DELTA CONVEYANCE DESIGN & CONSTRUCTION AUTHORITY

STAKEHOLDER ENGAGEMENT COMMITTEE (SEC)

Stakeholder Engagement Committee

February 12, 2020

MEETING OVERVIEW

- Follow-Up & Roundtable on January 22, 2020 SEC Meeting
- Engineering Discussion
  - Basics of Launch Shaft Site
  - Logistics
  - Siting Analyses

Minutes Review

January 22, 2020 SEC Meeting Follow-Up & Member Roundtable

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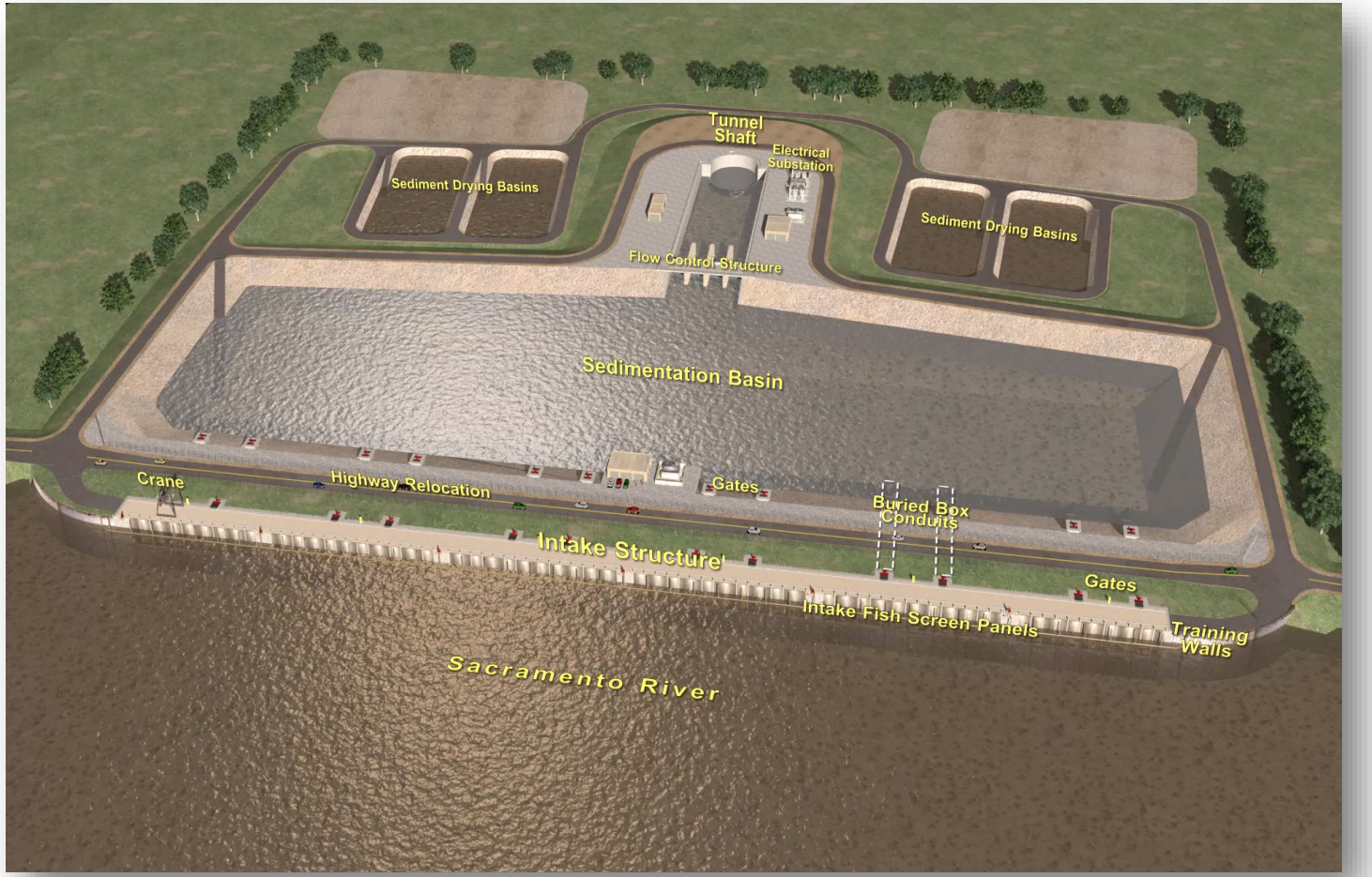
Discussion Topics

- Any questions from intake presentation?
- Thoughts on the layout of intakes
- Thoughts on logistics for access to the sites?
- Any ideas of ways to have public benefits at intake sites?

Note: We want to come back with more information on sound control after further study by our acousticians.



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Tunnel Launch Shafts

Today's Agenda

A. Basics of a Launch Shaft Site

- Components of a Tunnel Drive
- Construction Site Layout
- RTM Management
- Tunnel Liner Deliveries

B. Logistics

- Rail, Truck, and Barge Counts
- Logistics Maps

C. Siting Analyses

- Siting Methodology
- Site Rankings
  - Central Corridor
  - East Corridor
- Discussion

Next Meeting – Feb 26

1. SEC Input on Launch Shaft Locations
2. Basics of Retrieval Shafts and Maintenance Shafts
3. Siting Analysis of Retrieval and Maintenance Shafts
   - Central Corridor
   - Eastern Corridor
4. Discussion on Potential Beneficial Reuse opportunities for RTM in Delta

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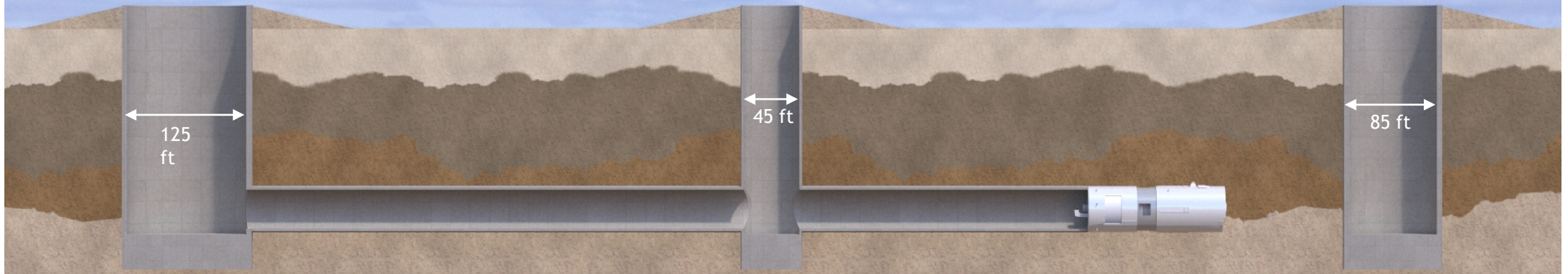
Tunnel Launch Shaft Basics

Key Components of a Tunnel Drive

10 to 15 mile tunnel drive lengths acceptable based on Delta soil conditions



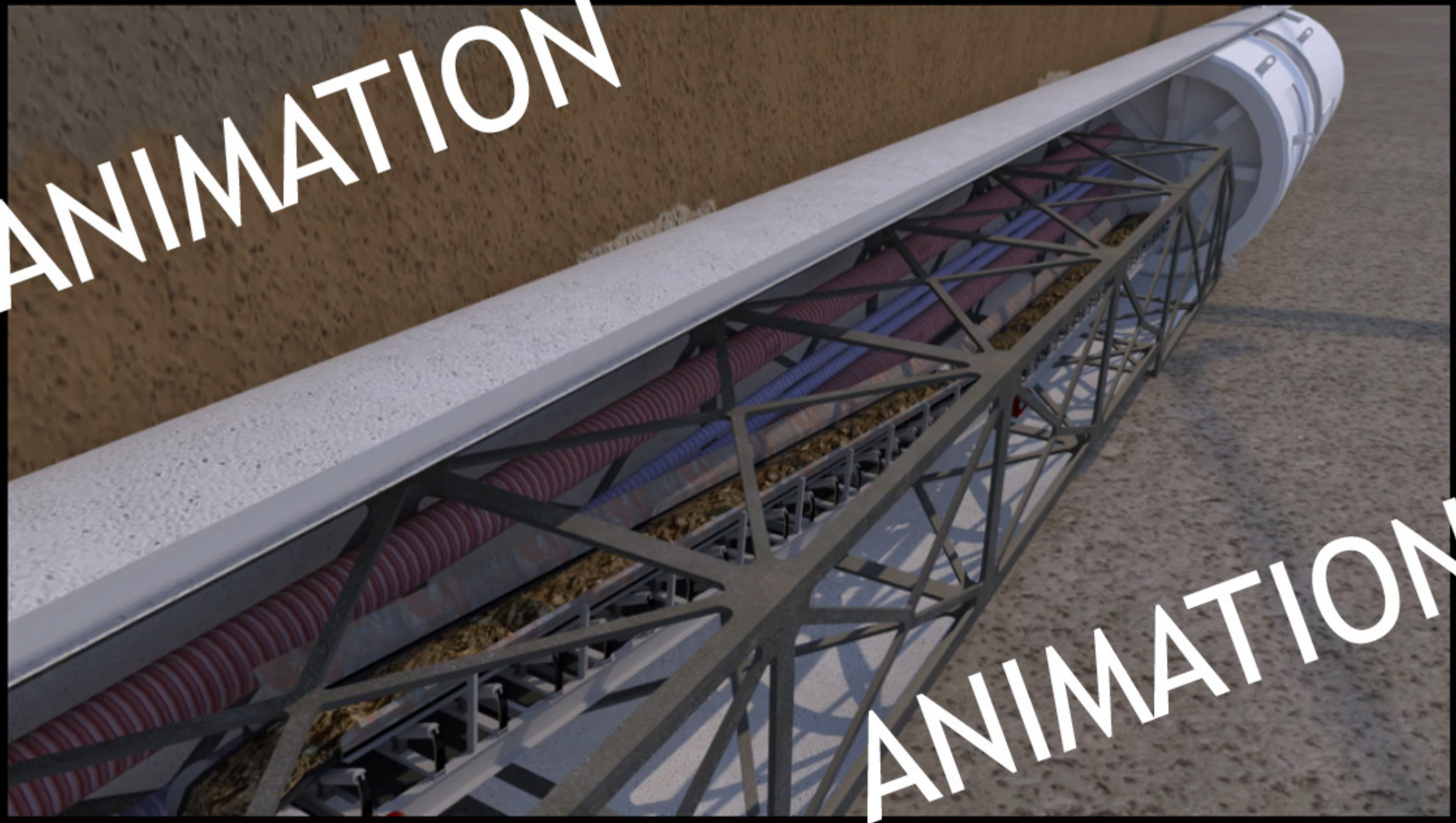
Tunnel Launch Shaft
Where the tunnel boring machine (TBM) is lowered into the tunnel. Where the concrete liners are transported into the tunnel. Where the excavated material (RTM) is removed.

