Attachment H
Summary of RM 10.9 Lessons Learned

to the Comments on behalf of the Lower Passaic River Study Area Site Cooperating Parties Group on the Proposed Plan for the Lower Eight Miles of the Lower Passaic River Study Area Portion of the Diamond Alkali Superfund Site

Bridge Openings: The RM 10.9 removal required coordination of openings of 10 bridges (see Exhibits 1 and 2) on the LPR between RM 2.6 and 10.4 to allow passage of tugs, barges, and dredging equipment. There were 104 one-way trips, and 1,040 total individual bridge openings on the LPR over the duration of the project.

Implications: **Current CPG estimates are that 20,000 to 25,000 individual bridge openings would be required under EPA's proposed Alternative 3, depending on equipment sizing assumptions.** Multiple daily bridge openings will cause significant traffic disruptions to the surrounding communities.

Bridge Mechanical Conditions, Maintenance, and Operations: The Bridge St. Bridge was inoperable at the initiation of the RM 10.9 removal and experienced significant mechanical problems during the project. The Amtrak Bridge and the New Jersey Transit Stickle Bridge had restrictions on openings during rush hours; barges can be moved only during each day's high tides, and movement was delayed when high tides occurred during rush hours. Other bridges have restricted opening schedules tied to community events (e.g., the Red Bull Arena in Harrison).

CFR Title 33 Part §117.739 specifically defines the notification times and requirements associated with bridge openings. In addition, Part §117.739 states for the following bridge are not required to open during certain hours:

> (e) The draw of the Amtrak Dock Bridge, mile 5.0, at Harrison, shall open on signal after at least a twenty-four hour advance notice is given by calling the number posted at the bridge; **except that, from 7:20 a.m. to 9:20 a.m. and from 4:30 p.m. to 6:50 p.m., Monday through Friday, except Federal holidays, the draw need not be opened for the passage of vessel traffic (emphasis added).** At all other times, a bridge opening may be delayed no more than ten minutes for the passage of rail traffic, unless the draw tender and the vessel operator agree to a longer delay.
>
> (g) The draw of the NJTRO Newark-Harrison (Morristown Line) Bridge, mile 5.8, at Harrison, New Jersey shall open on signal if at least one hour advance notice is given to the drawtender at Upper Hack Bridge mile 6.9, across the Hackensack River at Secaucus, N.J. In the event the HX drawtender is at the Lower Hack Bridge, mile 3.4 on the Hackensack River, at Jersey City then up to an additional half hour

> delay in opening is permitted. After the signal to open is given, the opening may be delayed no more than ten minutes. **From 7:15 a.m. to 9 a.m. and from 4:30 p.m. to 6:50 p.m., Monday through Friday except federal holidays, the draw need not open.(emphasis added)**
>
> (p) The draw of the Route 1 & 9 (Lincoln Highway) Bridge, mile 1.8, between Kearny and Newark, shall open on signal if at least a four hour advance notice is given; **except that, the draw need not open for the passage of vessel traffic between 6 a.m. and 10 a.m. and between 2 p.m. and 6 p.m., Monday through Friday, except holidays. (emphasis added).** Tide dependent deep draft vessels may request bridge openings between 6 a.m. and 10 a.m. and between 2 p.m. and 6 p.m., provided at least a twelve hour advance notice is given by calling the number posted at the bridge.

Bridge mechanical failures, delayed repairs, and restricted opening schedules impacted the RM 10.9 removal schedule by approximately 6 weeks (see Exhibit 1 for a summary of bridge conditions).

Implications: **Delayed bridge openings due to operational or mechanical issues will impede barge movement up and down the river, extending the duration of the dredging and capping activities.** The operating condition of aged bridges will require further evaluation during design of future dredging projects on the LPR, and significant infrastructure upgrades and/or frequent maintenance may be required for bridges to be operational during remedy implementation. Hudson and Essex counties recently started planning replacement of the Clay Street Bridge; channel movement could be restricted for several months during construction.

