Draft Final

River Mile 10.9 Removal Action Design Work Plan, Lower Passaic River Study Area

Prepared for

Cooperating Parties Group, Newark, New Jersey

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Acronyms and Abbreviations

AOC	Administrative Settlement Agreement and Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirements
BMP	best management practice
BODR	Basis of Design Report
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
COPC	Chemicals of Potential Concern
CPG	Cooperating Parties Group
CQCP	Construction Quality Control Plan
dmi	de maximis, inc.
EHS	Environmental Health and Safety
EMP	Environmental Management Plan
FFS	Focused Feasibility Study
FS	Feasibility Study
ft	foot, feet
LPR	Lower Passaic River
LPRSA	Lower Passaic River Study Area
mg/kg	milligrams per kilogram
NCP	National Contingency Plan
ng/kg	nanograms per kilogram
O&M	operation and maintenance
OSC	On Scene Coordinator
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
PAH	polycyclic aromatic hydrocarbon(s)
PCB	polychlorinated biphenyls
PCDD	polychlorinated dibenzo-p-dioxins
PCDF	polychlorinated dibenzofurans
PE	Professional Engineer
QA/QC	quality assurance/quality control
QAPP	quality assurance project plan
QCSM	Quality Control Systems Manager
RCRA	Resource Conservation and Recovery Act
RD	removal design
RDWP	removal design work plan
RFP	request for proposal
RI	remedial investigation
RI/FS	remedial investigation/feasibility study
RM	river mile
SME	subject matter expert
SOW	statement of work
TBC	to be considered
TCDD	tetrachlorodibenzo-p-dioxin
TCLP	Toxicity Characteristic Leaching Procedure

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TCRA	Time-Critical Removal Action
USEPA	United States Environmental Protection Agency
yd^3	cubic yard

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SECTION 1

1. Introduction

This Removal Action Design Work Plan (RDWP) for River Mile (RM) 10.9 of the Lower Passaic River (LPR) has been prepared by the Lower Passaic River Cooperating Parties Group (CPG) pursuant to the Administrative Settlement Agreement and Order on Consent for Removal Action, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Docket No. 02-2012-2015 (USEPA, 2012a; hereinafter referred to as the AOC). The AOC became effective on June 18, 2012 and is included as Appendix A.

The Removal Action will be conducted under both CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) as a Time-Critical Removal Action (TCRA). This RDWP describes the process that will be employed to design the removal action selected by the U.S. Environmental Protection Agency (USEPA) in the Action Memorandum/Enforcement dated May 21, 2012 (USEPA, 2012b). The Action Memorandum/ Enforcement is included as Appendix B of the AOC.

The purpose of this RDWP is to describe the overall Design and Implementation process for RM 10.9, including predesign investigations, design deliverables, project delivery, and the project schedule.

1.1 Removal Action Summary

The Removal Action is being performed to reduce the potential for exposure to receptors, and to mitigate potential migration of contaminated sediments from the RM 10.9 Removal Area (**Figure 1-1**). In addition to addressing these time-critical concerns, sediments removed from the RM 10.9 Removal Area will be used to conduct sediment washing bench-scale tests and potentially pilot scale tests dependent on the bench scale results.

Approximately 18,000 in situ cubic yards (yd^3) of contaminated surface sediment will be removed from the top 2 feet (ft) of the RM 10.9 Removal Area (**Figure 1-2**); the amount will be refined during the design process. During the design of the Removal Action, the means and methods for sediment removal, including the appropriate best management practices (BMPs) to minimize the resuspension of contaminated sediment during removal, will be determined. A protective cap will be designed, constructed, monitored, and maintained over the RM 10.9 Removal Area. As part of the design process, a Long-Term Monitoring Plan, including operation and maintenance (O&M) procedures, will be developed in order to monitor the cap's performance with respect to the design standards during the postconstruction period. It is recognized that data from the performance monitoring effort may help inform future decisions and/or remedial designs for the Lower Passaic River Study Area (LPRSA).

1.2 Description of Work Area

1.2.1 Removal Area Evaluation

As indicated in the Action Memorandum/Enforcement, dated May 21, 2012 (USEPA, 2012b), sediment conditions at the RM 10.9 Removal Area meet a number of specific factors identified in 40 *Code of Federal Regulations* (CFR) Part 300.41S(b)(2) for USEPA to consider in determining the appropriateness of a removal action, including, but not limited to the following:

- An actual or potential release of hazardous substances, including polychlorinated dibenzo-p-dioxins (PCDDs)/ polychlorinated dibenzofurans (PCDFs), polychlorinated biphenyls (PCBs), mercury, and polycyclic aromatic hydrocarbons (PAHs), exposing nearby human populations, animals or the food chain (40 CFR §300.4I5(b)(2)(i))
- Actual or potential contamination of sensitive ecosystems because of the presence of hazardous substances, including PCDDs/PCDFs, PCBs, mercury, and PAHs (40 CFR §300.415(b)(2)(ii))
- High levels of hazardous substances, including PCDDs/PCDFs, PCBs, mercury, and PAHs, present at or near the surface of the sediment that could migrate or be released because of weather and/or hydrologic conditions (40 CFR §300.415(b)(2)(iv)-(v))

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1.2.2 Physical Location

The RM 10.9 Study Area extends, bank to bank, between RM 10 and RM 12 of the LPRSA (**Figure 1-1**). The RM 10.9 Sediment Deposit Area (**Figure 1-2**) extends approximately 2,380 ft from RM 10.65 to RM 11.1, along an inside bend of the LPR, upstream of the DeJessa Park Avenue Bridge, which includes the mudflat and point bar in the eastern half of the river channel.

The RM 10.9 Removal Area (**Figure 1-2**) is an approximately 5.6-acre area within the RM 10.9 Sediment Deposit Area, bounded to the west by the navigation channel limits, and bounded on the east by the mean high water elevation. Further east is Riverside County Park, owned and operated by Bergen County and located in the Town of Lyndhurst. The removal area is approximately 0.6 acres greater than that specified in the AOC due to the inclusion of a narrow area that extends approximately 700 ft to the northeast. This area was included after a further review of the additional delineation sampling conducted by the CPG at the direction of EPA (RM 10.9 QAPP Addendum A, May 2012). As a result of the additional delineation sampling, the CPG proposed in its August 1, 2012 letter to USEPA to include the additional 0.6 acres into the RM 10.9 Removal Area .

