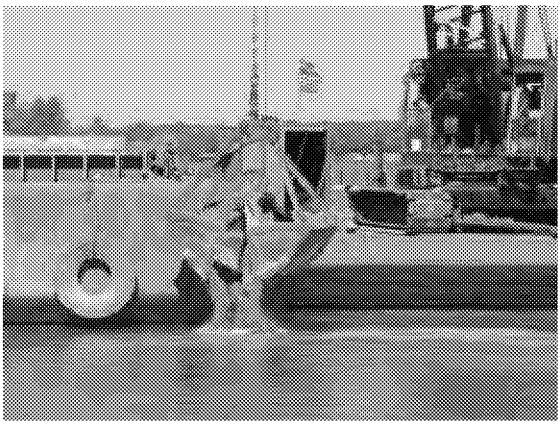

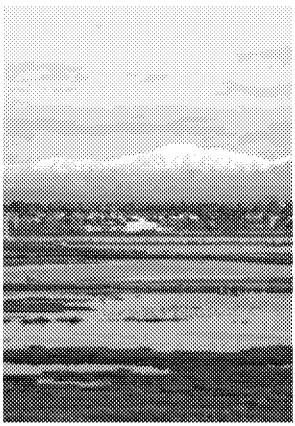

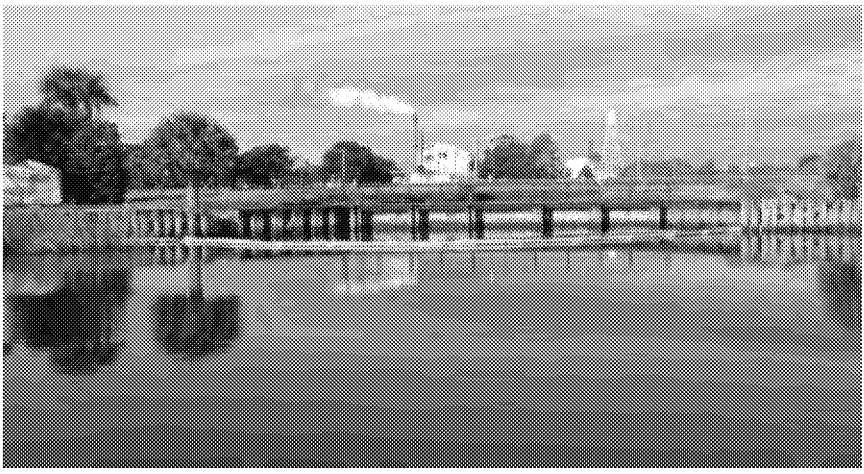

Pre-RD Group Investigation and Baseline Sampling Design Discussion

August 2, 2017

(8/8/17 clarifications added in yellow highlight)

Presentation to EPA R10

Anne Fitzpatrick and Jason Conder, Geosyntec; Betsy Ruffle, AECOM

Confidential: For Purposes of Settlement Negotiations Only

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August 2 Meeting Agenda

- Review DQOs and overall objectives
  - DQOs
  - Where do we have alignment
- SMA Delineation and Allocation Support
- Other Technical Discussions
  - Downtown Reach and Sediment Traps
  - Surface Water and Analytes
- Redline edits to the draft AOC and Statement of Work
- Alignment and Next steps

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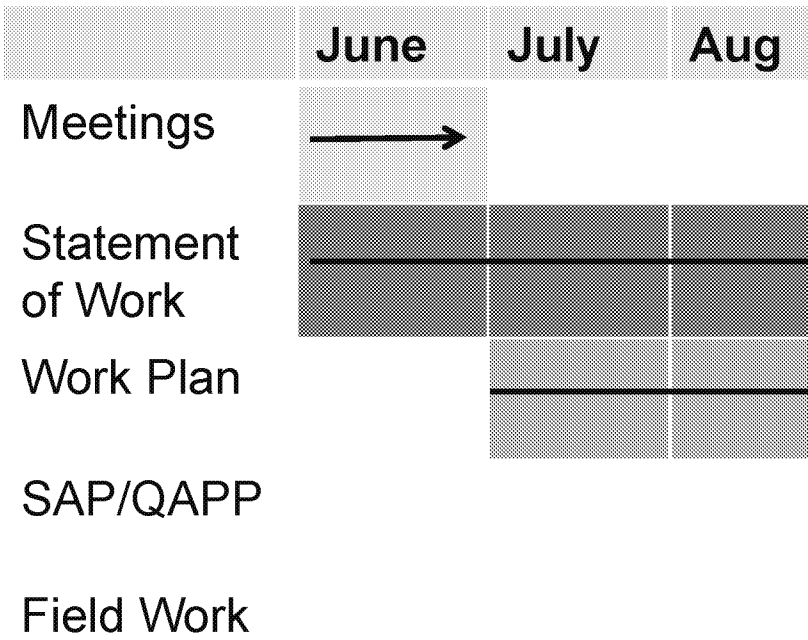
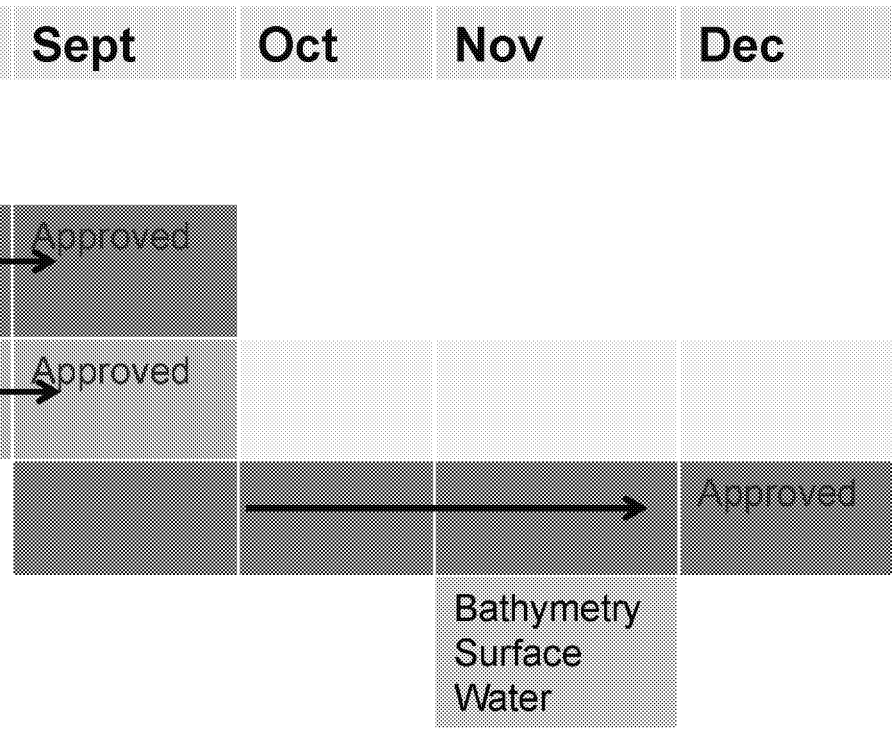


2017 Schedule



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Data Quality Objectives

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DQO Alignment

Task	Pre-RD Group DQOs				EPA Conceptual Sampling for Baseline and SMAs
	SMA Footprint	Site-wide and Segment-wide Trends	Upstream Background Conditions (3)	Inform Future ICs	
Site-wide Bathymetry	X				
Surface Sediment Sampling	X	X (1,2)	X		X
Fish Tissue Sampling (SMB)		X	X	X	X
Surface Water Sampling		X	X		X
Subsurface Sediment Coring	X				
Fish Acoustic Tracking Study				X	
Camera Survey of Anglers				X	
Porewater Sampling Upstream			X		

Notes:

(1) Evaluate trends by comparing the 2018 dataset to the 2004 dataset and other relevant datasets from the last 10 to 20 years.