The 2014 FFS states that coordination of bridge operations "may include assisting bridge authorities with engineering evaluations and maintenance of the bridges…during the remedial design." **This language suggests EPA may consider technical assistance to bridge authorities to be a legitimate CERCLA response cost. Maintenance of bridges so as not to impede river navigation is a legal responsibility of the bridge operators alone.**

Navigational Constraints: Tides, currents, channel width and depth, limited bridge clearances, obstructions, shoals, and outcrops restrict navigation and impact equipment sizing and timing of barge movement. Navigation around bridge pilings is impeded by outcrops, and currents must be coordinated with tides. Above the Jackson Street Bridge (RM 4.6), channel and bridge constraints are very restrictive:

- Four bridges have less than 13 feet clearance during low tide and 8 feet vertical clearance during high tide.

- Horizontal openings of several bridges, starting at Jackson Street Bridge, become very restrictive. Following USACE guidance, horizontal bridge clearances reduce maximum allowable barge width to less than 30 feet[1].
- The overall channel width narrows above the Jackson Street Bridge, limiting the room for staging and maneuvering scows and requiring the use of smaller dredges and barges.
- The water depth limits the vessel draft to 10 feet for safe navigation through shallower areas, limiting the barge capacity and volume.
- High water velocities require sufficiently powered tugboats to navigate the barges around bridge structures and shoal areas, restricting the opportunities to use smaller vessels, and likely eliminating the ability to transport multiple barges with a single tug.

Implications: **Channel width and depth and bridge constraints limit the size and number of dredges and barges that can operate on the LPR above RM 4.6 and, together with the tugboat horsepower requirements, limit the opportunities to use specialized or custom equipment.** CPG's cost and duration estimates are based on the assumption that only a single dredge would operate at a time upstream of this point, and that dredge and barge capacities would be limited, as follows[2]:

- Dredges: 5 cy bucket (channel); 3 cy bucket (mudflats)
- Barges: 800 cy (channel); 300 cy (mudflats)

Utilities: Accurate location of utilities is a challenge, and utility setback requirements create "no dredge zones." At RM 10.9, a subbottom profile survey and a magnetometer survey were performed to determine the lateral location and depth of a buried water line. The depth was not accurately determined due to poor ability to detect the concrete lines, and there was some uncertainly regarding the lateral location. The surveyed lateral location was approximately 10 ft offset from the mapped location. Due to the uncertainty in the survey results, the utility was unwilling to rely on the geophysical survey when determining where the setbacks should start from, and not willing to reduce the buffer to less than 30 ft on either side of the estimated pipeline alignment.

Implications: Numerous utility corridors exist within the LPRSA, as documented in the CPG's December 31, 2013, pre-draft FS report (see Figure 8-2, attached as Exhibit 3; see also Appendix B). EPA's 2014 FFS and Proposed Plan assume that remedy design would include procedures to locate utilities in the FFS Study Area more precisely and determine

[1] Barges with a 40-foot width were used for the RM 10.9 removal, resulting in 8 feet of clearance through the Erie/Montclair-Greenwood Lake RR Bridge at RM 8.1 and resulting in a significant navigational challenge.
[2] Above RM 8.1, average barge volume is likely limited to 500 cy, based on RM 10.9 removal.

appropriate dredging offsets, if necessary. In EPA's cost estimates, it is assumed that utility protection would be required only under Alternative 2. **No provisions for any utility protection are provided in the EPA cost estimate for Alternative 3. EPA's dredge prism calculations include no provisions for utility protection corridors.**

Hardened Shorelines/Hard Subsurface Conditions: Hardened shorelines and hard subsurface conditions were encountered in the RM 10.9 removal area and resulted in lower production rates and incomplete removal around the hardened areas. These conditions, along with the substantial debris in LPR sediments (based on the TSI Phase I removal, approximately 7 percent of the *in situ* dredge volume consists of debris), impact equipment selection and production rates and can result in unanticipated construction delays.