The LPR, including the RM 10.9 area, is categorized as an SE3 water body. The designated uses of SE3 water bodies per New Jersey Administrative Code (NJAC) 7:9B-1.12 include the following:

1. Secondary contact recreation
2. Maintenance and migration of fish populations
3. Migration of diadromous fish
4. Maintenance of wildlife
5. Any other reasonable uses

The area adjacent to the RM 10.9 Removal Area consists predominately of recreational facilities such as parkland and ball fields. A number of public boat launches are also located in the vicinity, and use of LPR for recreational boating is ongoing and significant. Individuals using the park including boaters, waders, and anglers, could potentially be exposed to the sediments within the RM 10.9 Removal Area.

1.2.3 Site Characteristics

Portions of the LPR below Dundee Dam can be characterized as stratified estuary. The LPRSA receives inflows of marine (salt) water from Newark Bay and fresh water from the Upper Passaic River (above Dundee Dam) and its tributaries, surface runoff, combined sewer overflows, and stormwater outfalls (below Dundee Dam). The less-dense fresh water flows downstream over the tidally influenced salt water, which, on the flood tide, moves upstream from Newark Bay. The exact extent of the salt front "wedge" (i.e., the wedge-shaped intrusion of salt water into the estuary that slopes downward in the upstream direction) is dependent on the phase of the tide and the volume of fresh water flowing downstream.

In 2004, USEPA commenced a remedial investigation and feasibility study (RI/FS) of the 17-mile LPRSA, funded by a group of potentially responsible parties known as the Lower Passaic River CPG under a settlement agreement pursuant to CERCLA Section 122(h), 42 U.S.C. § 9622(h). The RI/FS represented USEPA's portion of work being undertaken by a partnership of federal and State of New Jersey agencies under CERCLA and the federal Water Resources Development Act. In May 2007, USEPA entered into a second settlement agreement (the RI/FS agreement) with the CPG, under which the CPG agreed to complete the LPRSA RI/FS under the direction and oversight of USEPA.

Sediment samples collected in the vicinity of RM 10.9 Sediment Deposit Area as part of the RI/FS Low Resolution Coring Program suggested that concentrations above river-wide averages of PCDDs/PCDFs, PCBs, mercury, PAHs, and other contaminants may be present in this area. The measured concentrations coupled with the proximity of this area to Riverside County Park prompted the CPG to further evaluate the potential exposure to individuals using the park. In April 2011, the CPG proposed, and USEPA agreed, that the CPG would undertake additional sampling and data collection to characterize the RM 10.9 Study Area (de maximis, inc. [dmi], 2011).

The data from the sediment samples collected by the CPG in 2011 confirmed that portions of the sediment located in the RM 10.9 Sediment Deposit Area, including a mudflat on the eastern shore of the LPR that is

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exposed at low tide, contained elevated concentrations of PCDDs/PCDFs, PCBs, mercury, and PAHs (CH2M HILL and AECOM, 2011). In the uppermost 6 inches of sediment, peak concentrations detected include 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) at 29,000 nanograms per kilogram (ng/kg), PCBs at 34 milligrams per kilogram (mg/kg), mercury at 22 mg/kg, and total high-molecular-weight PAHs at 510 mg/kg. Elevated concentrations of PCDDs, PCDFs, PCBs, and mercury are generally co-located in surface and subsurface sediments. The RM 10.9 Removal Area dimensions were determined based on a review of sediment data collected at 54 locations within the RM 10.9 Sediment Deposit Area and were further refined based on data collected during a predesign investigation.

USEPA has also conducted additional soil sampling in the parks adjacent to the RM 10.9 Sediment Deposit Area. Concentrations detected in the parks were below levels of concern, and no additional action in the park is considered at this time.

1.3 Summary of Anticipated RM 10.9 Work

The CPG is required to perform all actions necessary to remove, treat, and/or properly dispose of approximately 18,000 yd^3 of sediment from RM 10.9 Removal Area (**Figure 1-2**) to a depth of 2 ft.

The CPG proposes removing the debris and sediment associated with the removal action via on-water operations using mechanical dredging equipment equipped with an environmental clamshell bucket or similar tool and transferring the debris and sediment to material-handling barges. Staging construction from the water side is advantageous because of access constraints and related logistical issues associated with land-based staging. The dredged material will then be transported down river to an off-loading facility for treatment and offsite disposal. The details of the debris and dredging operations (including equipment type, size, configuration and transport methods, and treatment approach) will be identified during design.

Varying bridge, channel dimensions, and tidal/river stage fluctuations constrain navigation access to differing degrees along the LPR. Consequently, it will be necessary to size the on-river transport equipment that can be used at the RM 10.9 Removal Area such that debris and sediment can be transported offsite and downriver to either the pilot-scale testing vendors' facilities (if pilot testing is completed) or a waterside stabilization processing facility.

To investigate alternate dispositions for removed sediments other than landfilling, a portion of the removed sediments may be used for pilot-scale testing. At this time, the CPG and USEPA have agreed that CPG will consider such testing of sediment-washing technologies, and that the decision to proceed will be based on the results of bench-scale sediment washing tests[1]. Thus selected vendors of treatment technologies will conduct bench-scale testing to demonstrate their ability to effectively and efficiently treat sediments for beneficial reuse or for disposal at a lower cost facility and/or to reduce the long-term liability for the CPG that would be incurred based on disposal of untreated sediments. The vendors will provide proposals for pilot-scale testing of their technologies to the CPG. The CPG will prepare a report for submittal to USEPA that explains the rationale for whether or not pilot-scale testing will proceed. The treated sediment will be disposed of at an appropriately permitted USEPA-approved disposal facility.