(2) We could adapt the 200 site-wide samples to meet EPA plan – unbiased, stratified random design per 8 segments.

(3) Upstream and Downtown Reach (combined) represent what is coming into the site and what is achievable [new bullet],

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pur

	Pre-RD Group Plan	EPA Plan
Site-wide Bathymetry	X	
Surface Sediment Sampling	X	X
Fish Tissue Sampling (SMB)	X	X
Anadromous and Migratory Fish and Other Biota Tissue		X
Surface Water Sampling	X	X
Subsurface Sediment Coring	X	X
Fish Acoustic Tracking Study	X	
Camera Survey of Anglers	X	
Porewater Sampling Upstream	X	
Downtown Reach		X
Sediment Traps		X

Where Do We Have Alignment

ple font = additional topics for discussion today

Description
Site-wide coverage
Adjust to unbiased robust sampling program for 8 segments plus SMA sampling at 300 ft spacing for allocation, focused COCs
SMB tissue sampling for focused COCs for trend analysis; whole body and calculate fillet; discuss Downtown Reach
Not proposed
8 transects, 3 events, 3 samples per transect, for trend analysis, focused COCs, use passive samplers, discuss DLs/analytes
90 SMA cores to fill data gaps needed for allocation, 2 ft increments, focused COCs, TOC, grain size
See memo, results will inform tissue data analysis and use of SMB to monitor remedy effectiveness
See memo; results could be useful for development of ICs
8 stations, metals, help determine PW background for COC metals
Move some samples into Downtown Reach in fine-grained areas, focused COCs
Consider 2 traps at upstream transects RM 11.8 and RM 16, 3 events, focused COCs, line of evidence for COC migration into site

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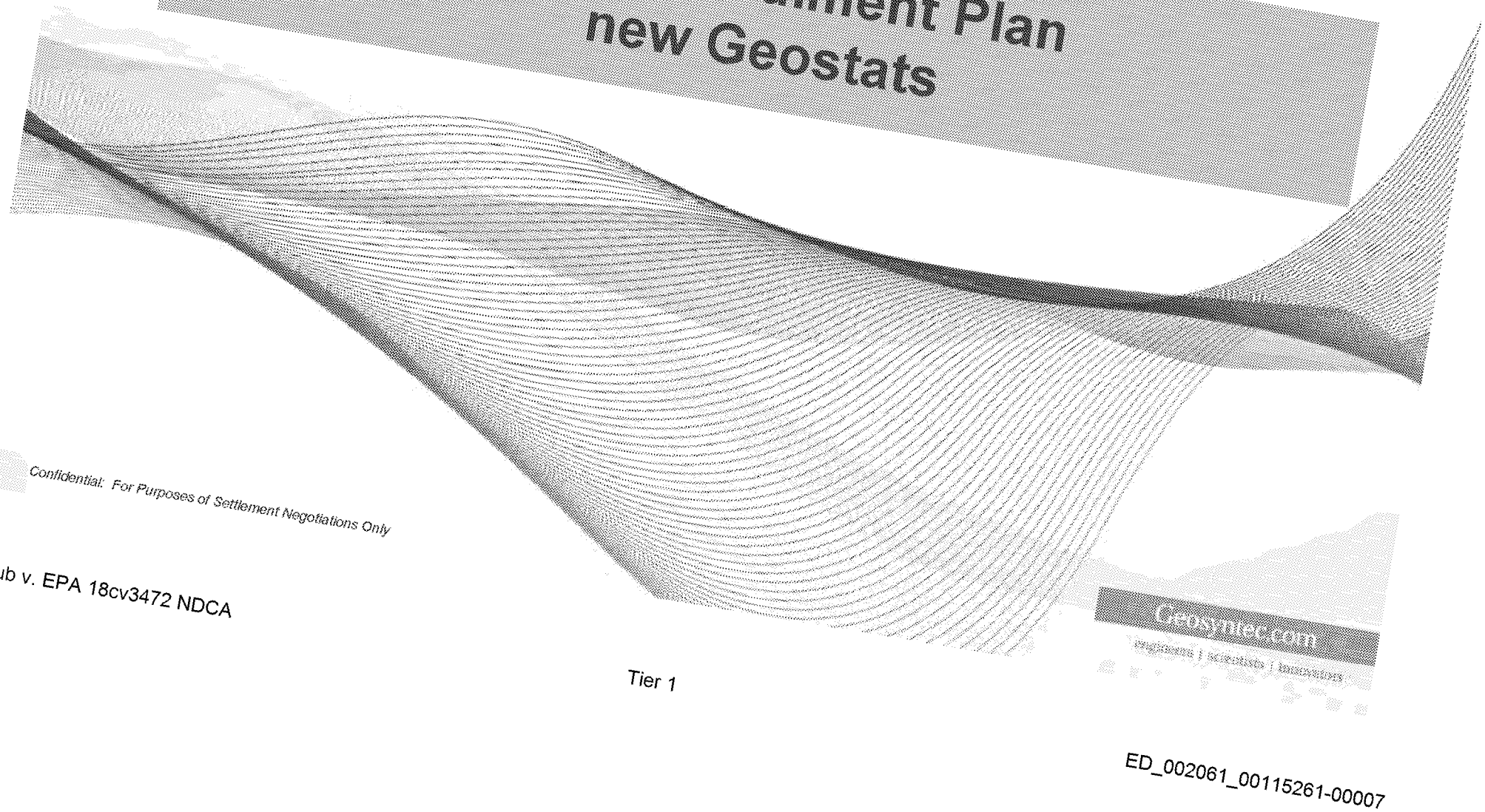
Surface Sediment Plan new Geostats



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Surface Sediment Plan

Progress and Potential Alignment

- 580 samples total
  - 320 unbiased (randomly placed) samples
    - 40 unbiased samples/segment (8 segments)
  - Same SMA sample density as original plan
    - Note: The 80 unbiased samples located in the SMAs also serve SMA delineation data needs

	Unbiased samples			Samples used for SMA Delineation		
Sample Plan	Unbiased samples in SMAs	Unbiased samples outside SMAs	Total Unbiased Samples (inside + outside SMAs)	Additional samples added to SMAs to increase sampling density	Total Samples in SMAs (SMA samples + Unbiased samples in SMAs)	Total Samples (Total Unbiased + Additional SMA samples)
484 Plan	50	150	200	284	334	484
Revised Plan	**80**	**240**	**320**	**260**	**340**	**580**

