	4	50
9	Drill-seed grasses	-	-	-	4	50
10	Hydroseed (RTM/Peat Stockpile only)	-	-	-	4	50

Table 4-55. Summary of Required Equipment for Reclamation Work at the Southern Forebay – Central / 36-Foot-Diameter Tunnel

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	229 [b]
3	Rip to 3-foot depth	Dozer large	47	5	10	229 [b]
4	Spread amendments to address compaction	Rubber-tire loader medium	3	1	3	229 [b]
		Farm tractor large	5	2		
5	Incorporate amendments to address compaction and cross rip	Farm tractor large	47	4	12	229 [b]
6	Spread topsoil	Scraper	94	5	19	288 [b]
		Dozer medium	94	5		
7	Cross disc	Farm tractor large	15	2	8	288 [b]
8	Final grade and level	Farm tractor large	10	2	5	229 [b]
9	Drill-seed grasses	Farm tractor large	4	2	2	229
10	Hydroseed (RTM/Peat Stockpile only)	Diesel truck	3	2	2	60
Total Duration					**107 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-56. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Southern Forebay – Central / 36-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	50	7	50
2	Grade and level site	-	-	-	5	50
3	Rip to 3-foot depth	-	-	-	7	50
4	Spread amendments to address compaction	Semi-truck	4	56	5	50
5	Incorporate amendments to address compaction and cross rip	-	-	-	6	50
6	Spread topsoil	-	-	-	12	50
7	Cross disc	-	-	-	4	50
8	Final grade and level	-	-	-	4	50
9	Drill-seed grasses	-	-	-	4	50
10	Hydroseed (RTM/Peat stockpile only)	-	-	-	4	50

Table 4-57. Summary of Required Equipment for Reclamation Work at the Southern Forebay – Central / 40-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	220	5	44	34
2	Grade and level site	Grader small	12	3	4	229 [b]
3	Rip to 3-foot depth	Dozer large	47	5	10	229 [b]
4	Spread amendments to address compaction	Rubber-tire loader medium	3	1	3	229 [b]
		Farm tractor large	5	2		
5	Incorporate amendments to address compaction and cross rip	Farm tractor large	47	4	12	229 [b]
6	Spread topsoil	Scraper	94	5	19	288 [b]
		Dozer medium	94	5		
7	Cross disc	Farm tractor large	15	2	8	288 [b]
8	Final grade and level	Farm tractor large	10	2	5	229 [b]
9	Drill-seed grasses	Farm tractor large	4	2	2	229
10	Hydroseed (RTM/Peat Stockpile only)	Diesel truck	3	2	2	60
				Total Duration	**109 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-58. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Southern Forebay – Central / 40-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	125	50	7	50
2	Grade and level site	-	-	-	5	50
3	Rip to 3-foot depth	-	-	-	7	50
4	Spread amendments to address compaction	Semi-truck	4	56	5	50
5	Incorporate amendments to address compaction and cross rip	-	-	-	6	50
6	Spread topsoil	-	-	-	12	50
7	Cross disc	-	-	-	4	50
8	Final grade and level	-	-	-	4	50
9	Drill-seed grasses	-	-	-	4	50
10	Hydroseed (RTM/Peat stockpile only)	-	-	-	4	50

Table 4-59 – Summary of Required Equipment for Reclamation Work at the Southern Forebay – Eastern / 26-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	194	5	39	30
2	Grade and level site	Grader small	12	3	4	229 [b]
3	Rip to 3-foot depth	Dozer large	47	5	10	229 [b]
4	Spread amendments to address compaction	Rubber-tire loader medium	3	1	3	229 [b]
		Farm tractor large	5	2		
5	Incorporate amendments to address compaction and cross rip	Farm tractor large	47	4	12	229 [b]
6	Spread topsoil	Scraper	94	5	19	288 [b]
		Dozer medium	94	5		
7	Cross disc	Farm tractor large	15	2	8	288 [b]
8	Final grade and level	Farm tractor large	10	2	5	229 [b]
9	Drill-seed grasses	Farm tractor large	4	2	2	229
10	Hydroseed (RTM/Peat Stockpile only)	Diesel truck	3	2	2	60
Total Duration					**104 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-60. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Southern Forebay – Eastern / 26-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	50	7	50
2	Grade and level site	-	-	-	5	50
3	Rip to 3-foot depth	-	-	-	7	50
4	Spread amendments to address compaction	Semi-truck	4	56	5	50
5	Incorporate amendments to address compaction and cross rip	-	-	-	6	50
6	Spread topsoil	-	-	-	12	50
7	Cross disc	-	-	-	4	50
8	Final grade and level	-	-	-	4	50
9	Drill-seed grasses	-	-	-	4	50
10	Hydroseed (RTM/Peat stockpile only)	-	-	-	4	50