All untreated sediment from RM 10.9 Removal Area will be sent to a waterside processing facility for sediment washing and/or stabilization before transport and disposal at an at an appropriately permitted USEPA-approved disposal facility.

Following completion of the sediment removal, a protective cap will be constructed, monitored, and maintained over the Removal Area. Data gathered during the monitoring of the performance of this cap will be evaluated and taken into consideration in the LPRSA RI/FS and may help inform the remedy selection process for future response actions. Placement techniques for the cap materials will be evaluated during the design. Staging of capping materials may occur at the Riverside County Park and/or at a contractor's staging area.

1 The bench-scale tests for evaluating the ex-situ treatment technologies were completed in August 2012, prior to the finalization of this RDWP. The removal efficiencies of PCDD/PCDF by sediment washing bench-scale tests were minimal (~25%) resulting in total dioxin TEQ concentrations in the treated sediment which were well above residential cleanup standards established by USEPA. Based on these results, the CPG will not be conducting sediment washing pilots of RM 10.9 sediment (CPG September 2012),

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1.4 Overview of Removal Design Process

Before the effective date of the AOC, the CPG began developing plans for design, including preparing and collecting necessary predesign data. Consistent with requirements of the AOC and Statement of Work (SOW), the overall design process will consist of the following four main stages:

- Predesign activities
- Basis of design
- Prefinal design
- Final design

The predesign activities stage consists primarily of collecting and analyzing data necessary to support the removal design for the TCRA. Predesign activities are described in Section 2.

The basis of design will be the second stage of the actual design process and is expected to represent a 30 percent complete design product (further described in Section 3).

The prefinal design will supplement the basis of design using results of the predesign activities and bench-scale testing and incorporate additional details necessary to produce a technically complete (100 percent) design package. The prefinal design will produce a complete set of drawings and specifications to support development of procurement packages for each of the engineering components. The prefinal design will be submitted to USEPA for review (further described in Section 3).

The final design will incorporate comments from USEPA and result in a complete design package ready for implementation in the RM 10.9 TCRA (further described in Section 3).

Design activities are described in Section 3. The design deliverables and the design schedule are presented in Section 4. The delivery and implementation strategy is discussed in Section 5.

1.5 Removal Action Objectives

The objectives for the RM 10.9 TCRA include the following:

- Reduce the potential for exposure to receptors from sediments present in the RM 10.9 Removal Area.
- Remove approximately 18,000 yd^3 of surface sediment (top 2 ft) and should sediment washing be selected for pilot scale demonstration, provide all or a portion of this removed amount up to 18,000 yd^3 for pilot-scale ex situ beneficial reuse treatment studies to evaluate the feasibility and cost-effectiveness of sediment washing. The ex situ volume to be treated by sediment washing will be dependent on the ability of the vendors to demonstrate through bench-scale tests the capabilities of their technologies, the capacity of the vendor's treatment systems and their materials-handling capabilities.
- Evaluate the means and methods for sediment removal and determine the potential impacts of sediment removal methods on surface water quality, and the means, if feasible, to minimize these impacts for the selected overall river remediation remedy.
- Evaluate effectiveness of sediment capping methods to reduce bioavailability and migration of chemicals of potential concern (COPCs) for the selected overall river remedy, including amending caps with activated carbon to mitigate the potential for contaminants migrating through the sand caps.
- Begin implementation of the Removal Action in May 2013.

1.6 Previous Project Documents

This RDWP is supplemented by the following documents, which have been previously prepared by the CPG:

- RM 10.9 Characterization Program Summary Report
- RM 10.9 Quality Assurance Project Plan (QAPP) Revision 3
- RM 10.9 QAPP Addendum A

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- RM 10.9 QAPP Addendum B
- RM 10.9 QAPP Addendum C

1.7 Work Plan Organization

The remainder of the RDWP includes the following sections:

- *Section 2—Predesign Activities*: Provides details regarding the collection of additional data to support the removal design and details of the bench-scale/pilot-scale treatability studies.
- *Section 3—Engineering Design Process*: Presents the engineering design process, including a description of the design stages, the various design components, and the specific design activities to be completed. This section also provides the design quality assurance/quality control (QA/QC) requirements to be followed during the design process.
- *Section 4 – Deliverables*: Describes the deliverables to be prepared in support of the removal design, including predesign studies, design support deliverables, engineering design deliverables, and the overall project schedule.
- *Section 5—Delivery and Implementation Strategy:* Provides the project management approach for the RM 10.9 TCRA.
- *Section 6—References*: Lists documents and additional references cited in this RM 10.9 RDWP.

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SECTION 2

2. Predesign Activities

2.1 QAPP Addendum A and Data Collection Activities

The CPG and USEPA determined that it was necessary to further define and delineate elevated levels of COPCs observed in the RM 10.9 Sediment Deposit Area during the RM 10.9 Characterization Program activities. Specifically, additional samples were required at locations upstream and along the eastern shore of the RM 10.9 Sediment Deposit Area.

Therefore, in order to refine the delineation of the RM 10.9 Removal Area, the CPG prepared the RM 10.9 QAPP Addendum A. This QAPP addendum was submitted to USEPA on May 10, 2012 (Rev. 0); Rev. 1 was submitted to USEPA on May 18, 2012. Field activities occurred the week of May 20, 2012. The delineation of contamination in the sediment in the RM 10.9 sediment area provides important information to design the Removal Action.

2.2 Data Gap Analysis and Data Collection Quality Assurance Project Plan

The CPG has conducted a data gaps analysis of the RM 10.9 Removal Area following completion of the 2011 RM 10.9 Characterization Program activities. The purpose of the data gaps analysis was to determine what additional data are required to support the removal and capping design. This analysis included a review of the RM 10.9 Characterization Program data, including sediment sampling and analysis, bathymetry measurements, and characterization of local hydrodynamics. A Data Collection QAPP (QAPP Addendum C, Rev. 0) for the data identified as necessary for the removal design was prepared and submitted to USEPA on May 30, 2012, to provide the details of the collection of these additional data. The scope of work, which was carried out the week of June 25, 2012, included the advancement of geotechnical borings and collection of engineering data needed to support the rationale for use of Best Management Practices, as described in the BODR, and the potential design of other sediment resuspension control measures, in the event these control measures are needed during sediment removal and capping activities.