Implications: Based on the CPG's 2013 survey of shoreline conditions from RM 0 to RM 14.3, 46.6 percent of the LPR shoreline consists of riprap, 41.8 percent of bulkhead, and about 11.6 percent of natural shoreline (Exhibit 3; see also pre-draft FS Report, App. B). Only about 5 percent of the bank consists of natural shoreline from RM 1 to RM 7 (FFS, App. F, p. 3-6). The CPG's pre-draft FS report (Appendix B) provides estimates of site-specific offsets, following USACE guidance, from bulkheads and structures ranging from 4 to 70 ft and proposes a minimum 5-ft offset from riprap shorelines, with larger offsets considered for safety where the shoreline is in poor condition. EPA assumes a 2-ft offset from bulkheads and 4-ft offset from riprapped shorelines (FFS App. G, p 1-2). **EPA's dredge prism calculations include no provisions for dredging offsets from hardened shorelines.**

In addition, river bottom features such as debris, moorings, and wrecks have been documented in the LPR, as summarized in Appendix B of the CPG's pre-draft FS Report. Most commonly, these include the remains of wrecked vessels, cars, or other large debris, or pilings or dolphins used for mooring vessels. Large boulders/stones are evident in some areas and visible at low tide along the shoreline.

EPA's FFS (p. 4-4) states, "an average production rate for each of the two primary dredges has been conservatively estimated to be 2,000 cubic yards per 24-hour day. This production rate accounts for periods where a smaller secondary dredge would operate at a lower production rate around obstructions such as bridge abutments and bulkheads." **EPA's assumed production rates do not adequately account for dredge production impacts that would be caused by shoreline structures and other waterway conditions, in addition to the navigational constraints and utility corridor issues discussed above.**

Fish Window: A fish migration window restricts dredging for 17 weeks (March 1 to June 30) each year. The RM 10.9 removal was scheduled around the fish window; however, a waiver was needed to allow for completion of the project. The waiver was

granted on the grounds that the work performed during the fish window was limited to cap placement, and did not include dredging activities.

Implications: EPA disregards the fish window in its duration analysis: "Dredging was assumed to occur for 40 weeks per year to account for equipment maintenance, weather, and some degree of fish window restrictions." The CPG assumes dredging will occur for 23 weeks, accounting for both winter shutdown and the 17-week fish window. **Fish window restrictions will significantly increase the duration of the dredging activities, nearly doubling the total project duration.**

Monitoring: Development and implementation of a monitoring program was challenging due to the existing, degraded status of the ambient water quality and the temporal variations in water quality driven by the tidal influence. Achieving consensus with the agencies on a program focused on potential dredging and capping impacts alone was difficult. Turbidity spikes were observed in the water column monitoring data that were not related to dredging activities, but likely from runoff and other background sources and tidal flow variations. Water column data collected during the RI indicated ambient COPC concentrations above water quality criteria in the LPR and above Dundee Dam.

Implications: Development and acceptance of a monitoring program that isolates potential water quality exceedances due to dredging/capping activities will be a challenge. **Misinterpretation of the monitoring data could lead to unwarranted project shutdowns, resulting in schedule delays and/or unnecessary BMPs.**

Permitting: The RM 10.9 removal required permits/permit equivalents from multiple agencies including Tidelands Licenses and Waterfront Development Permits, which include notification of property owners adjacent to the work area. The process was a critical path task and took several months to complete.

Implications: The permitting process for a large-scale removal has the potential to delay the initiation of dredging activities, as issuance of permit equivalents requires notice of all landowners adjacent to the river followed by a public statement period to grant access. Communities along the river may have additional permit requirements beyond those of NJDEP.