Table 4-61. Summary of Required Equipment for Reclamation Work at the Southern Forebay – Eastern / 31-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	201	5	41	31
2	Grade and level site	Grader small	12	3	4	228 [b]
3	Rip to 3-foot depth	Dozer large	46	5	10	228 [b]
4	Spread amendments to address compaction	Rubber-tire loader medium	3	1	3	228 [b]
		Farm tractor large	5	2		
5	Incorporate amendments to address compaction and cross rip	Farm tractor large	46	4	12	228 [b]
6	Spread topsoil	Scraper	99	5	20	305 [b]
		Dozer medium	99	5		
7	Cross disc	Farm tractor large	16	2	8	305 [b]
8	Final grade and level	Farm tractor large	10	2	5	228 [b]
9	Drill-seed grasses	Farm tractor large	4	2	2	228
10	Hydroseed (RTM/Peat stockpile only)	Diesel truck	4	2	2	77
Total Duration					**107 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-62. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Southern Forebay – Eastern / 31-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	50	7	50
2	Grade and level site	-	-	-	5	50
3	Rip to 3-foot depth	-	-	-	7	50
4	Spread amendments to address compaction	Semi-truck	4	56	5	50
5	Incorporate amendments to address compaction and cross rip	-	-	-	6	50
6	Spread topsoil	-	-	-	12	50
7	Cross disc	-	-	-	4	50
8	Final grade and level	-	-	-	4	50
9	Drill-seed grasses	-	-	-	4	50
10	Hydroseed (RTM/Peat stockpile only)	-	-	-	4	50

Table 4-63. Summary of Required Equipment for Reclamation Work at the Southern Forebay – Eastern / 36-Foot-Diameter Tunnel

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	227 [b]
3	Rip to 3-foot depth	Dozer large	46	5	10	227 [b]
4	Spread amendments to address compaction	Rubber-tire loader medium	3	1	3	227 [b]
		Farm tractor large	5	2		
5	Incorporate amendments to address compaction and cross rip	Farm tractor large	46	4	12	227 [b]
6	Spread topsoil	Scraper	103	5	21	317 [b]
		Dozer medium	103	5		
7	Cross disc	Farm tractor large	17	2	9	317 [b]
8	Final grade and level	Farm tractor large	10	2	5	227 [b]
9	Drill-seed grasses	Farm tractor large	4	2	2	227
10	Hydroseed (RTM/Peat stockpile only)	Diesel truck	5	2	3	90
Total Duration					**111 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-64. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Southern Forebay – Eastern / 36-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	50	7	50
2	Grade and level site	-	-	-	5	50
3	Rip to 3-foot depth	-	-	-	7	50
4	Spread amendments to address compaction	Semi-truck	4	56	5	50
5	Incorporate amendments to address compaction and cross rip	-	-	-	6	50
6	Spread topsoil	-	-	-	12	50
7	Cross disc	-	-	-	4	50
8	Final grade and level	-	-	-	4	50
9	Drill-seed grasses	-	-	-	4	50
10	Hydroseed (RTM/Peat stockpile only)	-	-	-	4	50

Table 4-65. Summary of Required Equipment for Reclamation Work at the Southern Forebay – Eastern / 40-Foot-Diameter Tunnel

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Slab demolition	Excavators medium	220	5	44	34
2	Grade and level site	Grader small	12	3	4	226 [b]
3	Rip to 3-foot depth	Dozer large	46	5	10	226 [b]
4	Spread amendments to address compaction	Rubber-tire loader medium	3	1	3	226 [b]
		Farm tractor large	5	2		
5	Incorporate amendments to address compaction and cross rip	Farm tractor large	46	4	12	226 [b]
6	Spread topsoil	Scraper	110	5	22	337 [b]
		Dozer medium	110	5		
7	Cross disc	Farm tractor large	18	2	9	337 [b]
8	Final grade and level	Farm tractor large	10	2	5	226 [b]
9	Drill-seed grasses	Farm tractor large	4	2	2	226
10	Hydroseed (RTM/Peat stockpile only)	Diesel truck	6	2	3	111
Total Duration					**114 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-66. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Southern Forebay – Eastern / 40-Foot-Diameter Tunnel