2.3 Bench-Scale Testing and Report

Sediment washing is being considered as the treatment technology of interest for removing site-specific COPCs from the RM 10.9 Removal Area sediments. Bench-scale testing will be performed on representative sediment samples from the RM 10.9 Removal Area. This is a first step towards evaluating potential ex-situ treatment options for the contaminated sediments that could be generated from environmental dredging in the LPR. The primary objective of the bench-scale tests is to determine the technical efficacy and cost-effectiveness of the sediment-washing process for removing site-specific COPCs from the RM 10.9 Removal Area sediments. The bench-scale tests will provide information to prepare a preliminary evaluation of the potential effectiveness and implementability of each technology at the pilot scale. These bench-scale tests may include, for example, jar testing, laboratory-scale (e.g., 1/12 pilot scale) batch unit optimization, and process validation. The bench-scale test results will also provide a basis for the vendor(s) to develop estimates of pilot-scale implementation unit costs to meet performance standards.

The CPG will provide a report with the findings of the bench-scale tests to USEPA. The report will contain the results of the bench-scale tests, including the efficacy and efficiency of treatment, and most importantly the vendor's proposal to conduct the pilot-scale test. The report will also contain the CPG's rationale and resulting decision of whether the technologies will be taken to the pilot scale and used to treat RM 10.9 sediments.

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SECTION 3

3. Engineering Design Process

This section describes the overall design process, design quality assurance and quality control, and the design process for each design element.

3.1 Overall Design Process

Following the predesign activities stage described in Section 2, three design stages will be conducted:

- Basis of design
- Prefinal design
- Final design

As stated in the AOC, the RDWP will be prepared and submitted in parallel with the Basis of Design Report (BODR). Developing these documents concurrently will enable the CPG to meet the aggressive project schedule. Furthermore, the design of the various components (e.g., sediment removal, sediment handling and processing, water treatment, transportation, and disposal) will be conducted in an iterative manner in order to optimize efficiency, since the design of one component can greatly influence the requirements of another component. Therefore, the entire process from sediment removal to disposal needs to be optimized on an iterative basis before the design can be completed.

The overall sequence of these design stages and general work products, as well as the design schedule are shown in the design process flow diagram (**Figure 3-1**). The design deliverables are further summarized and the design schedule is presented in Section 4.

3.1.1 Basis of Design

The BODR will document the key elements associated with the design process, including design criteria, design inputs, design approach, and assumptions, to provide the foundation for executing the prefinal design and final design and communicating the basis of design decisions for the project. The BODR will be used as a guide to ensure that the prefinal design and final design meet the design intent. The BODR will consist of the following:

- Results of studies and additional field sampling and analysis, if any, conducted after the predesign
- Preliminary figures support development of plans, drawings, and sketches
- Methods of sediment removal including resuspension control (if deemed necessary); sediment transport, off-loading, stockpiling, sediment treatment, stabilization or potentially dewatering, including process water treatment and discharge; treated/stabilized sediment transport and disposal; and capping, including cap materials transport and cap placement
- Design assumptions and parameters, including design constraints, treatment process and capping performance criteria (including byproducts concentration and volume if available), and preliminary design calculations
- Outline of implementation specifications
- Proposed siting/locations of staging and processing
- Weather and river conditions (flow and tidal dynamics) monitoring
- Substantive requirements of Applicable or Relevant and Appropriate Requirements (ARARs)
- Preliminary project schedule
- Anticipated long-term monitoring and O&M requirements

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3.1.1.1 Waterside Facilities for Dredging and Capping Support

Waterside facilities adjacent to the LPR or within the New York/New Jersey Harbor Complex nearby will be required to support marine activities such as dredging and capping. A staging/storage area will typically be used for off-loading dredged sediment/debris and equipment and for loading capping materials onto barges. The dredging/capping contractor(s) will be responsible for providing their own marine access and related properties for staging materials and operations.

3.1.1.2 Dredging and Dredged Material Transport

The equipment chosen for dredging and dredge material transport will depend on many factors, such as the attributes of the dredge prisms (areas and volumes); amount and type of debris; characteristics of the water body where the dredging will occur; and postdredging processes, including handling, processing, and disposal methods. A preliminary evaluation of these factors suggests that the dredging will be completed using excavators or crane-operated clam-shell buckets and that sediment and debris will be transported on the LPR by barges. The design scope of work for dredging and dredge material transport will consist of the following:

- Identify design constraints for dredging and material transport
- Evaluate mechanical methods for sediment removal and in-river transport
- Conduct preliminary design calculations (volumes, production rates, mass/process flow diagram)
- Prepare outline of technical specifications
- Prepare outline of engineering drawings
- Prepare a preliminary dredge plan that will consist of the following:
  - Removal objectives
  - Preliminary equipment selection and sizing
  - Anticipated production rates
  - Equipment cycle times
  - Debris removal
  - Required interaction with shore-based facilities
  - Sequencing of operations to meet production requirements
  - Preliminary resuspension management plan
- Prepare preliminary environmental management plan
  - During the BODR, preliminary engineering drawings, specifications, and preliminary dredging plans will be used to obtain proposals from prequalified contractors. Contractors will submit proposals based on performance-based specifications as further described in Section 5

3.1.1.3 Dredged Material Off-Loading and Treatment

Sediment removed as part of this Removal Action will be transported to either the selected sediment-washing vendors' site for off-loading or to an alternate off-loading site for treatment by stabilization or dewatering. It is assumed that the sediment-washing, stabilization or dewatering treatment contractors/vendors will provide their own marine access and related properties for off-loading and either treating and/or stabilizing or dewatering the sediment.