List of Exhibits

Exhibit 1: Characteristics and Conditions of Bridges on the LPR

Bridge Name	Owner	USACE River Mile	Bridge Type	Maximum Horizontal Clearance (ft)	Maximum Vertical Clearance (Low Tide) (ft)	Condition (National Bridge Inventory Database, accessed 4/25/14 (**http://nationalbridges.com/**))
Point-No-Point Reach						
Central Railroad of New Jersey (not in use)		1.2	Lift	145	NA	
Lincoln Highway Bridge	NJDOT	1.85	Lift	300	45 (140) [a]	Deck condition rating: Satisfactory Superstructure condition rating: Fair Substructure condition rating: Satisfactory Sufficiency rating (%): 48.0
Pulaski Skyway	NJDOT	2	Fixed	520	140	Deck condition rating: Poor Superstructure condition rating: Poor Substructure condition rating: Fair Structurally deficient Sufficiency rating (%): 2.0 (Under reconstruction)
Harrison Reach						
Point-No-Point Conrail	Conrail	2.6	Swing	103	21	
New Jersey Turnpike Bridge	NJDOT	2.7	Fixed	352	105	
Newark Reach						
Jackson Street Bridge	City of Newark	4.6	Swing	72	20	Deck condition rating: Good Superstructure condition rating: Fair Substructure condition rating: Fair Sufficiency rating (%): 77.1
Amtrak Dock Bridge	Amtrak	5	Lift	200	29 (143)	
Penn RR at Market Street		5	Draw	75	21	
Penn RR at Center Street		5	Draw	80	10	
Bridge Street Bridge	Essex Co.	5.7	Swing	80	12	Deck condition rating: Good Superstructure condition rating: Poor Substructure condition rating: Satisfactory Structurally deficient Sufficiency rating (%): 48.6

Bridge Name	Owner	USACE River Mile	Bridge Type	Maximum Horizontal Clearance (ft)	Maximum Vertical Clearance (Low Tide) (ft)	Condition (National Bridge Inventory Database, accessed 4/25/14 (**http://nationalbridges.com/**))
Morristown Line RR Bridge	NJ Transit	5.85	Swing	77	20	
Stickel Bridge	NJDOT	5.9	Lift	200	40 (140)	Deck condition rating: Satisfactory Superstructure condition rating: Satisfactory Substructure condition rating: Satisfactory Sufficiency rating (%): 73.0
Kearny Reach						
Clay Street Bridge	Essex Co.	6.1	Swing	75	13	Deck condition rating: Satisfactory Superstructure condition rating: Serious Substructure condition rating: Fair Structurally deficient Sufficiency rating (%): 31.5
Fourth Ave Conrail Bridge	Conrail	6.35	Bascule	126	12	Out of service - open
Arlington Reach						
Erie/Montclair-Greenwood Lake RR Bridge	NJ Transit	8.1	Swing	48	40	
Rutgers (Rte. 7) Bridge	NJDOT	8.8	Lift	65	50 [b]	Deck condition rating: Very Good Superstructure condition rating: Very Good Substructure condition rating: Very Good Sufficiency rating (%): 70.8
DeJesse-Avondale Street (Kingsland Avenue) Bridge	County Highway Agency	10.6	Open Truss Swing	65	12.5	Deck condition rating: Good Superstructure condition rating: Poor Substructure condition rating: Satisfactory Structurally deficient Sufficiency rating (%): 24.3

Notes:

[a] Vertical clearance in parentheses refers to clearance when the lift bridge is open.

[b] Maximum vertical clearance at mean water level.