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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	125	50	7	50
2	Grade and level site	-	-	-	5	50
3	Rip to 3-foot depth	-	-	-	7	50
4	Spread amendments to address compaction	Semi-truck	4	56	5	50
5	Incorporate amendments to address compaction and cross rip	-	-	-	6	50
6	Spread topsoil	-	-	-	12	50
7	Cross disc	-	-	-	4	50
8	Final grade and level	-	-	-	4	50
9	Drill-seed grasses	-	-	-	4	50
10	Hydroseed (RTM/Peat stockpile only)	-	-	-	4	50

4.2.8 South Delta Conveyance Facilities (State Water Project) – Both Corridors

4.2.8.1 Site Description

The SDCF (SWP) would manage flows between the Southern Forebay and Clifton Court Forebay before reaching the Banks Pumping Plant. Land at the existing site area was not cropped or was unclassified at the time of the 2016 survey (DWR, 2019). Permanent features would include the following:

- South Delta Outlet and Control Structures
- A concrete-lined section of the Banks Pumping Plant intake canal
- Regraded slopes around the control structures
- An electrical control building
- Access roads

Temporary construction areas would include areas for the following activities:

- Material storage
- Equipment storage
- Water treatment
- Access roads
- Parking areas
- Facilities and trailers for owners, contractors, shipping and receiving offices, and crew

Table 4-67 summarizes the acreage at the site delineated by base soil type and proposed post-construction use.

Table 4-67. Summary of Land Reclamation Areas at the State Water Project South Delta Conveyance Facilities

Base Soil	Proposed Post-Construction Use	Acres
Native Soil	Natural Habitat	53

4.2.8.2 Construction Methods and Equipment

Reclamation work would consist of reclaiming approximately 53 acres of temporary construction areas with native soil base to natural habitat use following the methods described in Section 4.1. Tables 4-68 and 4-69 summarize the equipment, durations, and expected on-road truck and commuter traffic that would be required to complete the reclamation work, assuming all 53 acres are impacted.

Table 4-68. Summary of Required Equipment for Reclamation Work at the State Water Project South Delta Conveyance Facilities

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-foot depth	Dozer large	11	1	11	53 [b]
3	Spread amendments to address compaction	Rubber-tire loader medium	1	1	2	53 [b]
		Farm tractor large	2	1		
4	Incorporate amendments to address compaction and cross rip	Farm tractor large	11	1	11	53 [b]
5	Spread topsoil	Scraper	35	1	35	53 [b]
		Dozer medium	35	1		
6	Cross disc	Farm tractor large	3	1	3	53 [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
				Total Duration	**69 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-69. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the State Water Project South Delta Conveyance Facilities

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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-foot depth	-	-	-	3	50
3	Spread amendments to address compaction	Semi-truck	2	54	4	50
4	Incorporate amendments to address compaction and cross rip	-	-	-	3	50
5	Spread topsoil	-	-	-	4	50
6	Cross disc	-	-	-	3	50
7	Final grade and level	-	-	-	3	50
8	Drill-seed grasses	-	-	-	3	50

4.2.9 South Delta Conveyance Facilities (Central Valley Project) – Both Corridors

4.2.9.1 Site Description

The SDCF could also include a connection to the CVP through a separate outlet control structure into the Delta-Mendota Canal, which would manage flows between Southern Forebay and Delta-Mendota Canal at the Jones Pumping Plant approach channel. Land at the existing site area was not cropped or was unclassified at the time of the 2016 survey (DWR, 2019).

Permanent features would include the following:

- CVP outlet and Delta-Mendota Control Structure
- Regraded slopes around the control structures
- An electrical control building
- Access roads

Temporary construction areas would include areas for the following activities:

- Material storage
- Equipment storage
- Water treatment
- Temporary Delta-Mendota Canal bypass channel
- Access roads
- Parking areas
- Facilities and trailers for owners, contractors, shipping and receiving offices, and crew

Table 4-70 summarizes the acreage at the site delineated by base soil type and proposed post-construction use.