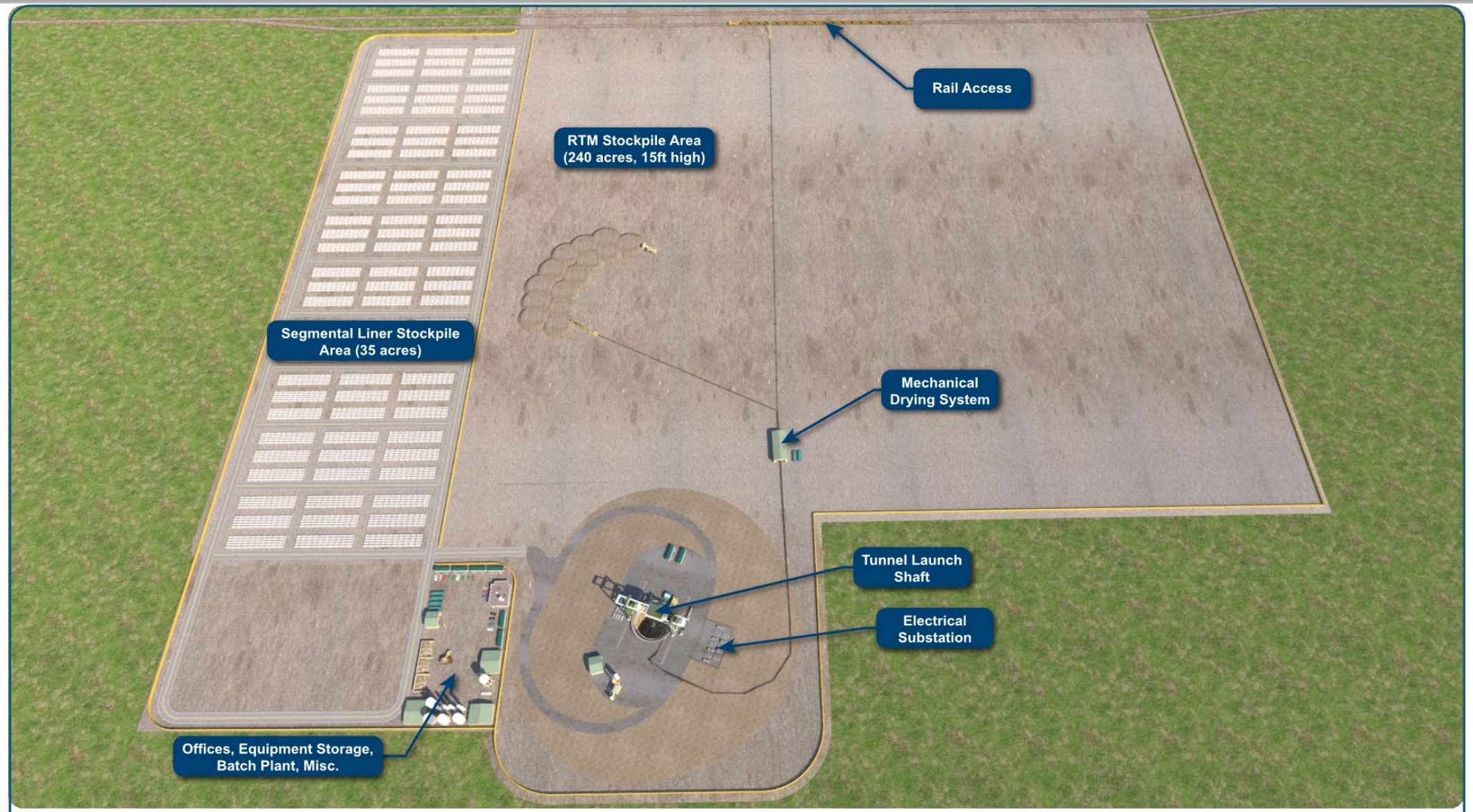
Maintenance Shaft
Provides direct access to the TBM for routine maintenance work. Needed approximately every 4 to 5 miles.

Tunnel Retrieval Shaft
Termination point of tunnel drive. Where TBM is disassembled and lifted out of the tunnel.

Main Activities at Launch Site

- Launch tunnel boring machine
- Tunnel boring operations
- Segment liner deliveries, stockpiling and transport into the tunnel for placement
- Reusable Tunnel Material (RTM) production, dewatering, and stockpiling
- Power supply systems
- Tunnel ventilation systems
- Site runoff management
- Tunnel boring machine worker access
- Emergency access





290 total acres
Single 15 mile drive
6,000 cfs capacity

Tunnel Launch Shaft Site Plan

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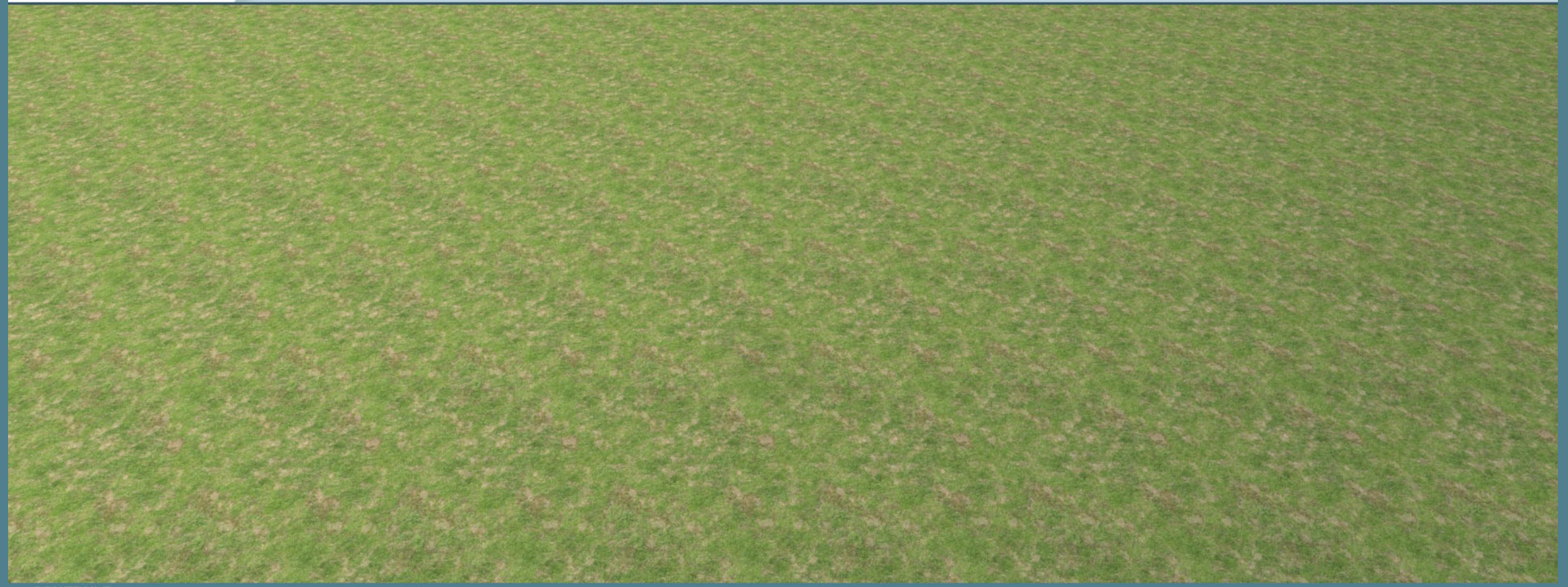
Tunnel Launch Shaft Construction



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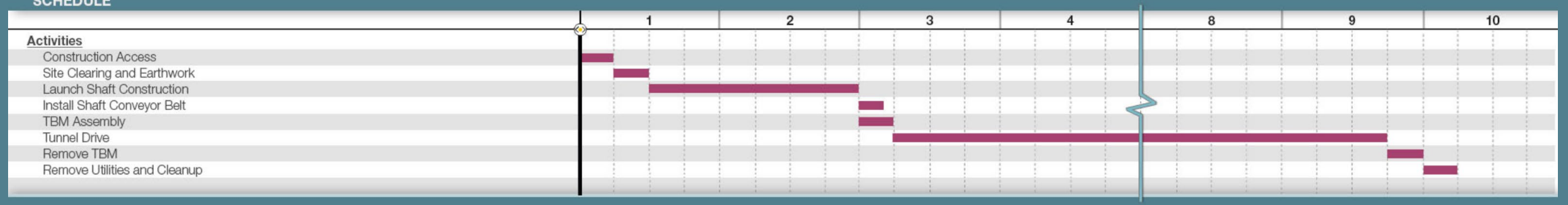

Tunnel Launch Shaft Construction

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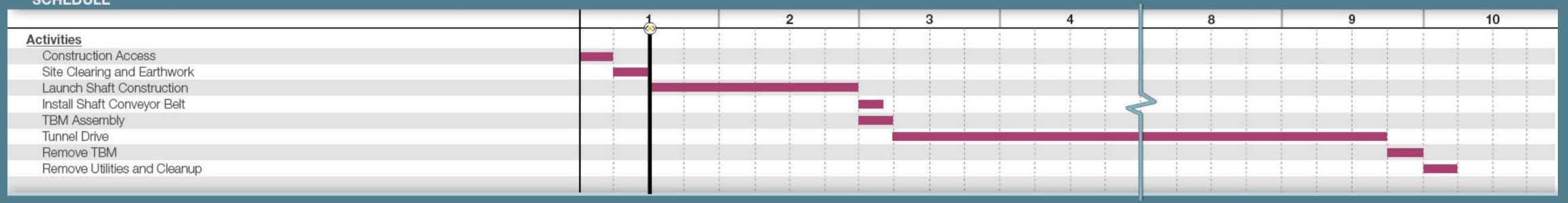

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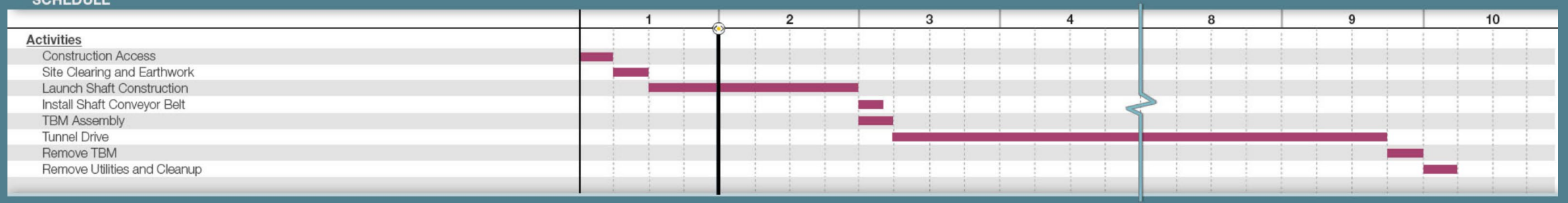