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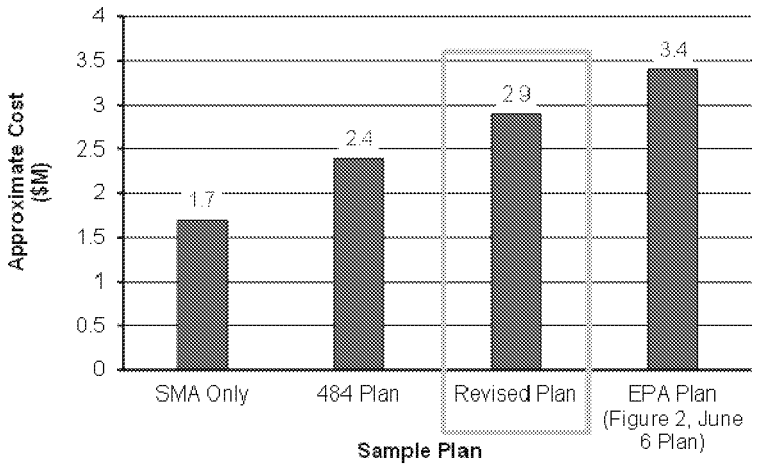
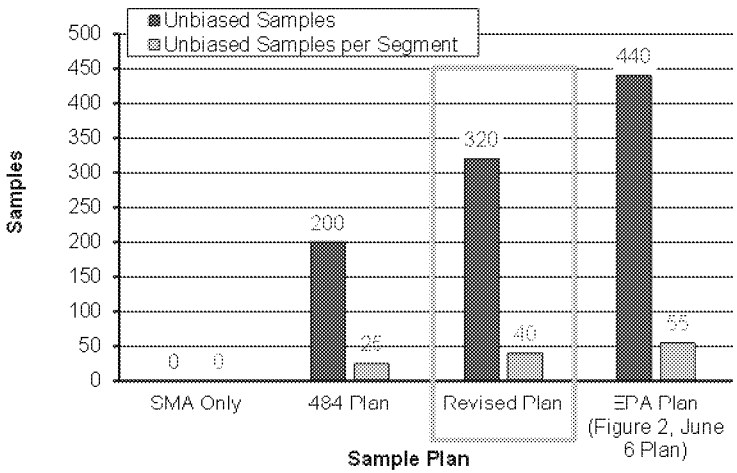
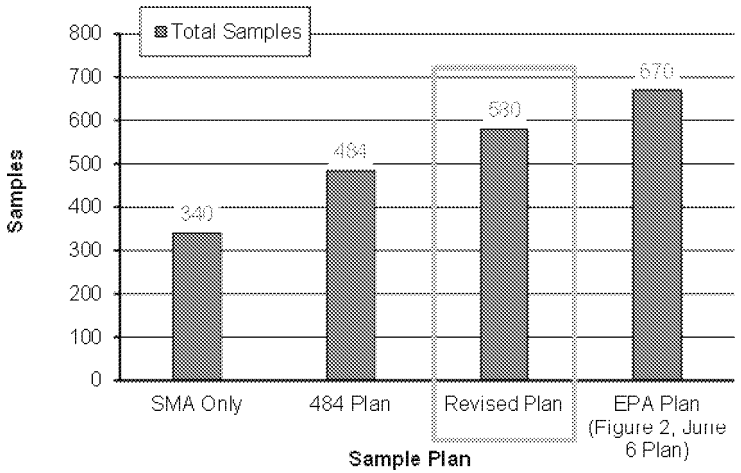
Overview of Revised Plan Approach

- Recommendation
  - Maintain original SMA sampling approach
  - Add 120 unbiased samples to the original 484 plan
- Features
  - Mid-way effort between 484 and EPA plan
  - Improves power for Pre-RD data objectives
  - Addresses EPA data objectives to reasonable degree







*Sample plan, sizes, and costs in these slides for the Site (River Mile 1.9 to River Mile 11.8).

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Revised/Proposed Plan: Changes

- Split 4 segments to 8 segments, split down the middle of river
  - Rolling river miles not necessary for recovery trends over time
  - Segments may get optimized in the future with composite sampling
- Add 120 unbiased samples to improve power in 8 segments
- Re-occupy 2004 locations (~100 locations)
  - Enable comparisons to 2004
- Stratification of unbiased samples: higher sample numbers in shoals relative to navigational channel

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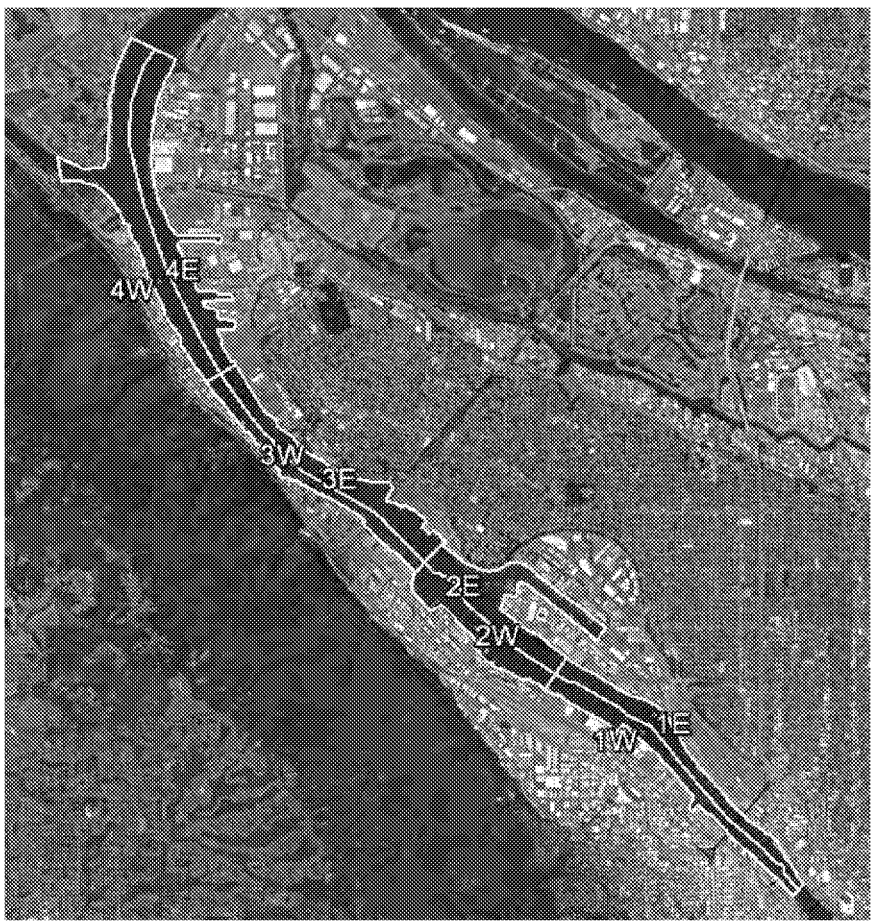
Revised/Proposed Plan: Evaluation

- Evaluated the plan's ability to address Data Quality Objectives (next slide)
- Evaluation for each of the 8 segments* using power analysis/Monte Carlo simulations similar to that used by EPA (Appendix A of June 6 sampling plan)
  - See supporting slides



*Compromise plan is also sufficiently robust to analyze Swan Island Lagoon as a subset of Segment 2E.