3.1.1.4 Capping

Following completion of the sediment removal, an appropriately protective cap will be constructed, monitored, and maintained over the RM 10.9 Removal Area. The cap will be constructed using suitably protective cap design which may include the use of activated carbon layers or other materials to provide chemical isolation, as well as cap armoring, to protect portions of the RM 10.9 Removal Area subject to higher shear stresses from potential erosion. The BODR for capping will consist of the following:

- Review of hydrodynamic conditions and geotechnical properties of the sediment
- Cap design and perform analytical model calculations
- Preliminary engineering calculations for cap armoring

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- Preliminary cap cross section(s) necessary to prevent the migration of the COPCs into the environment and to physically protect the cap's integrity from forces such as erosion
- Evaluation of cap materials placement techniques

3.1.1.5 Treated Material Transport and Disposal

The final disposition of the removed sediment will be independent of the treatment method(s) but dependent on the characteristics of the sediment, and available disposal facilities. It is assumed that the treated/stabilized or dewatered sediment will be transported by truck or existing rail facilities to the ultimate disposal facilities, as the volume of dredged sediment does not justify the expense of developing new rail transport capability. The BODR will verify that truck transportation and/or existing rail facilities will be able to transport the treated/stabilized sediment to the final disposal facility efficiently and safely. Based on preliminary results, the sediment is anticipated to be nonhazardous; however, to best manage liability associated with the sediment, the CPG plans to initially develop and distribute requests for proposals to commercial RCRA Subtitle C disposal facilities, which are all located out of state.

The BODR will evaluate potential landfill disposal options for sediments excavated from the RM 10.9 Removal Area. The landfill disposal selection will be governed predominantly by the RCRA hazardous waste status of the sediment (i.e., hazardous or nonhazardous) and the varying restrictions of Subtitle D (nonhazardous) landfills on accepting materials containing dioxins. This evaluation will consist of the following:

- Collect samples for Toxicity Characteristic Leaching Procedure (TCLP) analysis from the RM 10.9 Removal Area
- In accordance with the USEPA Memorandum dated November 12, 2008, *Consideration of Passaic River Sediments Pursuant to 40CFR Section 261.31*, confirm that the sediment from the RM 10.9 Removal Area will not be considered a listed RCRA waste per USEPA
- Review and compare RM 10.9 Removal Area characterization data to regulatory criteria
- Identify potential disposal sites and their specific acceptance criteria with regard to COPCs found at the RM 10.9 Removal Area

3.1.2 Prefinal Design

The prefinal design will advance the level of design from the BODR stage by incorporating additional information/studies from predesign activities, contractor-specific information (Section 5), and further design analysis. The prefinal design will produce a complete set of contractor performance requirements/specifications and task-specific plans and drawings. The prefinal design will consist of the following:

- Results of studies and additional field sampling and analysis, if any, conducted after the predesign
- Design assumptions, parameters, and constraints
- Design calculations
- Implementation plans and drawings
- Implementation specifications
- Implementation QAPP
- Implementation health and safety plan, including community health and safety concerns
- Dredge plan
- Sediment transport plan
- Sediment off-loading plan
- Sediment treatment/stabilization plan (process water and disposal)
- Treated/stabilized/dewatered sediment transport and disposal plan
- Sediment capping plan (including materials transport and staging)
- Implementation quality control plan
- Preparation of ARARs compliance document to address substantive requirements
- Environmental Management Plan (EMP)
- River traffic control procedures

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- Weather and river conditions monitoring
- Project schedule
- Long-term monitoring and O&M plan

3.1.2.1 Dredging and Dredged Material Transport

The plans and specifications will be prepared consistent with the construction approach identified during the BODR. The design documents to be prepared for this activity will consist of the following:

- Draft design calculations (volumes, production rates, and mass/process flow diagram)
- Implementation technical specifications
- Implementation engineering drawings
- Draft dredge plan
  - Removal objectives
  - Equipment selection and sizing
  - Anticipated production rates
  - Equipment cycle times
  - Debris removal
  - Required interaction with shore-based facilities
  - Sequencing of operations to meet production requirements
- Draft spill prevention, containment, and countermeasures plan
- Develop preliminary river traffic control measures that will consist of the following:
  - Outlines of channel markings
  - Navigational aids
  - Communication protocol
  - Other measures required for safe interaction with recreational and commercial shipping in the vicinity of the dredging
- Resuspension management

3.1.2.2 Dredged Material Off-Loading and Treatment

Sediment removed as part of this action will be transported to either the selected sediment washing vendors' site for off-loading or to an alternate off-loading site for stabilization or dewatering. It is assumed that the sediment-washing and stabilization or dewatering treatment contractors/vendors will provide their own offsite marine access and related properties for off-loading and either treating or stabilizing or dewatering the sediment. The following tasks will be performed in the prefinal design:

- Select potential sediment stabilization or dewatering contractors/vendors with off-loading capabilities and their availability
- Determine potential sediment washing vendors with off-loading capabilities and whether the CPG intends to proceed with a sediment-washing pilot-scale project(s)
- Select landfill disposal options for treated and stabilized or dewatered sediment
- Prepare implementation drawings and specifications

3.1.2.3 Capping

The appropriate method(s) for incorporating activated carbon into the cap cross section will be determined. The plans and specifications will be prepared consistent with the construction approach identified during the BODR. It is assumed for the purpose of estimating the prefinal design's level of effort that the same contractor selected to dredge the sediment will also place the cap.

3.1.2.4 Treated Material Transport and Disposal

The key design elements to be addressed during prefinal design of the treated material transport and disposal component consist of the following:

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- Site visits to observe facility operations and audits of the compliance history and permit requirements will be conducted
- USEPA Off-Site Rule coordinator approval will be obtained for the selected sediment management and disposal facilities
- Engineering drawings for procurement of treated/stabilized or dewatered sediment transport will be implemented
- Technical specifications for procurement of treated/stabilized or dewatered sediment transport and landfill disposal will be prepared

The prefinal design will verify the most effective mode of transportation for the treated/stabilized or dewatered sediment to a final disposition facility (landfill). A truck route from the treatment/stabilization or dewatering site to disposal facility will be determined. It is assumed that drawings and specifications will be prepared for transport of the treated/stabilized or dewatered sediment to a disposal facility. The prefinal design will also determine whether the transport of the treated/stabilized or dewatered sediment to the disposal facility will be a separate contract or included as part of another contract.