Tunnel Launch Shaft Construction

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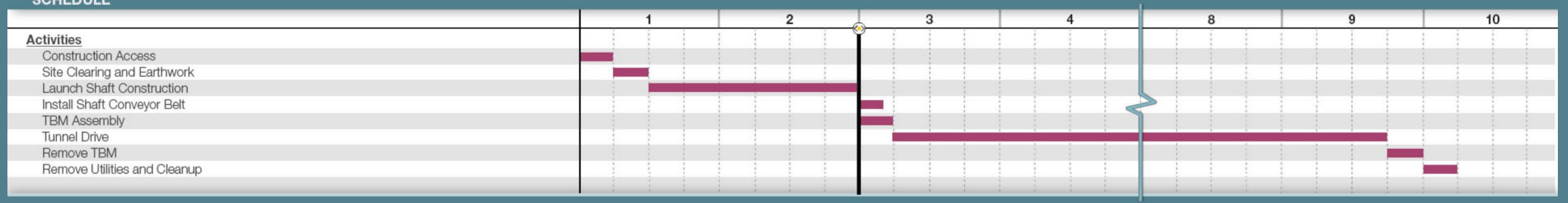

Tunnel Launch Shaft Construction

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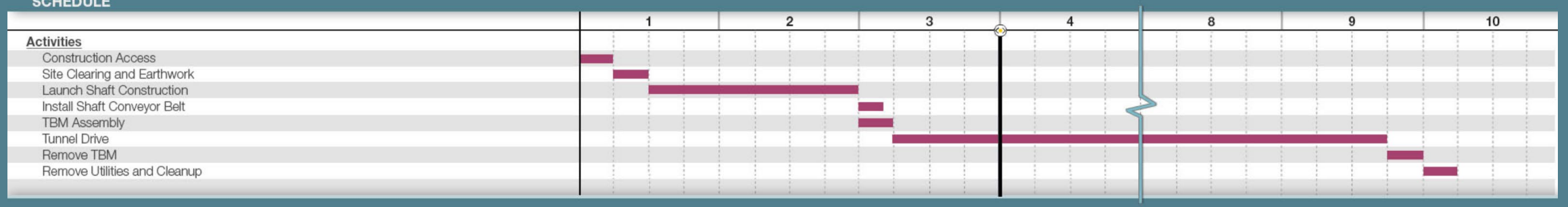


Reusable Tunnel Material (RTM)

- Extracted material from the tunneling process
- Comprised of clays, sands, and silts
- Consistency of toothpaste
- Soil conditioners used for boring operation are also present in low quantities
- Wet material would be dried prior to stockpiling
- Continuous soil and water testing program would be implemented to confirm quality of material for reuse or disposal
- Material suitable for beneficial reuse

RTM Drying Options

Centrifuge dewatering equipment

Land Application - Air Drying

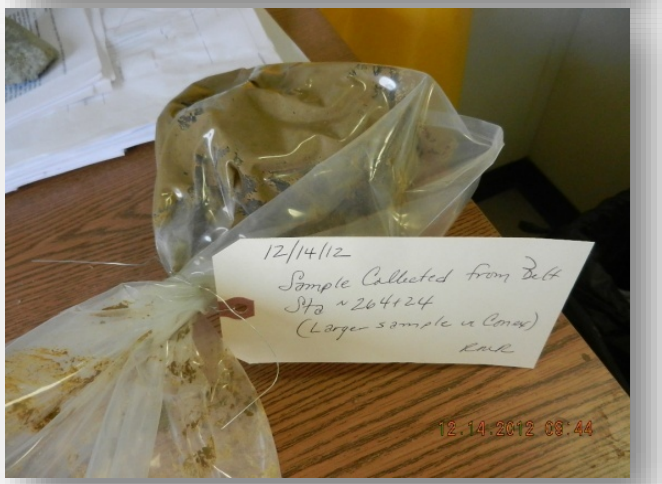
- Spread in approximately 12 to 18-inch lifts
- Would disc (turn) several times daily
- ~14 days to dry (weather dependent)
- Land intensive
- Would capture and treat drained water
- Additional truck emissions and noise (spreader, excavator, etc.)
- Would implement dust management
- Would implement stormwater runoff management

Mechanical Dewatering

- Centrifuges and plate presses have been used
- Could be housed indoors to capture dust and reduce noise
- Could be managed with electric powered conveyors hoppers, and machines

Typical RTM Testing Plan

- RTM is loaded onto a continuous conveyor belt that transports material to a Classification Holding Area
- Samples are taken daily from the conveyor belt
- The samples are logged, profiled, and stored on site for further screening if necessary
- RTM and decant water is held in designated zones awaiting sample results
  - Acceptable quality – material slated for beneficial reuse
  - Unacceptable quality – additional stored samples tested; material sent for landfill disposal



RTM and Environmental Test Results

- Reviewed available environmental soil laboratory results
- Initial observations:
  - Metals generally resemble background levels. Cadmium appears slightly elevated in all samples compared with published background, but doesn't appear to represent a human health or ecological risk.
  - Pesticides and total petroleum hydrocarbons (TPH): few detects (no pesticides, TPH in one water sample)
- Additional sampling as part of future soil investigation program
- Developing exposure scenarios to evaluate human health and ecological risks
- Evaluating alternatives to control airborne RTM particulate matter

Possible Local Beneficial Reuse Opportunities (further discussion Feb 26)

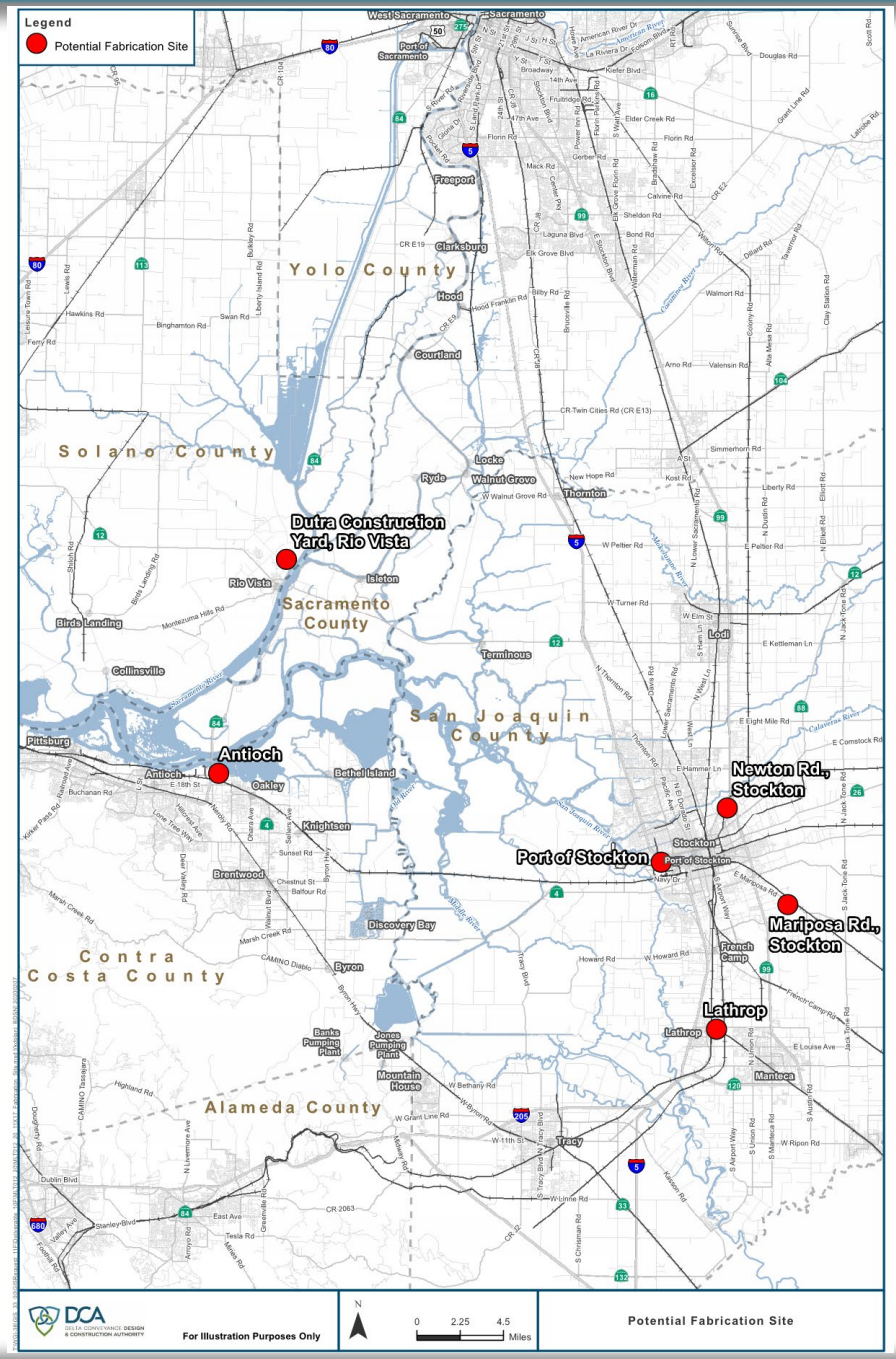
- Delta Conveyance Southern Forebay embankment
- Delta Conveyance mitigation projects in Delta
- Delta Reclamation Districts levee maintenance
- Other Delta restoration projects
- Land subsidence
- Road improvements
- Commercial sale

Pre-Cast Liners

- Liners typically provided by tunnel contractor
- Fabricated at existing or new purpose-built pre-cast facility
- Continuous operations at pre-cast facility with on-site stockpiling and batch shipments to tunnel launch sites
- Stockpiled on launch shaft site

Potential Pre-Cast Liner Fabrication Sites

- Approximately 50 segments per day needed for 6,000 cfs capacity (per tunnel drive)
- Delivery options
  - 25 trucks per day
  - One - 20 car rail delivery every 3 to 5 days
  - One barge delivery every 3 to 5 days
- Sites selected by contractor or pre-selected by the Project
- Prefer to identify acceptable locations as part of engineering planning process rather than leaving to contractor selection which allows for assessment of transportation effects
- Prefer pre-cast fabrication sites near rail or barge access to reduce trucking



Clarifications?