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Data Quality Objectives

Data Quality Objectives	Approach		Resolution	Revised Plan
	Pre-RD Group	EPA		
Delineate SMAs	Pre-RD investigation (this effort), then more detailed sampling based on initial results; Expected precision of +/- ~30% in SMAs	Full-high resolution delineation	Keep to Pre-RD characterization and note high-resolution will likely follow	✓ Plan will eventually satisfy both approaches
Recovery Trends	Compare 2004 data to 2018 data; Looking for large differences (~40%) over 14-year period	Compare 2018 data to future data, compare future time points; Looking for large differences (~40%) over 10-year period	Use unbiased data approach for 8 segments, but also re-occupations of 2004 locations, same precision desired	✓ Satisfies precision objective and EPA desire for unbiased approach
SWACs	Update SWACs; SWACs should be as/more precise than previous SWACs	None stated	None needed	✓ Satisfies objectives
Pre- vs Post-remedy Comparisons	Detect large differences (40%) for segments with significant SMA coverage (e.g., 20% or more remediation)	Detect slight differences (20%) in all segments	Pre- vs Post-remedy differences should be large in the most significant segments, 40% precision is adequate	✓ Satisfies objective with sample sizes optimized for expected differences
Post-remedy vs Background Comparisons	None stated	Equivalency Evaluation (90% UCL on Equivalency value should be less than ~1.5 assuming equivalent post-remedy conditions)	None needed	✓ Satisfies objectives

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Summary/Discussion
Sampling Plan and Benefits

- Improves statistical power of original 484 plan in developing SWACs and quantifying natural recovery since 2004, and allows an improved 8-segment spatial scale analysis
- Incorporates EPA's DQOs for pre- vs post-remedy comparisons and post-remedy vs background comparisons
- Captures recent technical progress made during the "statistical group" discussions:
  - Evaluation of sampling plans on the basis of 8 segments
  - Randomized placement method with some shift to re-occupy 80-100 of the 2004 stations
  - Stratification of the unbiased samples between navigational channel and shoals
- Represents a reasonable compromise to balance sampling costs and effort with statistical power to address critical DQOs

	Pre-RD Group Plan	EPA Plan	Description
Surface Sediment Sampling	X	X	Adjust to unbiased robust sampling program for 8 segments plus SMA sampling at 300 ft spacing for allocation, focused COCs

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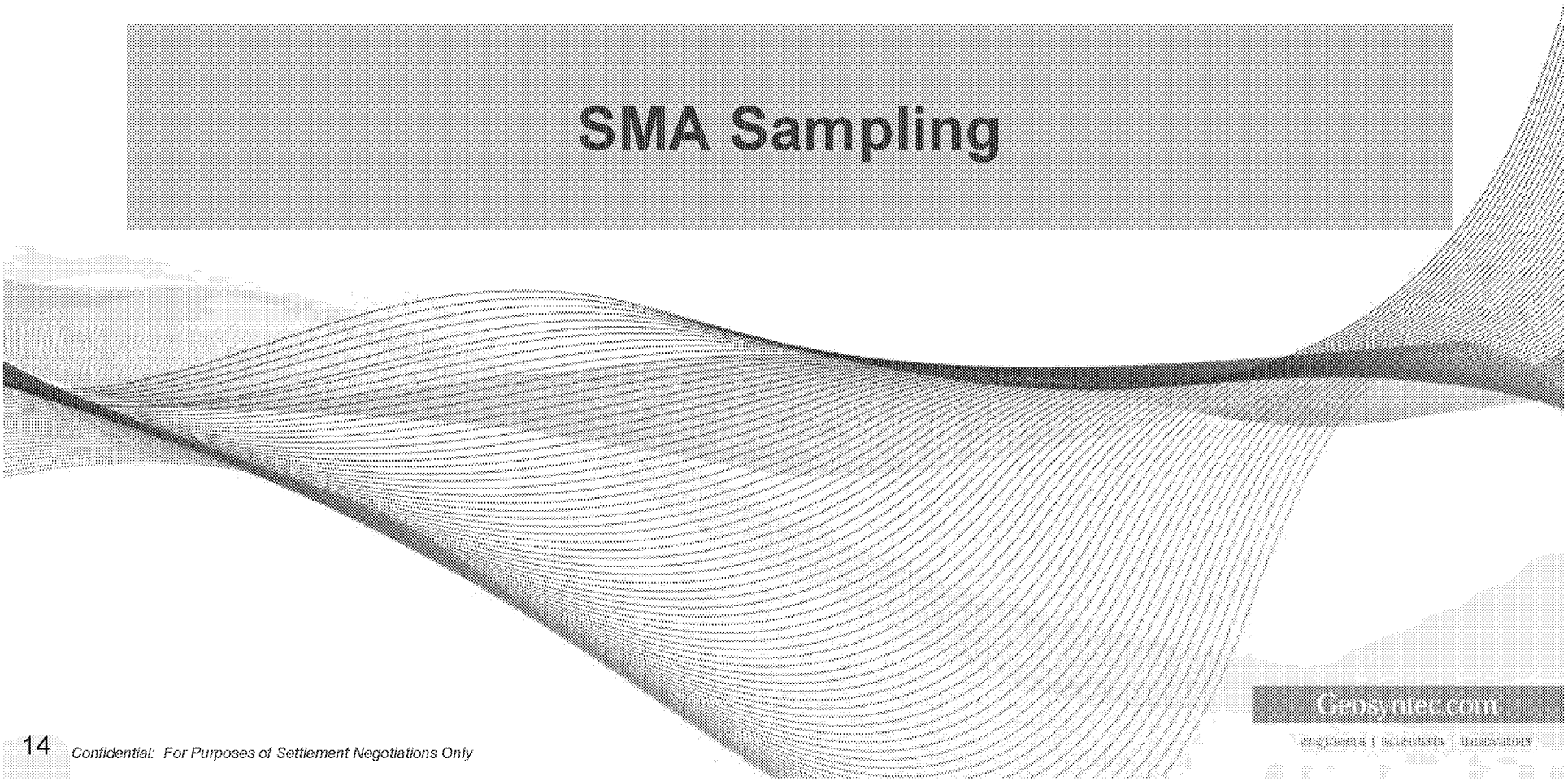
SMA Sampling



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SMA Sampling Plan

- Current SMA sampling plan (~334 surface samples, 90 cores) is sufficient for a scoping-level analysis of SMA
  - Statistical power analysis shows count is robust
  - Responsive to requests of allocation team and meets needs of allocation group (confirmed)
  - Re-baseline the SMA footprints to evaluate current conditions and run these data through the decision tree