The prefinal design will prepare specifications for the procurement of disposal at either a Subtitle C or D landfill as determined in the BODR.

3.1.2.5 Pilot-Scale Testing

If the CPG provide a notice to proceed with pilot-scale testing of some portion of the RM 10.9 Removal Area sediments, the CPG will, in coordination with the vendor(s) selected, submit the pilot-scale testing work plan to USEPA for review. The work plan submittal may include the following:

- Pilot-scale testing objectives/purpose
- Pilot-scale testing success criteria
- Permits and other legal requirements, unless work will occur entirely onsite, in which case the submittal will address substantive requirements of ARARs
- Pilot-scale testing assumptions and design constraints
- Proposed siting/locations of staging areas and treatment processes
- Real estate and easement requirements
- Methods and details of the proposed pilot-scale test activities including sediment off-loading, stock piling, screening, sediment preparation, sediment treatment and disposal, and water treatment
- Treatment process performance criteria, treatment unit processes, representativeness of removed material, expected removal or treatment efficiencies (concentration and volume), mass balances and design calculations
- Drawings and technical specifications
- Details of measurements and observations to be conducted for the pilot-scale testing
- Details of environmental monitoring to be conducted (i.e., odor, noise, and water discharge)
- Responsibility and authority of all organizations and key personnel
- Overall management strategy for completion of the tasks
- A project schedule including all major activities and deliverables

Once the USEPA receives the CPG's notice to proceed, the CPG may implement the pilot-scale testing work plan in accordance with the work plan's schedule. The CPG may terminate the pilot test(s) at its discretion and inform the USEPA of the rationale in a written report. Final disposal of the sediment will be in an appropriately permitted,

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USEPA-approved offsite facility.

3.1.3 Final Design (100 Percent)

The final design will be the revised prefinal design that fully incorporates the USEPA comments. The final design submittals will include those elements listed for the prefinal design. The final design will be considered a complete design package ready for implementation of the removal and capping action.

3.2 Design Quality Assurance/Design Control

The design team will use the tools, procedures, and policy documents developed by CH2M HILL for design and successful execution of sediment related projects. The team will also use discipline-specific checklists for each phase of the project, as applicable. The checklists are intended to include typical items required in applicable USEPA QA reference documents and internal standard of practice QA checks and protocols. The checklists will be completed by the discipline lead, signed, and given to the reviewer for their approval and signature. These checklists will be used to document and verify the completion of each design phase and define the remaining deficiencies that need correction. The signed checklists will be kept in the project files.

The specific quality management metrics for measuring success of the project, specifically meeting the USEPA's expectations and managing the identified risks that can be managed through quality performance of the work, includes the following:

- Internal reviews conducted with sufficient time to properly adjudicate comments
- Documents approved by internal and external stakeholders with no significant modifications or revisions
- Documents submitted on or before required due dates
- Risks identified and mitigated or managed without major impacts to the project
- Cost and level-of-effort budgets managed to allow work to progress without delays or stoppage

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SECTION 4

4. Deliverables

This section describes the deliverables to be prepared in support of the removal design, including predesign studies, design support deliverables, and engineering design deliverables. This section also describes the communication approach and presents the proposed design schedule. The list of deliverables (**Table 4-1**) includes those required plans listed in the AOC and associated SOW (**Appendix A**).

TABLE 4-1
RM 10.9 Project Deliverables

Deliverable	RDWP Section Where Described
Predesign	
Bench-Scale Testing Quality Assurance Project Plan	4.1.1
Bench-Scale Testing Report	2.3, 4.1.2
Pilot-Scale Testing Work Plan	3.1.2, 4.2.4
Health and Safety Plan	4.2.5
Basis of Design	
Basis of Design Report	3.1.1, 4.2.1
Project Schedule	4.4
Prefinal Design	
Prefinal Design Report	3.1.2, 4.2.2
Environmental Management Plan	4.2.7
Construction Quality Control Plan	4.2.6
Long-Term Monitoring and Operation and Maintenance Plan	4.2.8
Final Design	
Final Design Report	3.1.3, 4.2.3
Implementation	
Final Report	4.3

4.1 Predesign

4.1.1 Bench-Scale Testing Quality Assurance Project Plan

The CPG submitted the bench-scale testing QAPP on June 18, 2012, for each sediment treatment vendor that was asked to conduct bench-scale tests as described in the SOW.

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4.1.2 Bench-Scale Testing Report

Within 90 days after USEPA has received the bench-scale testing QAPP, the CPG will submit to USEPA the bench-scale testing report, as set forth in the SOW.

4.2 Design

4.2.1 Basis of Design Report

By August 2, 2012, 45 days from the effective date of the AOC (June 18, 2012), the CPG will submit the Removal Action BODR. The BODR will be prepared based on the results of data collected pursuant to the RM 10.9 QAPP and the capping and removal predesign activities.

4.2.2 Prefinal Design Report

Within 60 days of the USEPA accepting the BODR, the CPG will submit the prefinal design. The prefinal design will fully incorporate USEPA comments made to the removal and capping work plan/BODR and include the additional information as described in Section 3.1.2.

4.2.3 Final Design Report

Within 60 days of the USEPA accepting the prefinal design report, the CPG will submit the final design. The final design submittal will include those elements listed in the prefinal design and will fully incorporate USEPA's comments on the prefinal design report.

4.2.4 Pilot-Scale Testing Work Plan

Within 60 days after USEPA's acknowledgement of the CPG's decision to proceed with pilot-scale testing, the CPG will submit the pilot-scale testing work plan. The pilot-scale testing work plan will include the information outlined in Section 3.1.2.