10-Minute Break

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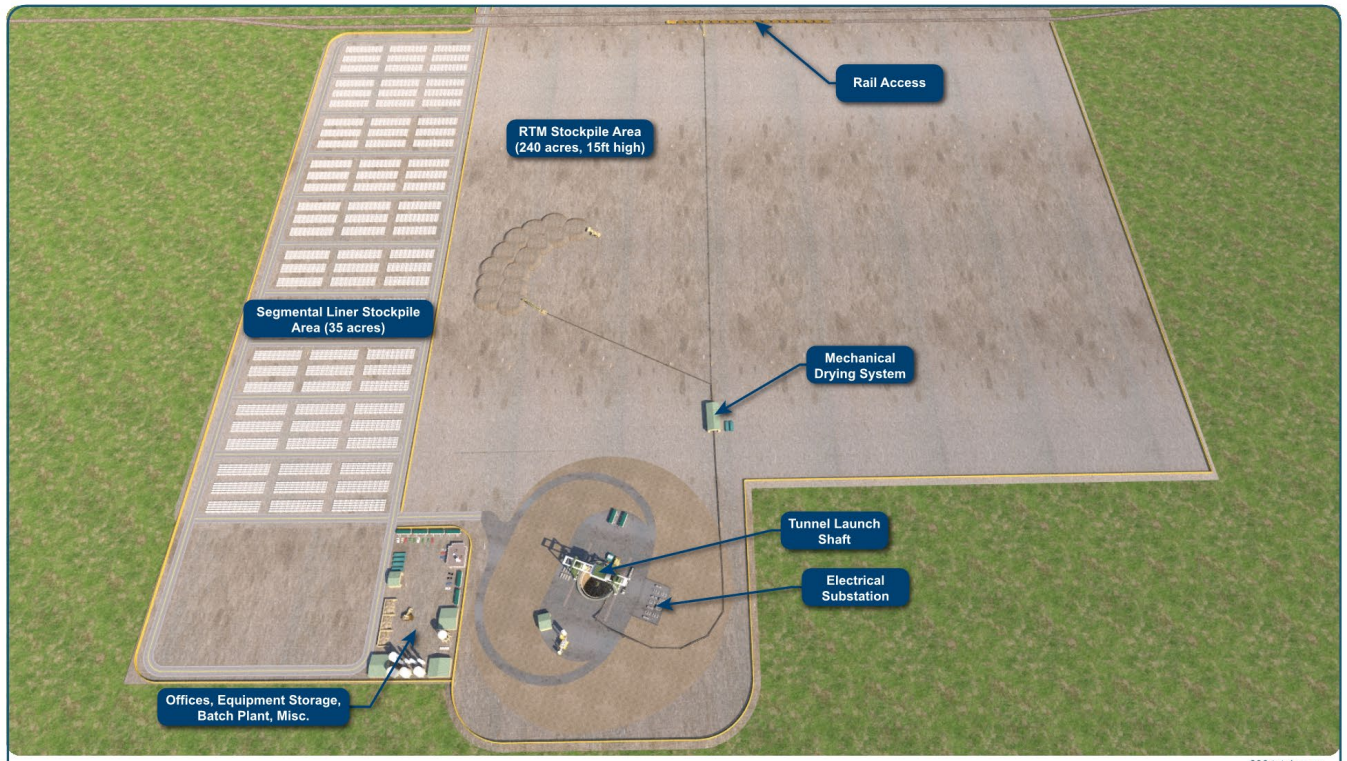
Launch Shaft Logistics

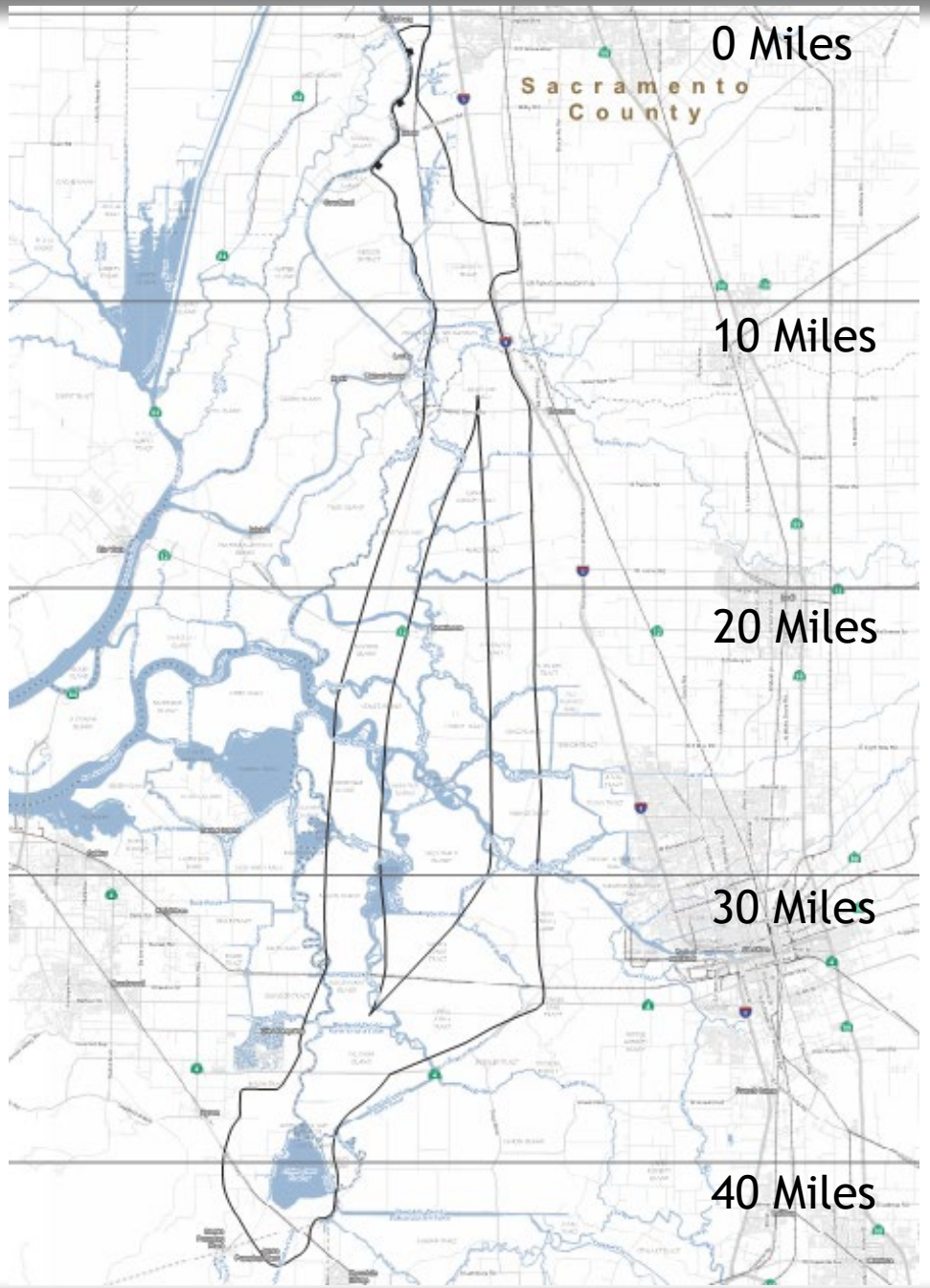
Launch Shafts

1. Substantial construction area required
2. Substantial production and stockpiling of RTM
3. Potential loading and hauling to move RTM off-site
4. Frequent tunnel liner segment deliveries and site stockpiling
5. Transportation logistics is one of the key factors in siting sites
   - Access to rail or barge landing would divert substantial traffic off local roads



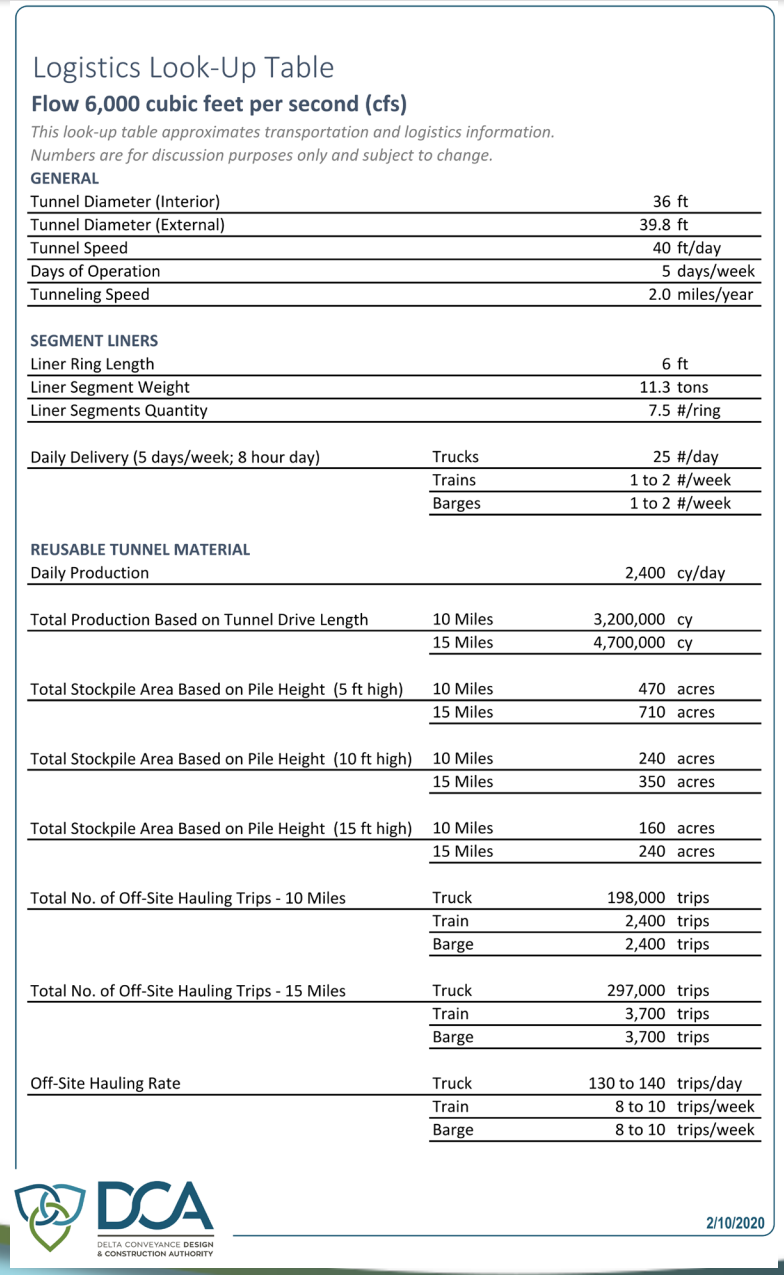
Tunnel Drive Length

1. The tunnel drive length dictates the number of liners needed and the amount of RTM produced
2. Engineering team recommends drive lengths between 10 to 15 miles based on Delta underground conditions (soft ground; consistent characteristics)
3. For the ~40 mile total tunnel length:
    - 3 to 4 tunnel drives
    - 2 to 3 launch shafts
    - 2 to 3 retrieval shafts



Look-Up Tables

1. Each table includes information on each capacity alternative in the NOP (3,000 cfs to 7,500 cfs)
2. Table includes the preliminary information:
   - Tunnel Diameter
   - Drive Speed
   - Liner Transport Trips
   - RTM Production and Total Stockpile Area
   - RTM Transport Trips
3. Transportation calculations based on trucking, rail, and barge options (count = roundtrips)
4. ***Data is based on a set of assumptions for the purposes of relative comparison and discussion – all are subject to refinement as engineering is progressed***



Logistics Look-Up Table

Flow 6,000 cubic feet per second (cfs)

This look-up table approximates transportation and logistics information.
Numbers are for discussion purposes only and subject to change.