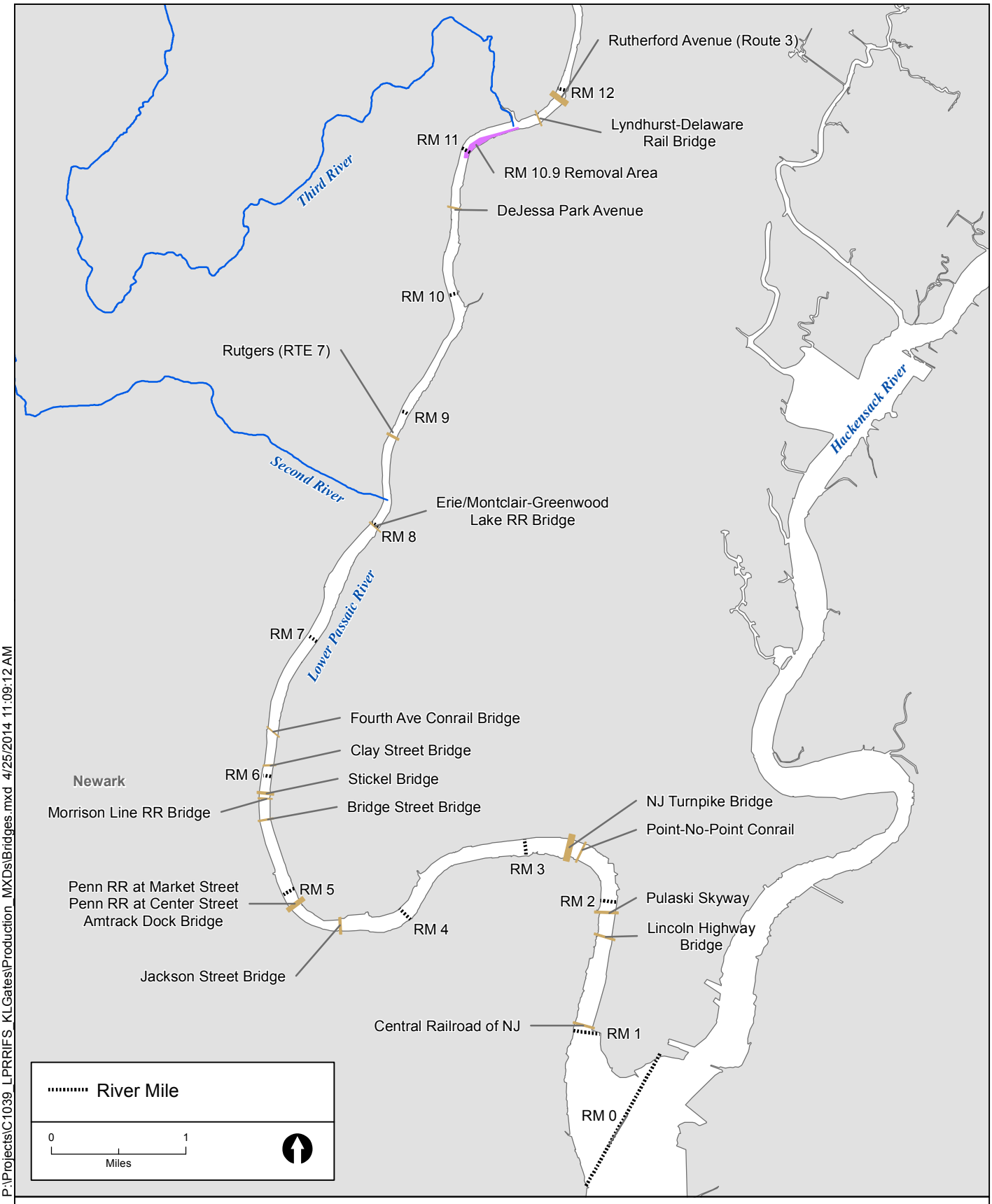

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Exhibit 2.
Bridges of the Lower Passaic River

Summary of Key In-Water Construction Constraints (RM 0-15)