4.2.5 Health and Safety Plan

Within 30 days after the effective date, the CPG will submit for USEPA review and comment a plan that ensures the protection of the public health and safety during performance of work under this Settlement Agreement. This plan will be prepared in accordance with USEPA's *Standard Operating Safety Guide* (PUB 9285.1-03, PB 92-963414, June 1992). In addition, the plan will comply with all currently applicable Occupational Safety and Health Administration (OSHA) regulations found at 29 C.F.R. Part 1910. If USEPA determines that it is appropriate, the plan will also include contingency planning. The CPG will incorporate all changes to the plan recommended by USEPA and will implement the plan during the pendency of the Removal Action. The CPG may submit an amendment to the health and safety plan submitted pursuant to the RI/FS Settlement Agreement to satisfy this requirement.

4.2.6 Construction Quality Control Plan

As part of the prefinal design, a construction quality control plan (CQCP) will be prepared to describe the organization, inspections, tests, procedures, and documentation necessary to ensure work complies with approved plans and contract requirements applicable to the construction efforts, including work by subcontractors and suppliers (i.e., one CQCP for the full team effort).

The CQCP will detail the roles and responsibilities of the site personnel, including the Quality Control System Manager (QCSM), and QC inspectors/site engineers/sampling technicians. It will also provide checklists and forms to be used during various inspection activities to be conducted before, during, and after construction activities. In addition, it will outline the steps to be taken to control and document substantive changes or deviations to any planning or contract requirements.

4.2.7 Environmental Management Plan

As part of the prefinal design, an EMP will be developed to manage environmental issues associated with the removal and capping works. The EMP will address the following issues:

- Environmental management objectives

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- Regulatory requirements
- Environmental targets
- Roles and responsibilities of project personnel
- Practices and procedures that will be adopted to minimize environmental impacts
- Environmental management and monitoring
- Inspections and corrective actions
- Community consultation and complaints handling

Several components will be developed as part of the EMP to address the specific environmental aspects of the project. These components are as follows:

- Surface water quality monitoring plan
- Air quality monitoring plan, if applicable
- Odor monitoring plan
- Noise monitoring plan, if applicable
- Complaints response protocol

Input to each of these components will be provided as the design progresses from the BODR to the prefinal design phase.

4.2.8 Long-Term Monitoring and Operation and Maintenance Plan

In accordance with the AOC, or as otherwise directed by USEPA, the CPG will submit a long-term monitoring and O&M plan, which will meet the requirements for postremoval site control consistent with Section 300.415(l) of the NCP and Office of Solid Waste and Emergency Response (OSWER) Directive No. 9360.2-02. Upon USEPA approval, the CPG will implement this long-term monitoring and O&M plan and will provide USEPA with documentation of all postremoval site control arrangements.

4.3 Final Report

Within 90 days after completion of all work required by this Removal Action, the CPG will submit for USEPA review and approval a final report summarizing the actions taken to comply with the AOC. The final report will conform, at a minimum, with the requirements set forth in Section 300.165 of the NCP entitled "OSC [on-scene coordinator] Reports."

The final report will include a good faith estimate of total costs or a statement of actual costs incurred in complying with the AOC, a listing of quantities and types of materials removed offsite or handled onsite, a discussion of removal and disposal options considered for those materials, a listing of the ultimate destination(s) of those materials, a presentation of the analytical results of all sampling and analyses performed, and accompanying appendices containing all relevant documentation generated during the Removal Action (e.g., manifests, invoices, bills, contracts, and permits). The final report will also include the following certification signed by a person who supervised or directed the preparation of that report:

> Under penalty of law, I certify that to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of the report, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

4.4 Project Schedule

A project schedule that includes all major tasks and deliverables is included as **Appendix B**. The schedule provides approximate completion dates for the predesign, design, and implementation of the RM 10.9 Removal Action. It is assumed that the USEPA review period for each of the design submittals will have a duration of 20 calendar days. Effective and open communication will be critical to achieving the project's aggressive milestones. The status of ongoing efforts and issues that arise will be discussed during periodic teleconference or meetings.

Because of the uncertainty associated with the schedule for several tasks that are out of CPG's control (e.g.,

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seasonal constraints and USEPA review periods), this schedule is approximate.

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SECTION 5

5. Delivery and Implementation Strategy

5.1 Delivery and Implementation Strategy

In order to meet the RM 10.9 Removal Action implementation milestone of May 2013, it will be necessary to begin the procurement process in parallel with the design process. This "design-bid-build" approach will result in the selection of the contractors before the completion of the prefinal design, which allows the contractor to become an integral part of the design team and to have the contractors' specific equipment/project approach incorporated into the prefinal and final design reports. Getting the construction contractors onboard during the design phase will allow the project to transition quickly to mobilization and subsequent implementation.

The RM 10.9 Removal Action will be performed by several contractors. Each of these contractors will be selected based on "best value" to the project. The selection process will begin during preparation of the BODR and will conclude during the prefinal design phase of the project. The selection process will include the following:

- Identification of qualified contractors
- Preparation and issuance of requests for proposals (RFPs)
- Evaluation and selection of contractors

5.4.1 Contractor Identification

Five engineering design packages will be developed for the RM 10.9 TCRA. These design packages will be either performance based or prescriptive. A performance-based design specifies a desired outcome but not the means and methods to achieve the outcome, whereas a prescriptive design specifies the means and methods that must be used to achieve the desired outcome. For each of these packages, potential contractors will be identified during the basis of design phase of the project. The vendors will be evaluated based on their experience, equipment availability, and health and safety records. An initial list of potential available contractors for each of the engineering design packages is provided in **Table 5-1**.