Table 4-70. Summary of Land Reclamation Areas at the Central Valley Project South Delta Conveyance Facilities

Base Soil	Proposed Post-Construction Use	Acres
Native Soil	Natural Habitat	83

4.2.9.2 Construction Methods and Equipment

Reclamation work would consist of reclaiming approximately 68 acres of temporary construction areas with native soil base to natural habitat use following the methods described in Section 4.1. Tables 4-71 and 4-72 summarize the equipment, durations, and expected on-road truck and commuter traffic that would be required to complete the reclamation work, assuming all 68 acres are impacted.

Table 4-71. Summary of Required Equipment for Reclamation Work at the Central Valley Project South Delta Conveyance Facilities

Step	Tasks	Equipment[a]	Equipment-Days	Pieces of Equipment	Duration (days)	Acres
1	Grade and level site	Grader small	5	1	5	83 [b]
2	Rip to 3-foot depth	Dozer large	17	1	17	83 [b]
3	Spread amendments to address compaction	Rubber-tire loader medium	1	1	2	83 [b]
		Farm tractor large	2	1		
4	Incorporate amendments to address compaction and cross rip	Farm tractor large	17	1	17	83 [b]
5	Spread topsoil	Scraper	17	1	17	83 [b]
		Dozer medium	17	1		
6	Cross disc	Farm tractor large	5	1	5	83 [b]
7	Final grade and level	Farm tractor large	4	1	4	83 [b]
8	Drill-seed grasses	Farm tractor large	2	1	2	83
				Total Duration	**69 days**	

[a] Refer to tables in Section 4.1 for specific make, model, and size of equipment.

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

Table 4-72. Summary of On-Road Truck and Commuter Traffic for Reclamation Work at the Central Valley Project South Delta Conveyance Facilities

Step	Tasks	On-Road Truck Traffic			Commuter Traffic	
		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-foot depth	-	-	-	3	50
3	Spread amendments to address compaction	Semi-truck	2	52	4	50
4	Incorporate amendments to address compaction and cross rip	-	-	-	3	50
5	Spread topsoil	-	-	-	4	50
6	Cross disc	-	-	-	3	50
7	Final grade and level	-	-	-	3	50
8	Drill-seed grasses	-	-	-	3	50

4.3 Equipment Summary

Tables 4-73 through 4-75 provide a summary of the estimated quantity of the equipment and duration required to complete reclamation of the temporary construction areas at each of the project sites.

Table 4-73. Summary of Required Equipment for Reclamation Work at Project Sites

Task	Equipment	Intake C-E-2		Intake C-E-3		Intake C-E-5 (3,000 cfs)		Intake C-E-5 (1,500 cfs)		Twin Cities Complex (Glanville Tract) - Launch Shaft - Central – 26-ft Tunnel ID		Twin Cities Complex (Glanville Tract) - Launch Shaft - Central – 31-ft Tunnel ID		Twin Cities Complex (Glanville Tract) - Launch Shaft - Central – 36-ft Tunnel ID		Twin Cities Complex (Glanville Tract) - Launch Shaft - Central – 40-ft Tunnel ID		Twin Cities Complex (Glanville Tract) - Launch Shaft - Eastern – 26-ft Tunnel ID		Twin Cities Complex (Glanville Tract) - Launch Shaft - Eastern – 31-ft Tunnel ID	
		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)	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	7	24	7	27	7	30	6	37	7	24	7	27
Ring levee removal (Twin Cities only)	CAT 623 scraper	1	Not Required	1	Not Required	1	Not Required	1	Not Required	5	9	5	9	5	9	5	11	5	9	5	9
	CAT D8 dozer	1		1		1		1		5		5		5		5		5		5	
	CAT 12G grader	1		1		1		1		5		5		5		5		5		5	
	CAT CS68B compactor	1		1		1		1		5		5		5		5		5		5	
	Water truck	1		1		1		1		5		5		5		5		5		5	
Grade and level site	CAT 12G grader	1	5	1	7	1	7	1	7	4	4	4	5	4	5	4	4	4	4	4	4
Rip to 3-foot depth	CAT D8 dozer	2	9	2	13	2	14	2	14	5	12	5	14	5	14	5	11	5	12	5	12
Spread amendments to address compaction	CAT 930K loader	1	2	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2
	Case Magnum 280 farm tractor	1		2		2		2		4		4		4		4		4		4	
Incorporate amendments to address compaction and cross rip	Case Magnum 280 farm tractor	2	9	2	13	2	14	2	14	5	13	5	14	5	14	5	11	5	13	5	13
Spread topsoil	CAT 623 scraper	2	17	2	21	2	19	2	16	7	15	6	22	5	31	5	35	6	18	5	26
	CAT D6 dozer	2		2		2		2		7		6		5		5		6		5	