GENERAL			
Tunnel Diameter (Interior)		36	ft
Tunnel Diameter (External)		39.8	ft
Tunnel Speed		40	ft/day
Days of Operation		5	days/week
Tunneling Speed		2.0	miles/year
SEGMENT LINERS			
Liner Ring Length		6	ft
Liner Segment Weight		11.3	tons
Liner Segments Quantity		7.5	#/ring
Daily Delivery (5 days/week; 8 hour day)	Trucks	25	#/day
	Trains	1 to 2	#/week
	Barges	1 to 2	#/week
REUSABLE TUNNEL MATERIAL			
Daily Production		2,400	cy/day
Total Production Based on Tunnel Drive Length	10 Miles	3,200,000	cy
	15 Miles	4,700,000	cy
Total Stockpile Area Based on Pile Height (5 ft high)	10 Miles	470	acres
	15 Miles	710	acres
Total Stockpile Area Based on Pile Height (10 ft high)	10 Miles	240	acres
	15 Miles	350	acres
Total Stockpile Area Based on Pile Height (15 ft high)	10 Miles	160	acres
	15 Miles	240	acres
Total No. of Off-Site Hauling Trips - 10 Miles	Truck	198,000	trips
	Train	2,400	trips
	Barge	2,400	trips
Total No. of Off-Site Hauling Trips - 15 Miles	Truck	297,000	trips
	Train	3,700	trips
	Barge	3,700	trips
Off-Site Hauling Rate	Truck	130 to 140	trips/day
	Train	8 to 10	trips/week
	Barge	8 to 10	trips/week

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Tunnel – Basic Data

1. Internal tunnel diameter is a function of flow
2. External tunnel diameter accounts for liner thickness
3. Tunnel boring speed dependent on tunnel diameter and daily operating hours
   - Smaller = faster
   - Daily Operation = 20 hours
4. Distance per year based on annual days of operation

Tunnel Data

	Tunnel Diameter			
Capacity	**Interior**	**External**	**Tunneling Speed**	
cfs	*ft*	*ft*	*ft/day*	*miles/year*
3,000	25	28.5	45	2.2
4,500	31	34.5	40	2.0
6,000	36	39.8	40	2.0
7,500	40	44.8	35	1.7

Annual tunnel distance assumes 5 days/week of tunnel operations; 1 day of maintenance; 1 day of rest; 50 total work weeks in year.

Tunnel Liner Segment Deliveries

1. Daily number of segments needed dependent on tunnel diameter and boring speed
   - Larger diameter = heavier liner
   - Larger diameter = slower speed
2. Daily number of deliveries is driven by the weight of the liners

Deliveries					
Capacity	# Segments	Truck		20 Car Rail	Barge
		24 ton, 10 hour day		*100 ton/car*	*2,000 ton*
cfs	*per day*	*#/day*	*Interval*	*Interval*	*Interval*
3,000	49	25	20 to 25 min	5 to 7 days	5 to 7 days
4,500	50	25	20 to 25 min	4 to 6 days	4 to 6 days
6,000	50	25	20 to 25 min	3 to 5 days	3 to 5 days
7,500	50	50	10 to 15 min	2 to 4 days	2 to 4 days

Note: Assumes liner deliveries keep pace with daily production rates for the purposes of comparison and discussion. Actual deliveries may vary depending on ultimate manufacturing and delivery plan.

RTM Stockpile Area (Drive in One Direction)

1. RTM volume per drive is based on the tunnel diameter and the total drive length
2. Total area needed is dependent on how high the material is piled
3. Launch site consideration includes sufficient space to stockpile the entire volume of RTM produced to minimize risk of work stoppage
4. The total acreage needed could decrease if material could be hauled off-site for beneficial reuse as the tunnel is excavated

Stockpile Area						
Capacity	**10 Mile Bore**			**15 Mile Bore**		
	5 Ft High	10 Ft High	15 ft High	5 Ft High	10 Ft High	15 ft High
cfs	*Acres*			*Acres*		
3,000	240	120	80	360	180	120
4,500	350	180	120	530	270	180
6,000	470	240	160	710	350	240
7,500	600	300	200	900	450	300

Note: The date in the table is based on a single drive direction. If a two drives are launched from a single location, i.e. tunneling north and tunneling south, then these quantities would double.

RTM Off-Site Hauling (Where Required)

1. RTM can be used by:
   - Conveyance project at the launch shaft site *(highest priority)*
   - Offsite conveyance project facilities
   - Offsite to other identified beneficial reuse
   - Stockpiled on site for future unknown use
2. Two project features require RTM:
   - Southern Forebay (~5,000,000 cy @ 6,000 cfs)
   - Mitigation Areas (quantity and locations unknown)
3. Access to rail or barge desirable for off-site transport - high volume of material
4. Team prefers to identify beneficial reuse scheme as part of this project so that public has complete picture of potential transportation requirements

RTM Off-Site Hauling

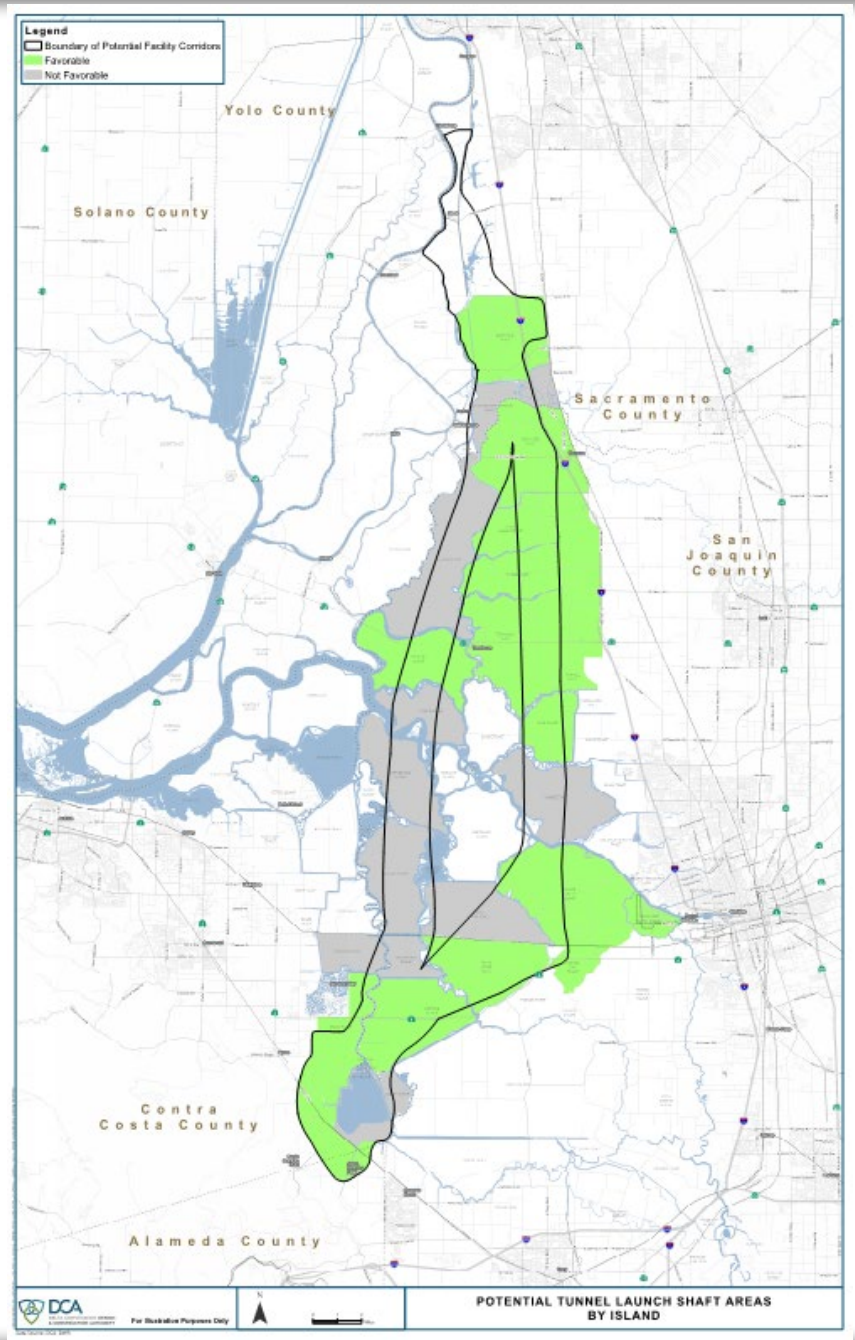
Capacity	RTM Generated	Transportation Trips			
		Truck		20 Car Rail	Barge
		16 cy, 10 hour day		*(65 cy/car)*	*(1,300 cy)*
cfs	*cy/day*	*#/day*	*Interval*	*#/day*	*#/day*
3,000	1,400	90	7 to 8 min	1 to 2	1 to 2
4,500	1,800	110	5 to 6 min	1 to 2	1 to 2
6,000	2,400	150	4 to 5 min	2	2
7,500	2,700	170	3 to 4 min	2	2

Note: For the basis of comparison, the RTM hauling counts are based on the daily volume of material generated at a launch shaft site and 5 days a week of operation and hauling.

Existing data indicates RTM suitable for reuse (e.g. levee construction) subject to more extensive field testing and analysis.

Launch Shaft - Logistics Maps

- Maps identifying feasibility of existing routes for surface roads, rail and barging for the purposes of siting a Launch Shaft
- “Heat Maps” identifying islands that are accessible by road, rail or barge
- Favorable access represents areas that have good road access and either rail or barge access
- Rating System for Launch Shaft Siting:
  - Green – Favorable for Tunnel Launch Shaft
  - Grey – Not Favorable for Tunnel Launch Shaft



Clarifications?