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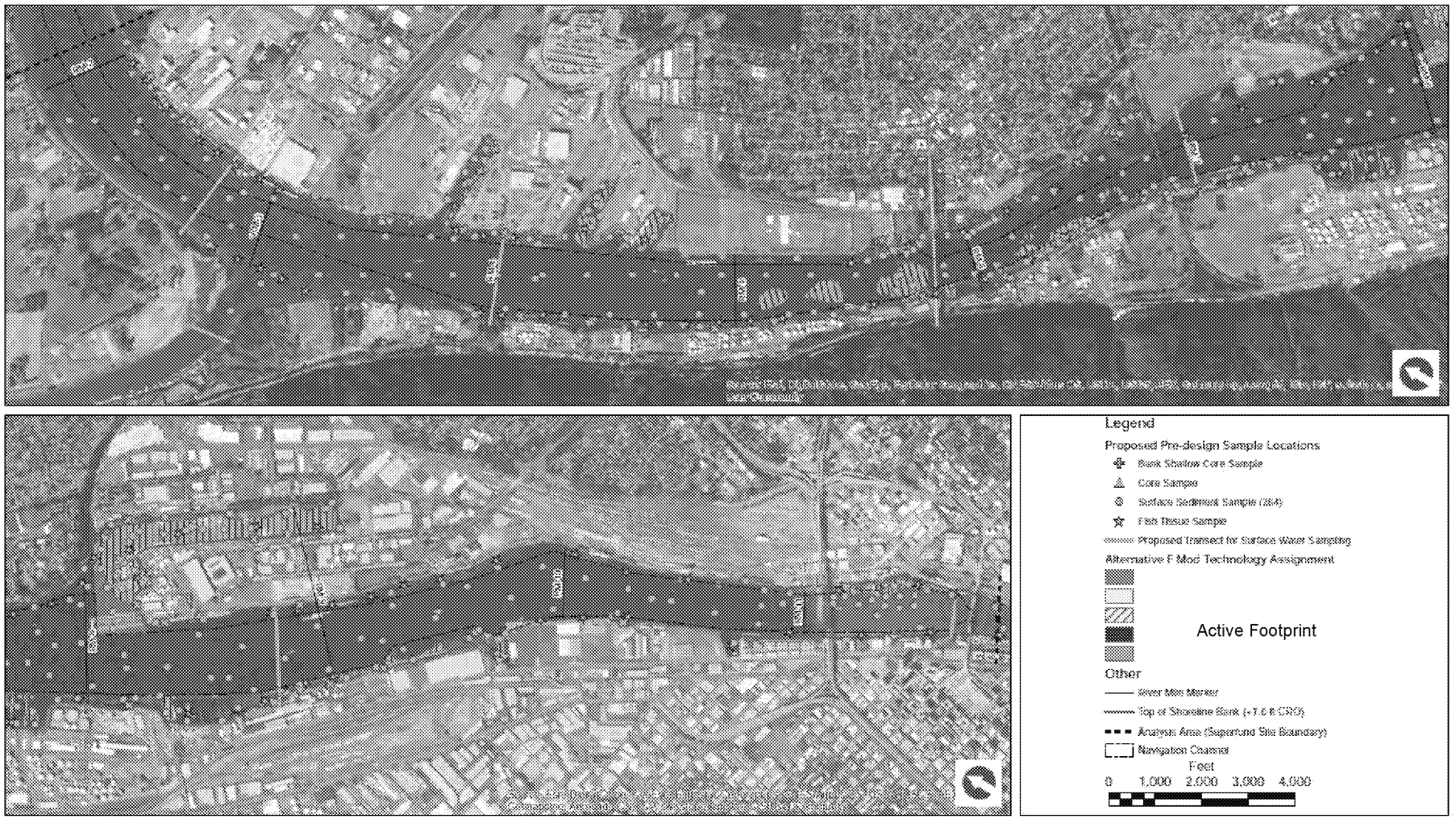
Entire Program

Surface sediment, cores, fish tissue, and surface water (approximate locations)



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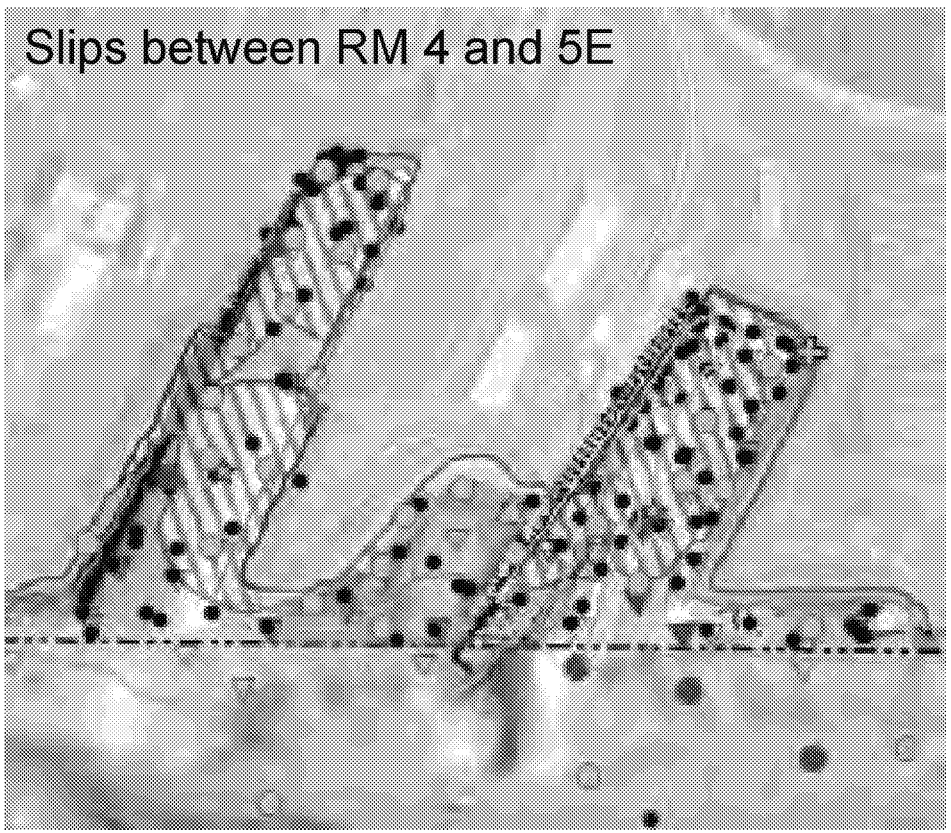
Rationale for Grab Placement in SMAs

- Several considerations
  - Regular spacing/ coverage across active footprint (~250 ft)
  - Re-occupy some old stations
  - More stations near steep chemical gradients to reduce uncertainty



Orange = proposed
Pink = recent sampling since the RIFS
Triangles = cores
Circles = grabs

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Rationale for Core Placement