Table 4-73. Summary of Required Equipment for Reclamation Work at Project Sites

Task	Equipment	Intake C-E-2		Intake C-E-3		Intake C-E-5 (3,000 cfs)		Intake C-E-5 (1,500 cfs)		Twin Cities Complex (Glanville Tract) - Launch Shaft - Central – 26-ft Tunnel ID		Twin Cities Complex (Glanville Tract) - Launch Shaft - Central – 31-ft Tunnel ID		Twin Cities Complex (Glanville Tract) - Launch Shaft - Central – 36-ft Tunnel ID		Twin Cities Complex (Glanville Tract) - Launch Shaft - Central – 40-ft Tunnel ID		Twin Cities Complex (Glanville Tract) - Launch Shaft - Eastern – 26-ft Tunnel ID		Twin Cities Complex (Glanville Tract) - Launch Shaft - Eastern – 31-ft Tunnel ID	
		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)	Equipment (Qty)	Duration (days)	Equipment (Qty)	Duration (days)
Spread amendments to address fertility (RTM base only)	CAT 930K loader	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	2	1	2	1	2	1	2	1	2	1	2
	Case Magnum 280 farm tractor	1		1		1		1		2		2		2		2		2		2	
Cross disc	Case Magnum 280 farm tractor	1	5	1	7	1	7	1	7	4	5	4	6	4	7	4	7	4	5	4	6
Final grade and level	Case Magnum 280 farm tractor	1	4	1	5	1	6	1	6	4	4	4	4	4	4	4	3	4	4	4	4
Drill-seed grasses	Case Magnum 280 farm tractor	1	2	1	3	1	3	1	3	1	6	1	7	1	7	1	6	1	6	1	6
Hydroseed (RTM stockpile only)	Diesel truck	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	1	1	3	1	7	1	14	1	1	1	5
Establish access road to RTM stockpile	CAT 12G grader	1	Not Required	1	Not Required	1	Not Required	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		1		1		1		1		1		1		1		1	
	CAT CS68B compactor	1		1		1		1		1		1		1		1		1		1	
	Water truck	1		1		1		1		1		1		1		1		1		1	
		Total (days)	**53**	**Total (days)**	**71**	**Total (days)**	**72**	**Total (days)**	**69**	**Total (days)**	**97**	**Total (days)**	**115**	**Total (days)**	**132**	**Total (days)**	**143**	**Total (days)**	**100**	**Total (days)**	**116**

Notes:

ID = inner diameter

Qty = quantity

Table 4-74. Summary of Required Equipment for Reclamation Work at Project Sites

Task	Equipment	Twin Cities Complex (Glanville Tract) - Launch Shaft - Eastern – 36-ft Tunnel ID		Twin Cities Complex (Glanville Tract) - Launch Shaft - Eastern – 40-ft Tunnel ID		Bouldin Island - Launch Shaft – 26-ft Tunnel ID		Bouldin Island - Launch Shaft – 31-ft Tunnel ID		Bouldin Island - Launch Shaft – 36-ft Tunnel ID		Bouldin Island - Launch Shaft – 40-ft Tunnel ID		Lower Roberts Island - Launch Shaft – 26-ft Tunnel ID		Lower Roberts Island - Launch Shaft – 31-ftTunnel ID		Lower Roberts Island - Launch Shaft – 36-ft Tunnel ID		Lower Roberts Island - Launch Shaft – 40-ft Tunnel ID	
		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)	Equipment (Qty)	Duration (days)	Equipment (Qty)	Duration (days)
Slab demolition	CAT 330 excavator	6	35	6	37	5	21	5	25	5	26	5	29	4	26	4	31	4	33	4	36
Ring levee removal (Twin Cities only)	CAT 623 scraper	5	9	5	10	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	Not Required
	CAT D8 dozer	5		5		1		1		1		1		1		1		1		1	
	CAT 12G grader	5		5		1		1		1		1		1		1		1		1	
	CAT CS68B compactor	5		5		1		1		1		1		1		1		1		1	
	Water truck	5		5		1		1		1		1		1		1		1		1	
Grade and level site	CAT 12G grader	4	4	4	4	1	5	1	5	1	5	1	5	1	9	1	10	1	11	1	11
Rip to 3-foot depth	CAT D8 dozer	5	13	5	10	2	9	2	9	2	9	2	10	2	18	2	21	2	22	2	22
Spread amendments to address compaction	CAT 930K loader	2	2	2	2	1	1	1	1	1	1	1	1	1	5	1	5	1	5	1	5
	Case Magnum 280 farm tractor	4		4		2		2		2		2		1		1		1		1	
Incorporate amendments to address compaction and cross rip	Case Magnum 280 farm tractor	5	13	5	11	2	9	2	9	2	9	2	10	2	19	2	21	2	22	2	23
Spread topsoil	CAT 623 scraper	5	31	5	35	2	21	2	26	2	29	2	33	3	17	3	21	3	23	3	25
	CAT D6 dozer	5		5		2		2		2		2		3		3		3		3	
Spread amendments to address fertility (RTM base only)	CAT 930K loader	1	2	1	2	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	1	1	1	1	1	1	1
	Case Magnum 280 farm tractor	2		2		1		1		1		1		1		1		1		1	

Table 4-74. Summary of Required Equipment for Reclamation Work at Project Sites

Task	Equipment	Twin Cities Complex (Glanville Tract) - Launch Shaft - Eastern – 36-ft Tunnel ID		Twin Cities Complex (Glanville Tract) - Launch Shaft - Eastern – 40-ft Tunnel ID		Bouldin Island - Launch Shaft – 26-ft Tunnel ID		Bouldin Island - Launch Shaft – 31-ft Tunnel ID		Bouldin Island - Launch Shaft – 36-ft Tunnel ID		Bouldin Island - Launch Shaft – 40-ft Tunnel ID		Lower Roberts Island - Launch Shaft – 26-ft Tunnel ID		Lower Roberts Island - Launch Shaft – 31-ftTunnel ID		Lower Roberts Island - Launch Shaft – 36-ft Tunnel ID		Lower Roberts Island - Launch Shaft – 40-ft Tunnel ID	
		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)	Equipment (Qty)	Duration (days)	Equipment (Qty)	Duration (days)
Cross disc	Case Magnum 280 farm tractor	4	7	4	7	1	13	1	15	1	16	1	18	1	12	1	14	1	16	1	17
Final grade and level	Case Magnum 280 farm tractor	4	4	4	3	1	4	1	4	1	4	1	4	1	8	1	9	1	9	1	9
Drill-seed grasses	Case Magnum 280 farm tractor	1	7	1	5	1	2	1	2	1	2	1	2	1	4	1	4	1	5	1	5
Hydroseed (RTM stockpile only)	Diesel truck	1	8	1	15	1	8	1	10	1	11	1	13	1	3	1	4	1	5	1	6
Establish access road to RTM stockpile	CAT 12G grader	1	Not Required	1	Not Required	1	3	1	3	1	3	1	3	1	2	1	2	1	2	1	2
	CAT 623 scraper	1		1		1		1		1		1		1		1		1		1	
	CAT CS68B compactor	1		1		1		1		1		1		1		1		1		1	
	Water truck	1		1		1		1		1		1		1		1		1		1	
		Total (days)	**135**	**Total (days)**	**141**	**Total (days)**	**96**	**Total (days)**	**109**	**Total (days)**	**115**	**Total (days)**	**128**	**Total (days)**	**124**	**Total (days)**	**143**	**Total (days)**	**154**	**Total (days)**	**162**