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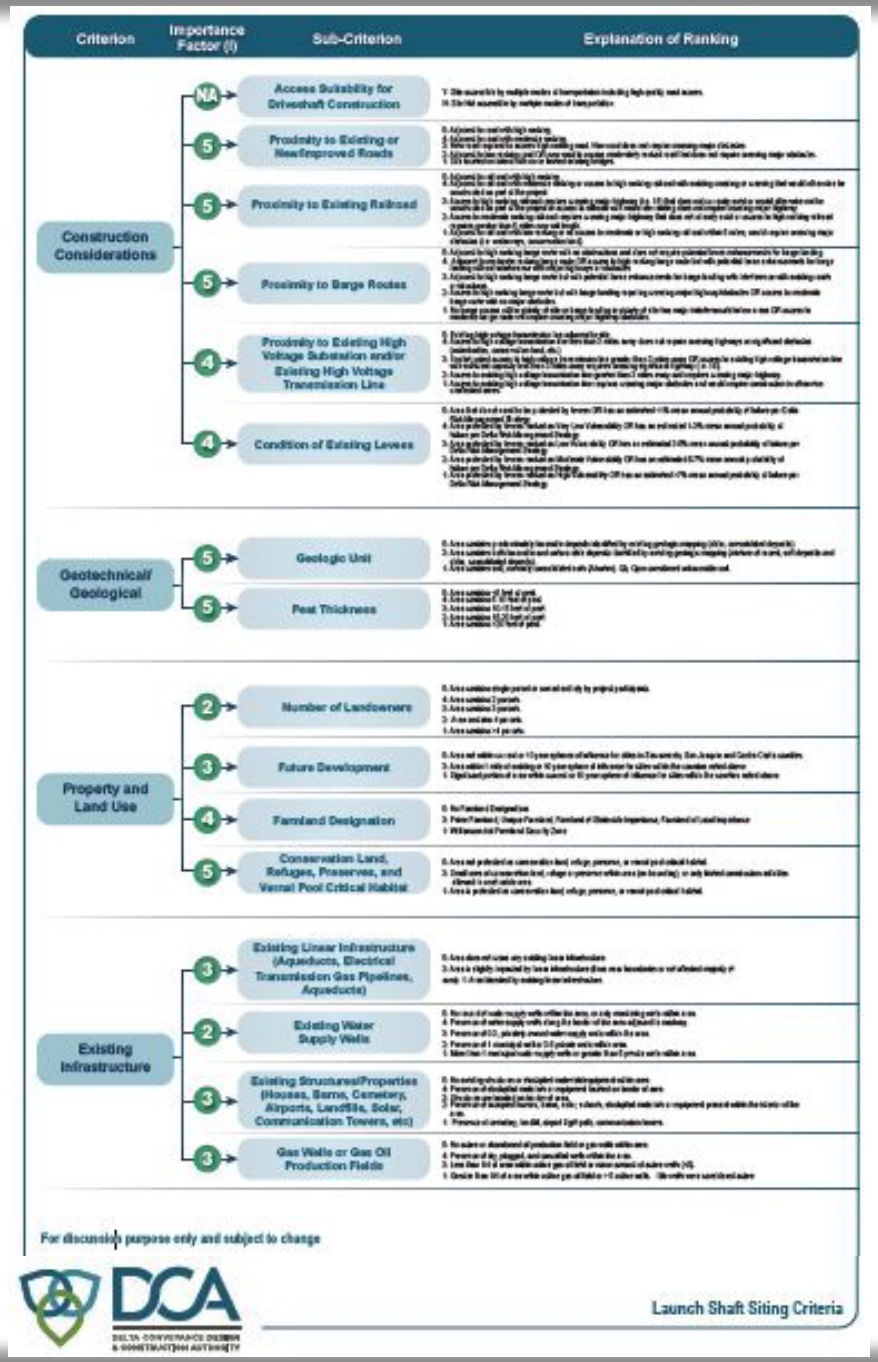
LAUNCH SHAFT SITING ANALYSIS

Siting Methodology

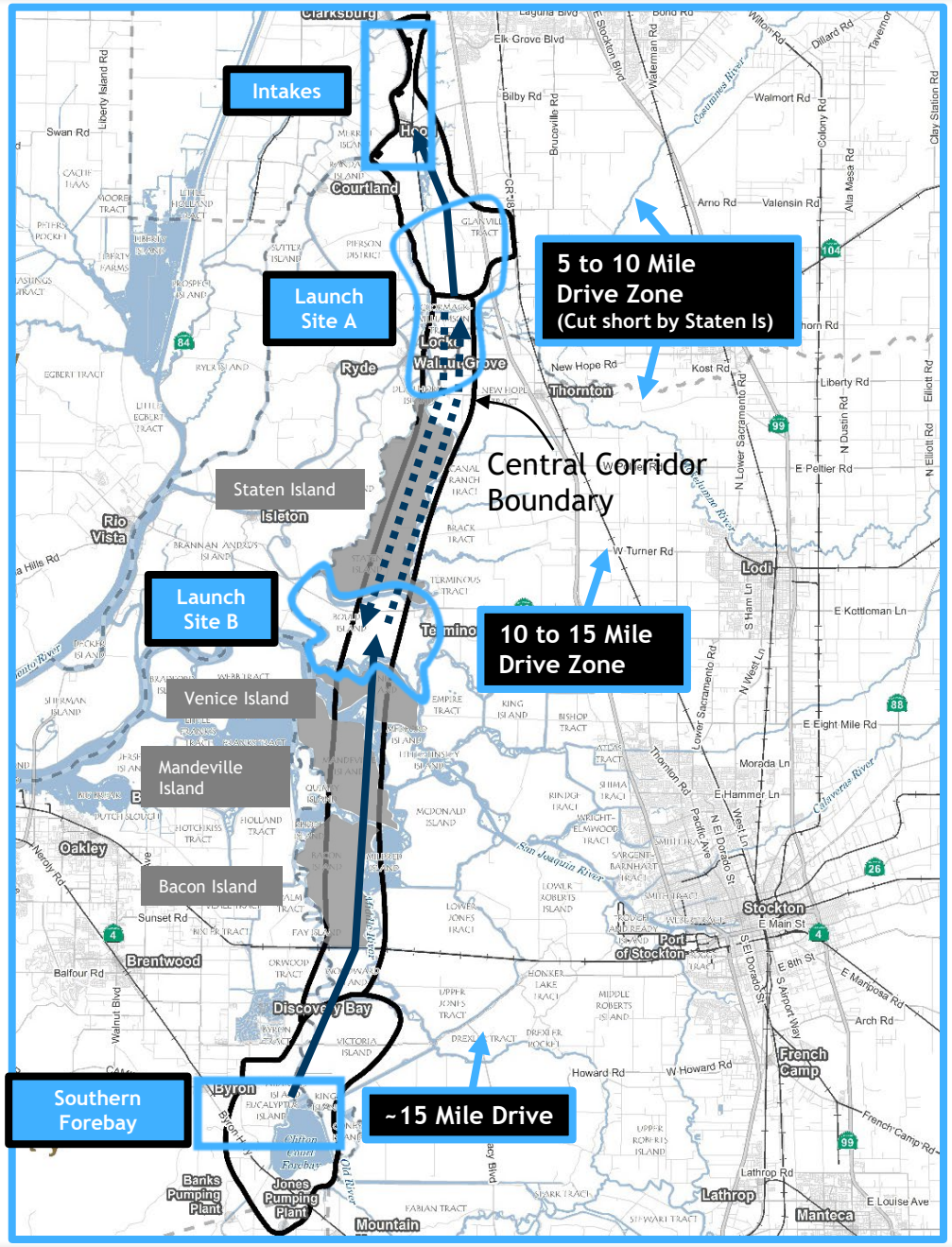
- Siting methodology breakdown is in handout packet
- Methodology is broken out into criteria and sub-criteria
- Sub-criteria are assigned an Importance Factor to reflect their weighting
- Criteria are based on design and construction considerations
  - The CEQA process will consider additional environmental considerations



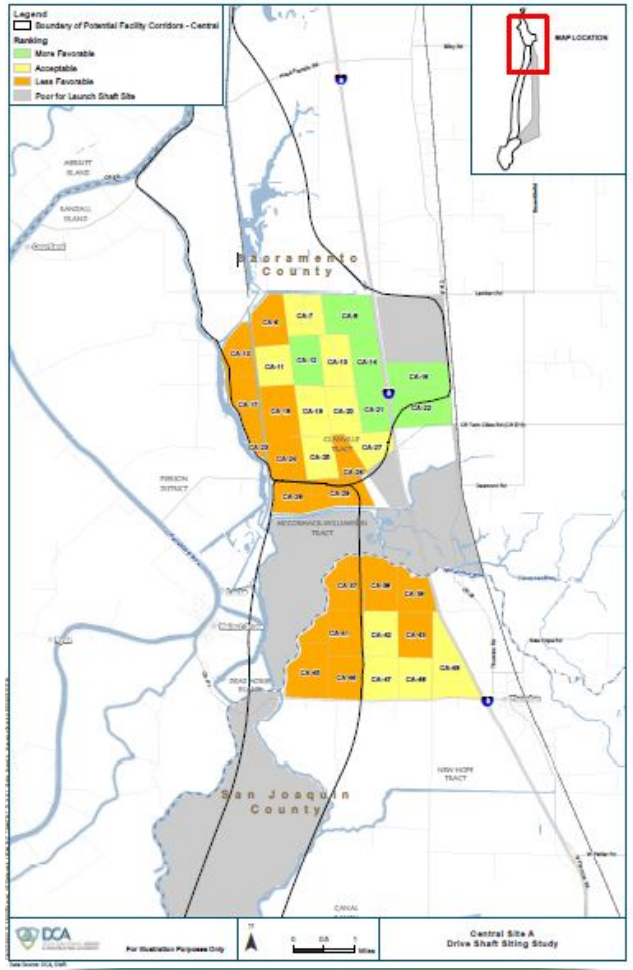
Central Alignment

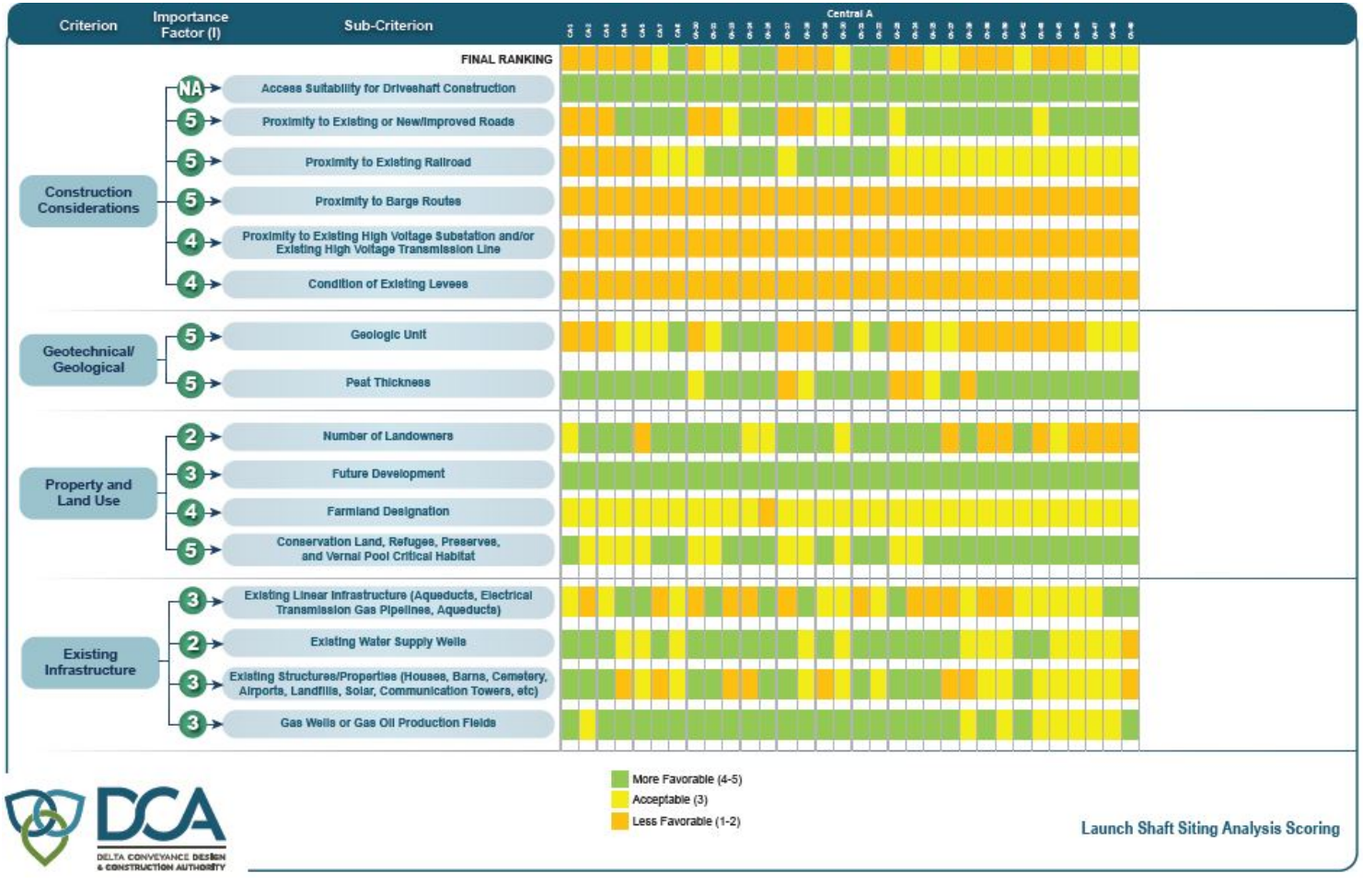
3 Drives:

1. **Intakes to Launch Site A**
   - Drive shorter than desirable to avoid Staten Island
   - Drive north to reduce potential effects at intakes
   - Sites closer to rail preferable for liner and RTM transport
2. **Launch Site A to Launch Site B (Bouldin Island)**
   - Good road (Hwy 12) and barge access (off San Joaquin River)
   - Good location to stockpile RTM for Delta beneficial reuse
   - Launch or receive at this site depending on where RTM desired
3. **Launch Site B to Southern Forebay**
   - Drive north from Southern Forebay to Bouldin – use RTM to build forebay levees
   - Potential for ~100% reuse of material on site

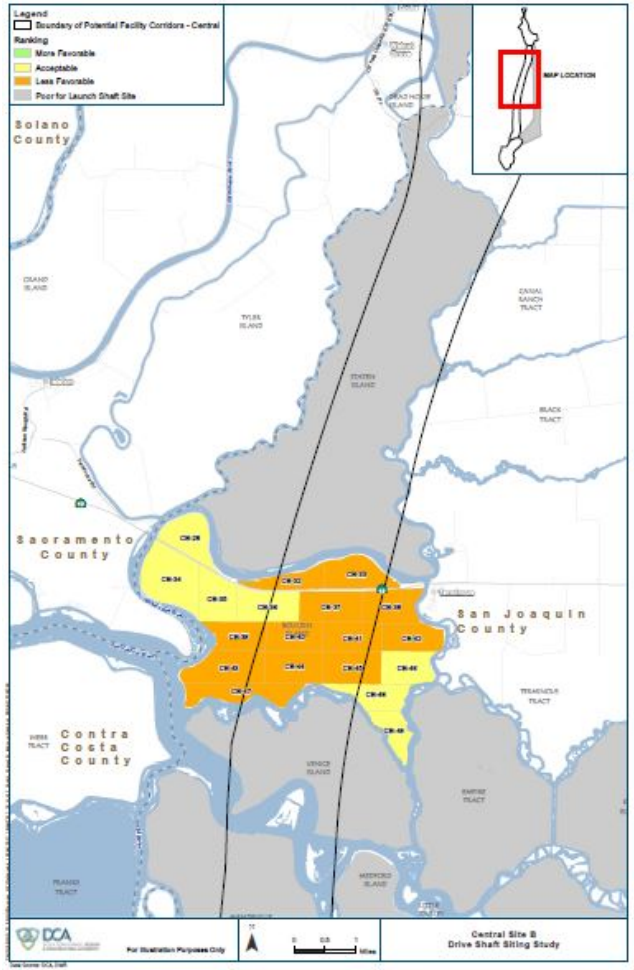


Central Alignment -Shaft Site A





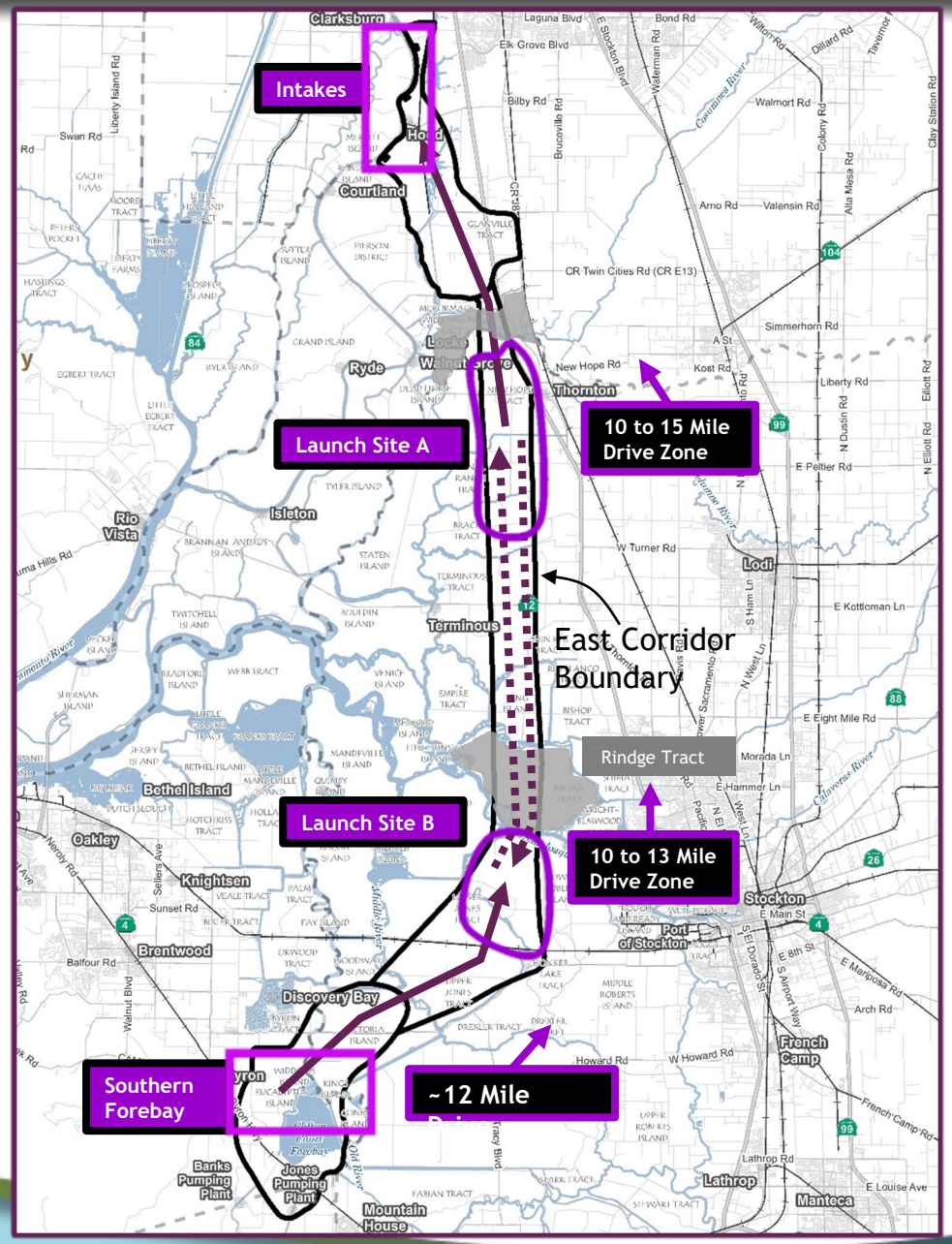
Central Alignment -Shaft Site B



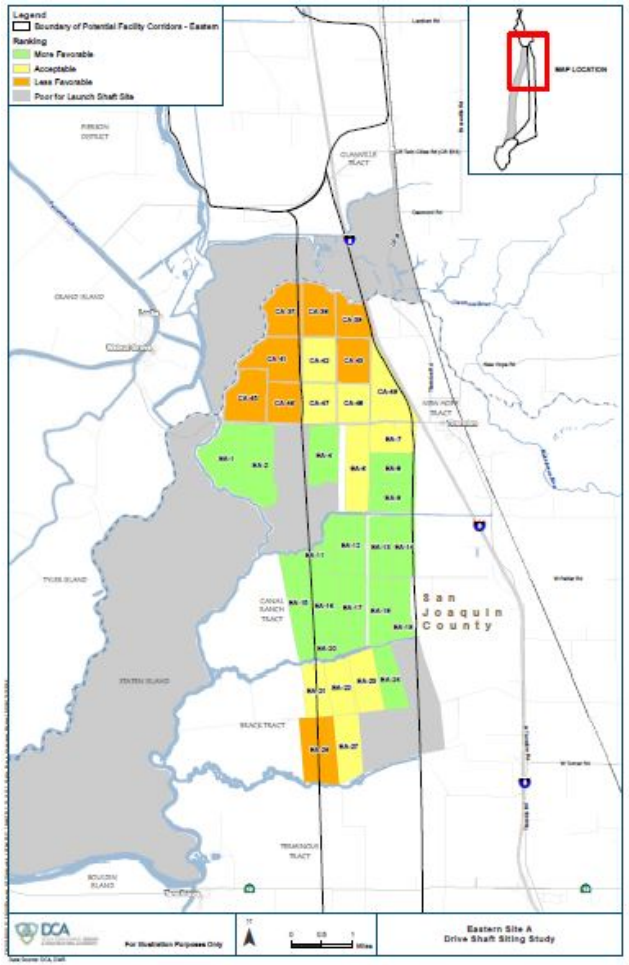
Configurations - East

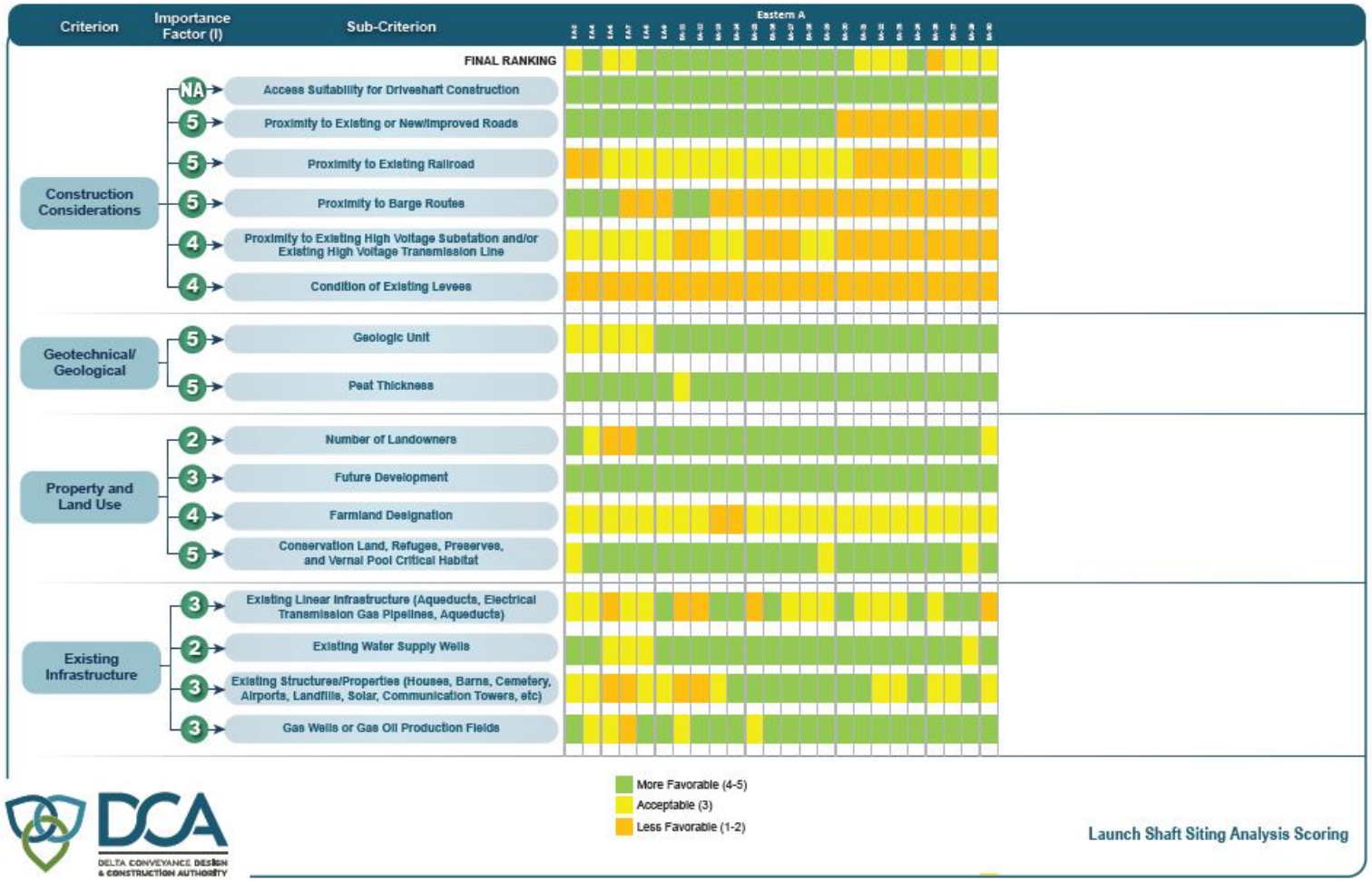
3 Drives:

1. **Intakes to Launch Site A**
   - Drive north to reduce potential effects at Intakes
   - Sites closer to rail preferable for liner and RTM transport
2. **Launch Site A to Launch Site B**
   - Acceptable road (Hwy 4) and barge access (San Joaquin River)
   - Good location to stockpile RTM for Delta beneficial reuse
   - Launch or receive at this site depending on where RTM desired
3. **Launch Site B to Southern Forebay**
   - Drive from Forebay north to Launch Site B – use RTM to build forebay levees
   - Potential for ~100% reuse of material on site