- Several considerations
  - Lack of horizontal samples at boundaries, ~300 ft spacing
  - Strong concentration gradient over short distance
  - New nearshore areas included in Alt F Mod
  - Isolated active areas/blobs proposed for dredging but without any subsurface data
  - Tag bottom, define vertical extent
- Rely on best professional judgment
- *Note: plan not optimized with surface grab or recently completed studies (Swan Island, RM 5-6, RM 11E)*

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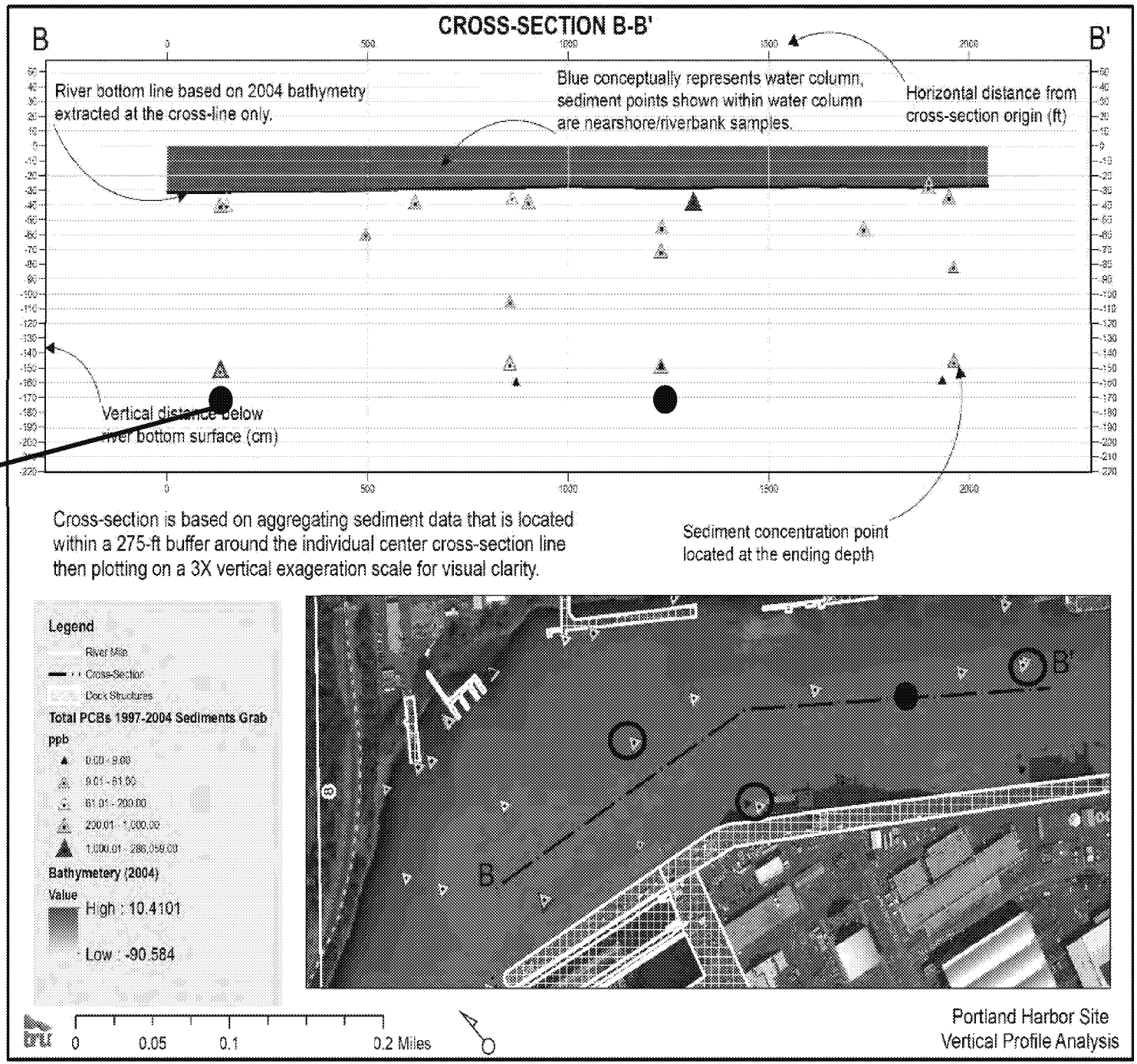
Approach: Vertical Profile Core Analysis

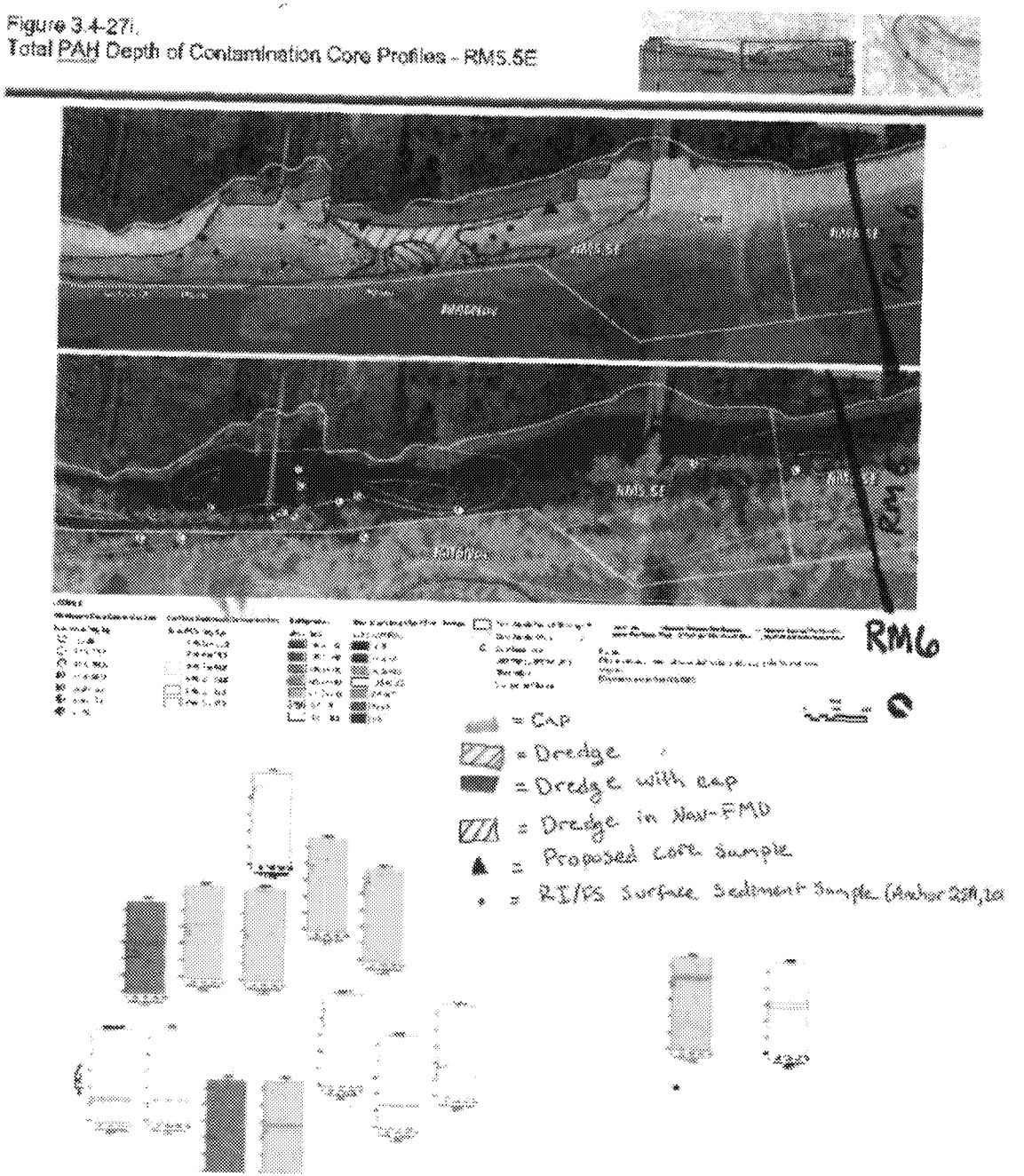
Proposed Vertical Control Sampling Location