Notes:
ID = inner diameter
Qty = quantity

Table 4-75. Summary of Required Equipment for Reclamation Work at Project Sites

Task	Equipment	Southern Forebay - Central – 26-ft Tunnel ID		Southern Forebay - Central – 31-ft Tunnel ID		Southern Forebay - Central – 36-ft Tunnel ID		Southern Forebay - Central – 40-ft Tunnel ID		Southern Forebay - Eastern - 26-ft Tunnel ID		Southern Forebay - Eastern – 31-ft Tunnel ID		Southern Forebay - Eastern – 36-ft Tunnel ID		Southern Forebay - Eastern – 40-ft Tunnel ID		South Delta Outlet and California Aqueduct Control Structure		Jones Outlet and Delta-Mendota Canal Control Structure	
		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)	Equipment (Qty)	Duration (days)	Equipment (Qty)	Duration (days)
Slab demolition	CAT 330 excavator	5	39	5	41	5	42	5	44	5	39	5	41	5	42	5	44	1	Not Required	1	Not Required
Ring levee removal (Twin Cities only)	CAT 623 scraper	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	Not Required
	CAT D8 dozer	1		1		1		1		1		1		1		1		1		1	
	CAT 12G grader	1		1		1		1		1		1		1		1		1		1	
	CAT CS68B compactor	1		1		1		1		1		1		1		1		1		1	
	Water truck	1		1		1		1		1		1		1		1		1		1	
Grade and level site	CAT 12G grader	3	4	3	4	3	4	3	4	3	4	3	4	3	4	3	4	1	3	1	5
Rip to 3-foot depth	CAT D8 dozer	5	10	5	10	5	10	5	10	5	10	5	10	5	10	5	10	1	11	1	17
Spread amendments to address compaction	CAT 930K loader	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	2	1	2
	Case Magnum 280 farm tractor	2		2		2		2		2		2		2		2		1		1	
Incorporate amendments to address compaction and cross rip	Case Magnum 280 farm tractor	4	12	4	12	4	12	4	12	4	12	4	12	4	12	4	12	1	11	1	17
Spread topsoil	CAT 623 scraper	5	19	5	19	5	19	5	19	5	19	5	20	5	21	5	22	1	35	1	17
	CAT D6 dozer	5		5		5		5		5		5		5		5		1		1	
Spread amendments to address fertility (RTM base only)	CAT 930K loader	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	Not Required	1	Not Required
	Case Magnum 280 farm tractor	1		1		1		1		1		1		1		1		1		1	
Cross disc	Case Magnum 280 farm tractor	2	8	2	8	2	8	2	8	2	8	2	8	2	9	2	9	1	3	1	5
Final grade and level	Case Magnum 280 farm tractor	2	5	2	5	2	5	2	5	2	5	2	5	2	5	2	5	1	3	1	4

Table 4-75. Summary of Required Equipment for Reclamation Work at Project Sites

Task	Equipment	Southern Forebay - Central – 26-ft Tunnel ID		Southern Forebay - Central – 31-ft Tunnel ID		Southern Forebay - Central – 36-ft Tunnel ID		Southern Forebay - Central – 40-ft Tunnel ID		Southern Forebay - Eastern - 26-ft Tunnel ID		Southern Forebay - Eastern – 31-ft Tunnel ID		Southern Forebay - Eastern – 36-ft Tunnel ID		Southern Forebay - Eastern – 40-ft Tunnel ID		South Delta Outlet and California Aqueduct Control Structure		Jones Outlet and Delta-Mendota Canal Control Structure	
		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)	Equipment (Qty)	Duration (days)	Equipment (Qty)	Duration (days)
Drill-seed grasses	Case Magnum 280 farm tractor	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	2
Hydroseed (RTM stockpile only)	Diesel truck	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	3	1	Not Required	1	Not Required
Establish access road to RTM stockpile	CAT 12G grader	1	Not Required	1	Not Required	1	Not Required	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		1		1		1		1		1		1		1		1	
	CAT CS68B compactor	1		1		1		1		1		1		1		1		1		1	
	Water truck	1		1		1		1		1		1		1		1		1		1	
		Total (days)	**104**	**Total (days)**	**106**	**Total (days)**	**107**	**Total (days)**	**109**	**Total (days)**	**104**	**Total (days)**	**107**	**Total (days)**	**111**	**Total (days)**	**114**	**Total (days)**	**69**	**Total (days)**	**69**

Notes:
ID = inner diameter
Qty = quantity

5. References

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

California Department of Water Resources (DWR). 2020. 2020 State Water Resilience Portfolio Draft. January.

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 reviewed by**	**Consistency review by**	**Approved for submission by**
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This interim document is considered preliminary and was prepared under the responsible charge of Michael Conant, California Professional Engineering License C79228.