TABLE 5-1
Engineering Design Packages

Design Approach	Scope	Preliminary List of Potential Contractors
Dredging		
Performance	Dredging Debris removal and segregation Transporting dredged material to the off-loading facility	Jay Cashman D.A. Collins Sevenson Environmental Weeks Marine
Sediment Washing		
Performance	Pumping, storing, treating, and discharging decant water from barges Off-loading dredged material from the barges and transporting it to a sediment-receiving area Preparing (removing debris, screening, and mixing) sediment for the sediment-washing process Treating the sediment through the sediment-washing process Storing, treating, and discharging wastewater from the sediment-washing process Storing the treated sediment and other material (e.g., debris) Loading the treated material and debris (separately) onto trucks for transport to the offsite disposal facility	Biogenesis Pear Technology

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Stabilization		
Performance	Pumping, storing, treating and discharge under regulatory permit decant water from barges Off-loading dredged material from the barges and transporting it to a sediment-receiving area Preparing (screening, mixing, and potential dewatering) sediment for stabilization Treating the sediment with reagents for stabilization of the sediment Storing the treated sediment Loading the treated material onto trucks for transport to the offsite disposal facility	Clean Earth Inc Jay Cashman
Capping		
Prescriptive	Chemical containment modeling Active layer treatability study Cap plan and typical cap sections (active layer, sand layer, geotextile barrier, and armor stone) design Erosion control design Cap placement criteria	Jay Cashman D.A. Collins Sevenson Environmental
Transportation and Disposal		
Prescriptive	Transportation (trucking or rail) Disposal	Heritage Environmental Services Clean Harbors, Inc. EQ Northeast, Inc. Chemical Waste Management

5.4.2 Requests for Proposal

For each of the engineering design packages, an RFP will be prepared based on the design information developed to date and containing the following information:

- Scope of work
  - Contractor's scope of work
  - Services provided by others
  - Site requirements and restrictions
  - Health and safety requirements
  - QC requirements
  - Regulatory/environmental compliance
  - Project control requirements
  - Work schedule
  - List of technical specifications and drawings
  - Measurement and payment
- Contract terms and conditions. At a minimum the contractor will be required to submit the following information with their proposal:
  - Description and organizational chart of project team
  - Previous project experience (name, location, description, client, contract price, completion date)
  - Previous project performance (adherence to schedule/budget, compliance with permit requirements)
  - Implementation strategy demonstrating an understanding of the contract scope of work
  - Proposed schedule

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- Description of equipment (ownership, type, size, condition, utilization, maintenance and repair program)
- Personnel experience (resumes of propose staff)
- Health and safety compliance (loss experience rates, experience modification rates, compliance history, content and scope of environmental health and safety [EHS] program(s), implementation of EHS program(s), qualifications and experience of EHS personnel, EHS training experience of project personnel, and substance abuse program)

Contractors will be permitted to provide proposals on more than one of the engineering design packages.

5.4.3 Evaluation/Selection Process

The proposals which are received will be evaluated by a technical evaluation board based on the technical criteria below:

- Project approach and ability to achieve the required schedule
- Performance on past projects, including health and safety
- Equipment type, size, condition, and availability
- EHS compliance
- Experience of personnel and health and safety certifications, including working with RCRA wastes
- Price

The technical evaluation will use a point system for each category. A technical evaluation board which will comprise individuals from the CPG, dmi, and CH2M HILL will then use the rating scale to score the bidders based on the point system established for each of the evaluation categories. The points from each category will be summed to get an individual score. The individual scores from each board member will then be totaled to arrive at an overall score for each contractor. Once selected, the contractor's equipment and project approach will be integrated into the final design report.

5.5 Project Organization

The proposed CH2M HILL Design Team includes individuals with the skill sets and sediment-specific experience needed to complete an effective design and implementation for the RM 10.9 TCRA. **Figure 5-1** shows the project organizational structure for the design, and **Table 5-2** lists the project's key personnel, their responsibilities, and their years of experience. The project organization will be revised accordingly for implementation and will be included in the CQCP to be submitted as part of the prefinal design report.

TABLE 5-2
Key Personnel

Personnel	Role	Years of Experience
Roger McCready, PG	Project Manager	25
Jim Brinkman, PE	Design Manager	29
Mike Jury, PE	SME—Dredging and Capping	38
Dennis Grubb, PhD	SME—Capping and Dredge Material Management	20
George Hicks	Global Sediment Lead	30
Gary Foster	SME—Construction	31
Terri Gerrish, PE	SME—Permitting	32
Bruce Manning	SME—Water Treatment	35
Jennifer Wilkie, PhD, PE	Project Engineer	18
Andrea DePoy, PE	Assistant Project Manager	14

SME, subject matter expert.

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SECTION 6

6. References

AECOM. Lower Passaic River Study Area River Mile 10.9 Characterization Quality Assurance Project Plan Addendum A - Sediment Collection for Bench-Scale Testing of Sediment Treatment and Dewatering Technologies and for Additional Delineation. May 2012

AECOM. Lower Passaic River Study Area River Mile 10.9 Characterization Addendum C Data Gap Sample Collection to Support Sediment Removal and Sediment Capping Design. May 2012.

CH2M HILL and AECOM. 2011. River Mile 10.9 Characterization Program Summary, Lower Passaic River Study Area. Newark, New Jersey. April 19.

dmi (de maximis, inc.). 2011. USEPA-CPG Meeting Summary of March 29, 2011 - Lower Passaic River Study Area. Clinton, New Jersey: Robert Law, CPG Project Coordinator. April 15.

dmi. (2012, August 1), Re: RM 10.9 Removal Action – Identification of Additional Area. CERCLA Docket No. 02-2012-2015. Clinton, New Jersey: Robert Law, CPG Project Coordinator.

USEPA (U.S. Environmental Protection Agency). 2008. *Consideration of Passaic River Sediments Pursuant to 40 CFR 261.31.* November 12.

USEPA (U.S. Environmental Protection Agency). 2012a. Diamond Alkali, Lower Passaic River Study Area—River Mile 10.9 Administrative Settlement Agreement and Order on Consent for Removal Action. May 21 (Effective June 18.)

USEPA (U.S. Environmental Protection Agency). 2012b. Action Memorandum/Enforcement: Determination of Need to Conduct a CERCLA Time Critical Removal Action at the Diamond Alkali Superfund Site, Lower Passaic River Study Area, River Mile 10.9 Removal Area.

Appendix A
Diamond Alkali, Lower Passaic River Study Area—River Mile 10.9 Administrative Settlement Agreement and Order on Consent for Removal Action, May 21, 2012 (Effective June 18, 2012)

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Appendix B
RM 10.9 Project Schedule

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