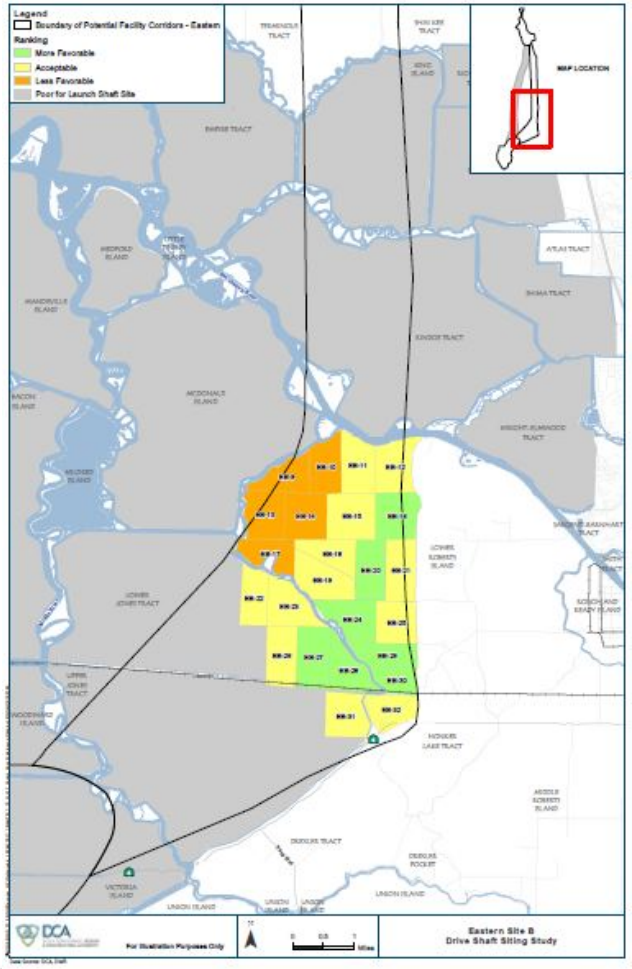


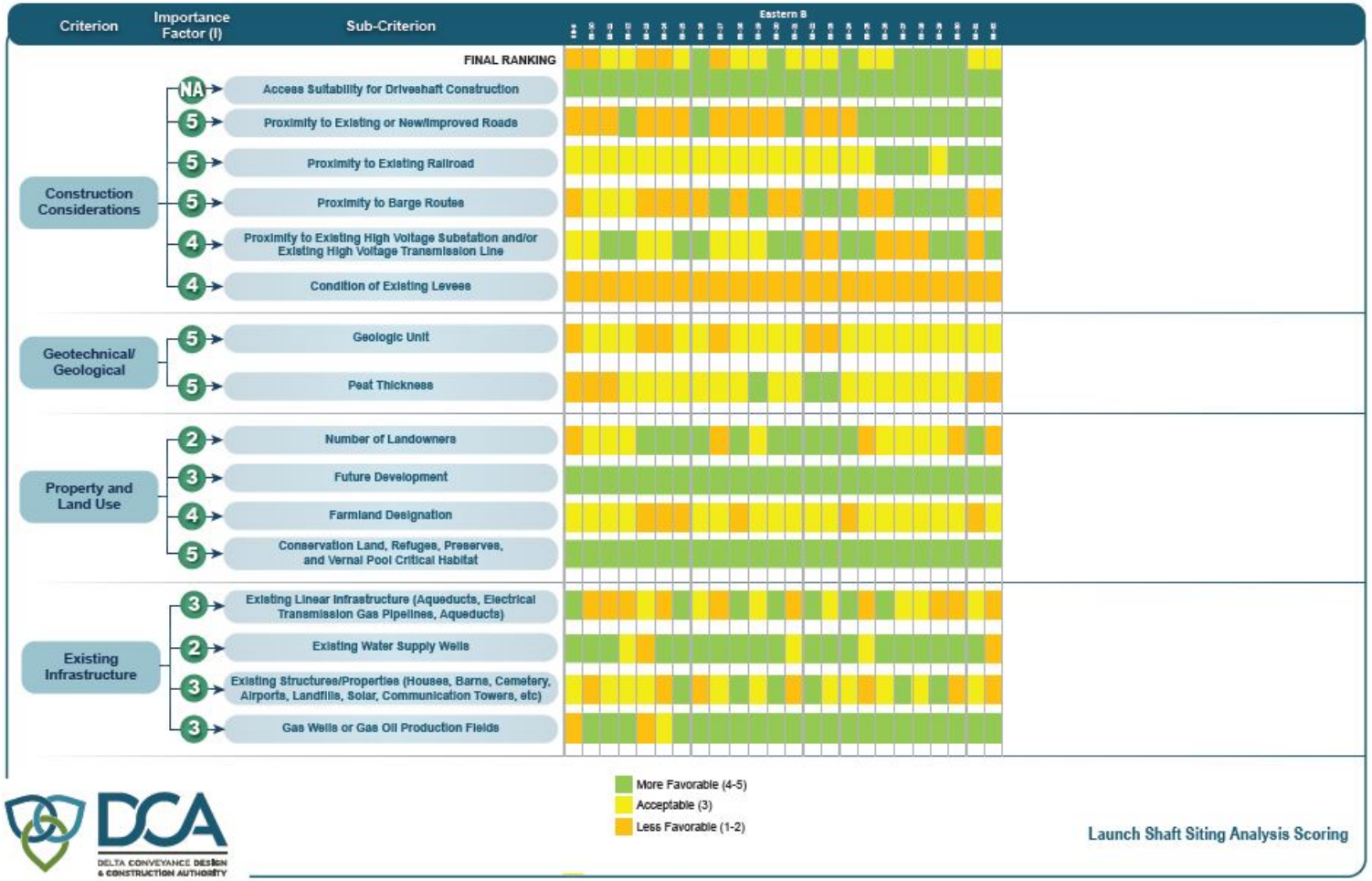
East Alignment – Shaft Site A





East Alignment – Shaft Site B





Clarifications?

For SEC Consideration

- DCA has identified zones where we believe launch shafts could be located based on acceptable drive lengths and has created an evaluation system to rank feasible sites within each of these zones. We have reviewed the results of this exercise with you today.
- Questions for SEC to consider:
  - Do you feel that the evaluation system captures the design and construction issues important to the Delta?
  - Do the results of the evaluation system applied to the areas within each zone make sense? What specifically seems appropriate or inappropriate?
  - Do you have any thoughts regarding areas that would be preferred for locating a launch shaft?
- Is there any additional information related to the **siting** of launch shafts that you would like presented at the next SEC meeting on February 26?

Public Comment

Item 4: Staff Presentation & Committee Discussion

Public Comment

Non-Agendized Items

NEXT SEC MEETING

DATE: February 26, 2020

TIME: 3-6 PM (2-3 hours)

LOCATION: Belle Vie Vineyards,
19900 Sherman Islands Cross Rd., Rio Vista, CA

TOPICS*:

- Follow-up SEC MEETING #4 & Member Roundtable
- Finalize Drive Shaft Locations
- Review Retrieval Shaft Locations
- Review Maintenance Shaft Locations

**Subject to change*