Type	Occurrences
Bridges	21
Utility Crossings	29
Large Debris	39

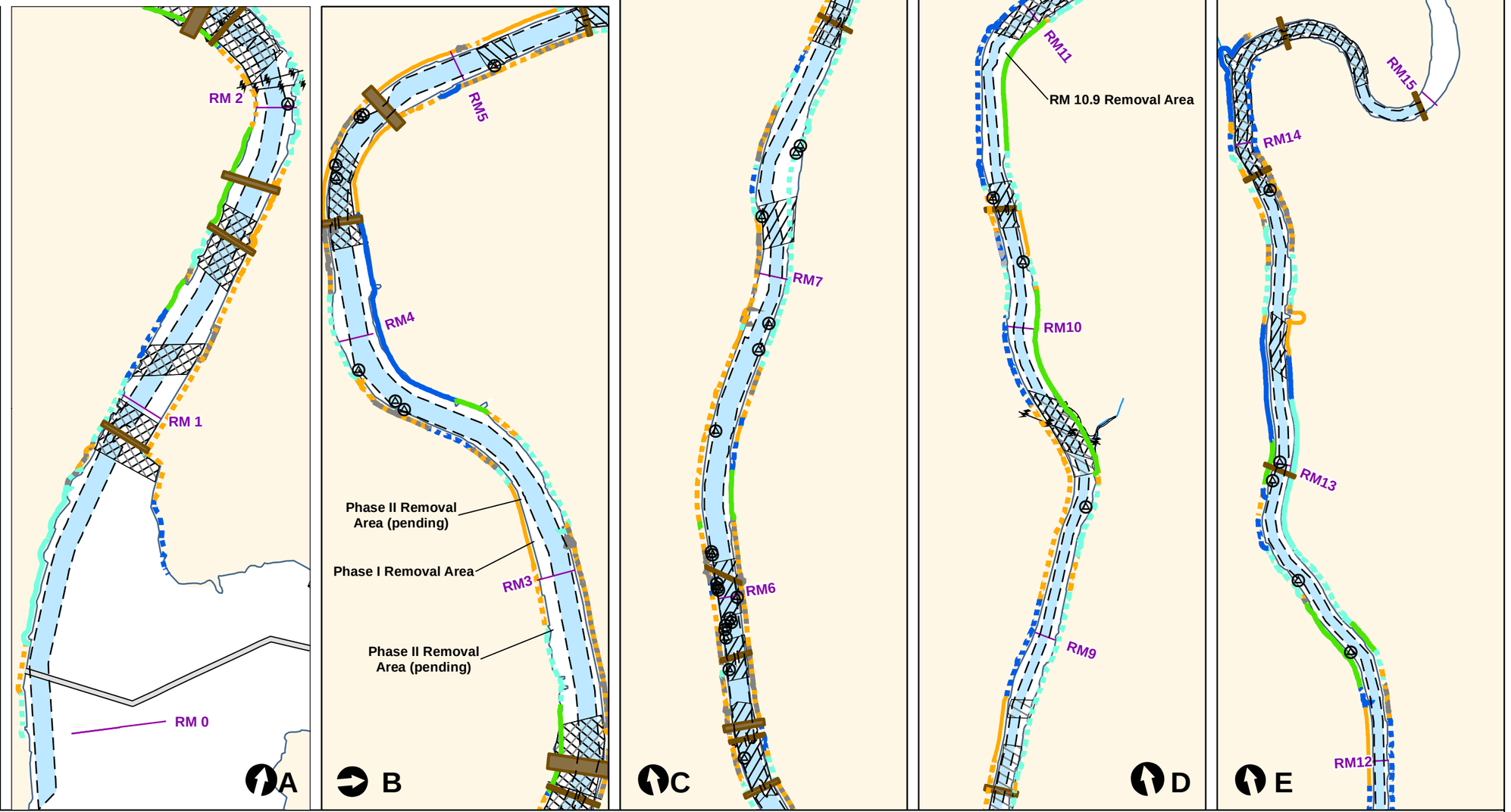
Shoreline Type Summary (RM 0-14.3) and Dredging Offsets

Type	Miles	Typical Dredging Offset (ft)
Bulkhead	12.3	TBD
Engineered Rip Rap	5.4	TBD
Non Engineered Rip Rap	8.4	TBD
Natural	3.4	TBD

Shore Type, Condition

- Bulkhead, Poor to Failing
- Bulkhead, Fair
- Bulkhead, Good
- Engineered Rip Rap, Poor to Failing
- Engineered Rip Rap, Fair
- Engineered Rip Rap, Good
- Non Engineered Rip Rap, Poor to Failing
- Non Engineered Rip Rap, Fair
- Non Engineered Rip Rap, Good
- Natural
- Debris
- Cable Overhead
- Pipeline Submarine On Land Line
- Cable Area
- Pipeline Area
- Cable and Pipeline Area
- Federal Navigation Channel
- Passaic River Shoreline
- River Mile
- Bridge

Notes
1. Bridges, utility areas, and debris will potentially require dredging offsets.
2. Proposed dredging offsets for bulkheads are based upon material type, condition, and adjacent structures and roadways.
3. Refer to FS Section XX and Appendix B for detailed information regarding in-water construction constraints and offset requirements.



Feet
0 750 1,500 3,000

Exhibit 3.
In-Water Construction Constraints
Lower Passaic River Study Area Feasibility Study

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