Proposed Core Location

Existing Core location



Proposed Core Locations – *Example RM 5.5E*



- No existing cores in dredge footprint
- 1 core nearby horizontal and vertically bounded to 10 ft

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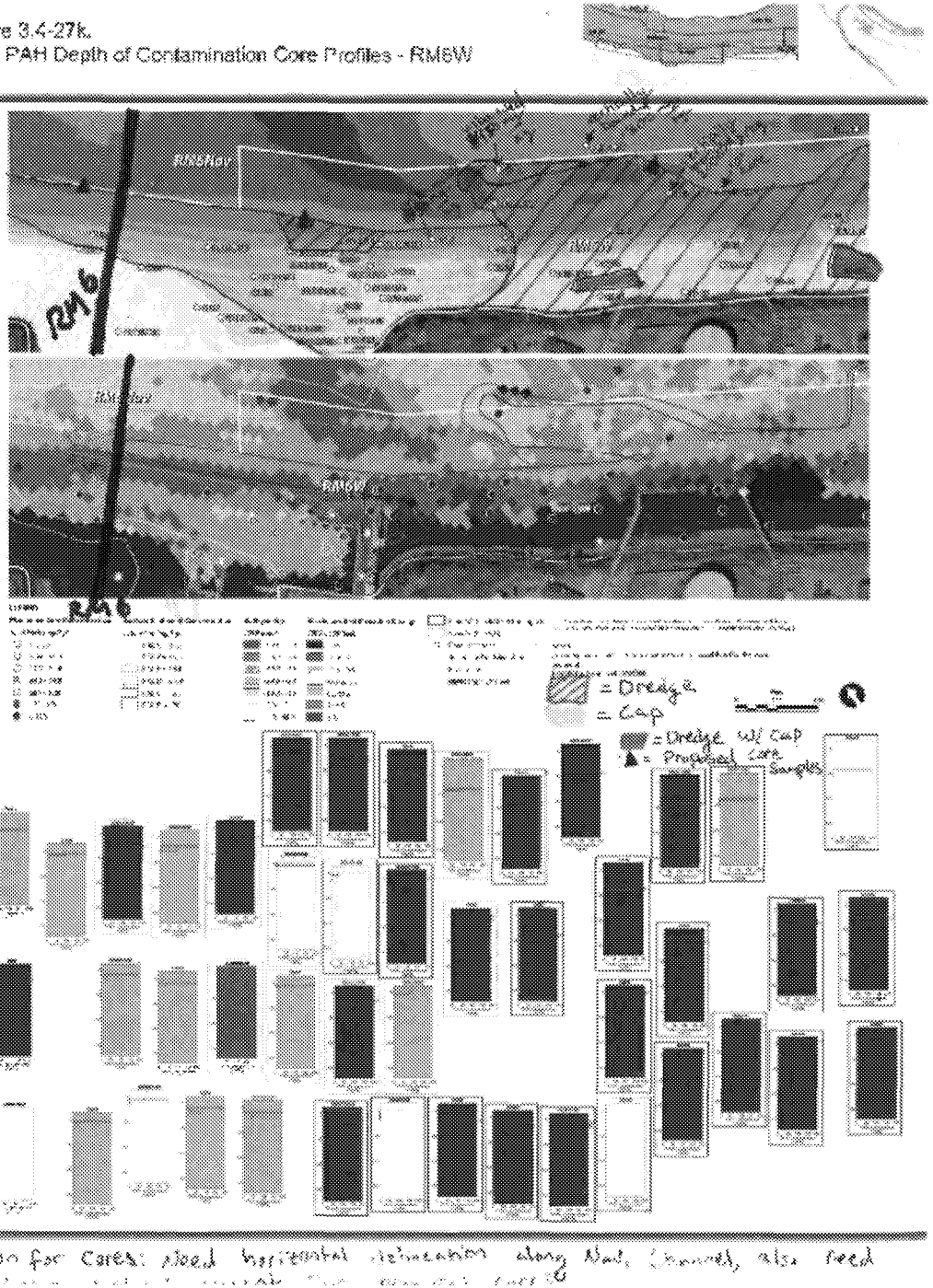
Figure 3.4-27k.
Total PAH Depth of Contamination Core Profiles - RM6W



Reason for Cores: plug horizontal delineation along Nail Channel, also need

Proposed Core Locations – *Example RM 6W*

- Lots of cores, so focus on boundaries and gradients
- On left side – add core at edges and within dredge footprint
- On right side - refine gradient between max PAH concentration of 3000 to ~1000 mg/kg
- Spacing is about 230 ft
- Could optimize the spatial coverage

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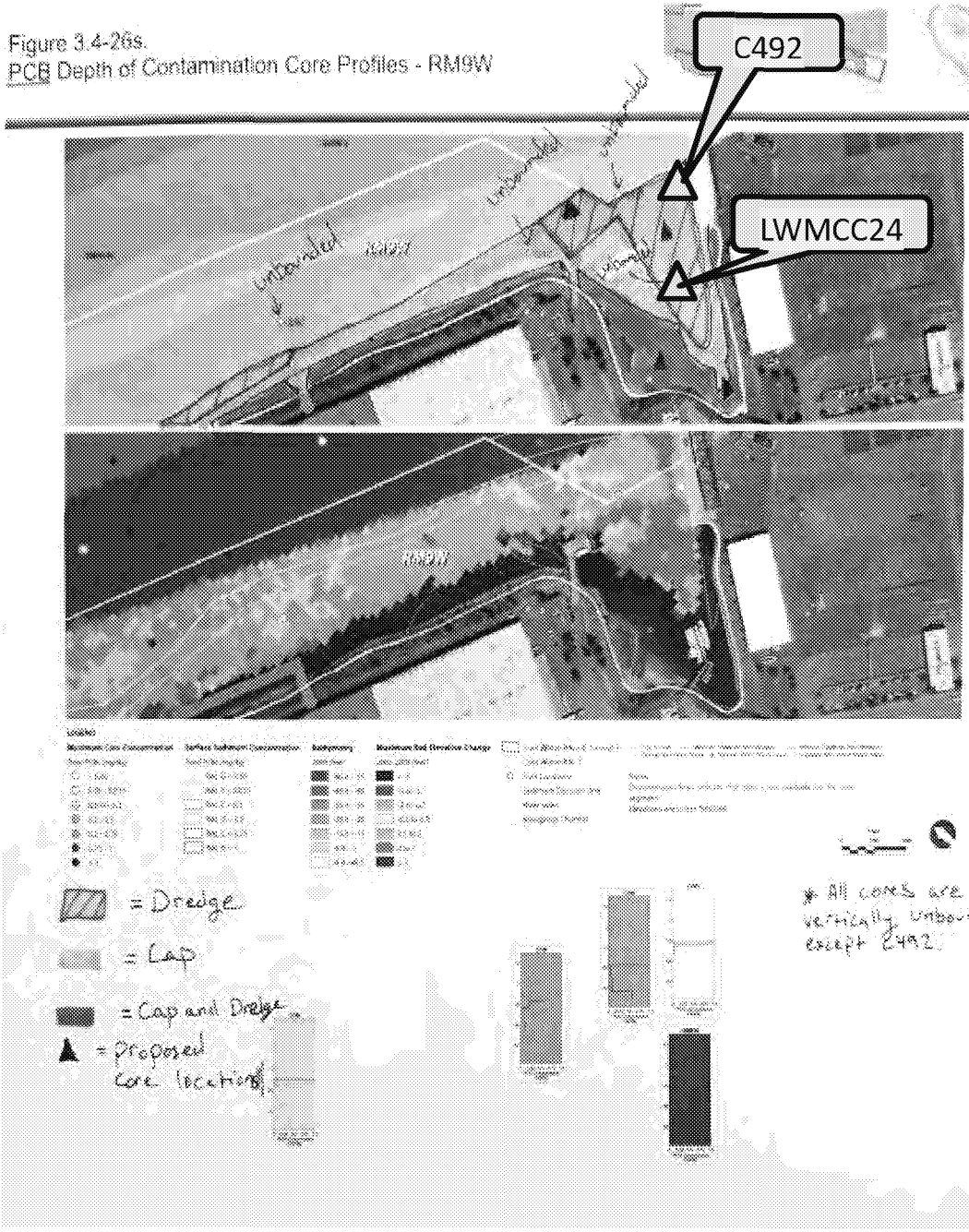
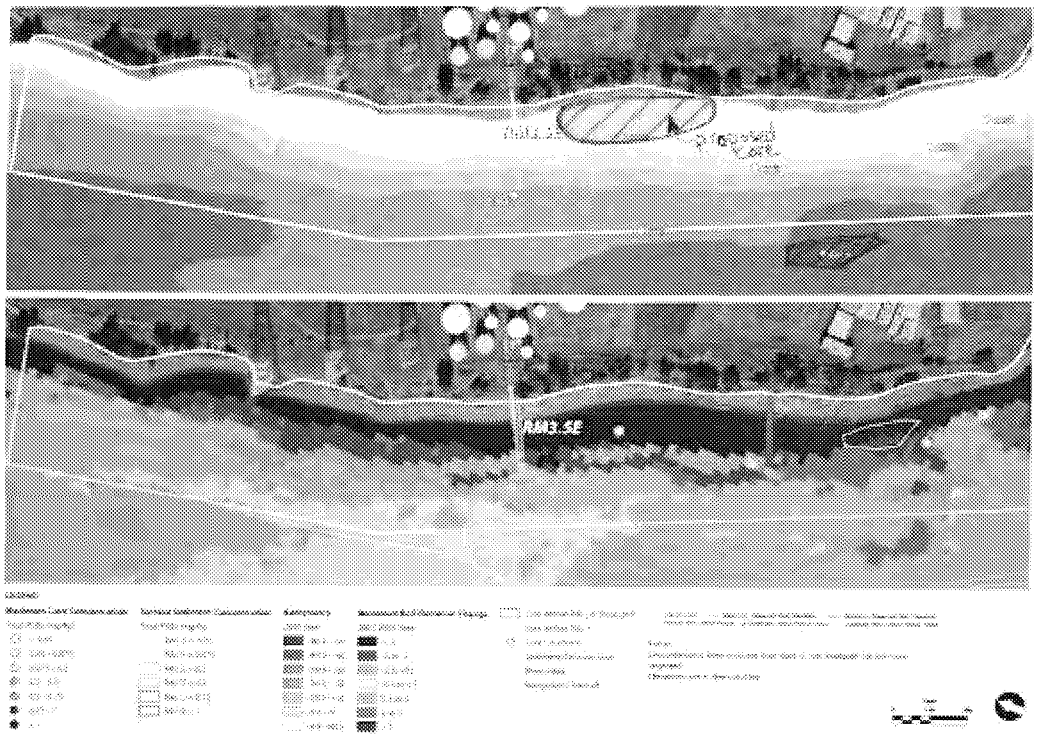
Figure 3.4-26s.
PCB Depth of Contamination Core Profiles - RM9W



Proposed Core Locations – *Example RM 9W*

- Fill data gap to refine vertical and horizontal extents in dredge area
- All cores vertically unbounded except for C492 which was shortest core
- Data gap - no cores in shallow area
- LWMC24 had conc >750 ppb PCB but vertically unbounded and >400 ft from shore
- Also, no bathymetry nearshore (data gap)

Figure 3.4-26c.
PCB Depth of Contamination Core Profiles - RM3.5E



Proposed Core Locations – *Example RM 3.5E*

- Isolated area with no existing cores in dredge footprint

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Proposed Core Locations –
Example RM 5 to 6Nav – good coverage already exists

Orange = proposed

Pink = recent sampling since the RIFS

Triangles = cores

Circles = grabs

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Overview: Sediment Sampling

- The Pre-RD group scope satisfies DQOs for SMA delineation and baseline dataset to evaluate recovery trends
- Pre-RD Group scope for SMA delineation is sufficient (and will be further augmented with additional sampling)
  - Sediment core density sufficient for allocation
  - EPA effort is 100% design level (to be completed later)
- Willing to discuss unbiased sampling plan in 8 segments based on recent discussions with John Kern, EPA consultant
- New data will go through decision tree to refine the SMA footprints; including a re-evaluation of Alt F mod footprint reflecting new data

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Summary/Discussion *of SMA sampling plan*

- Pre-RD scope in SMA areas:
  - 334 grab samples
  - 90 cores in SMA
- Sample count sufficient for allocation and reduces uncertainty in horizontal and vertical extent of active footprints
- Could move/slide the proposed stations for more optimization
- Do we have consensus?

	Pre-RD Group Plan	EPA Plan	Description
Surface Sediment Sampling	X	X	Adjust to unbiased robust sampling program for 8 segments plus SMA sampling at 300 ft spacing, focused COCs
Subsurface Sediment Coring	X	X	90 SMA cores to fill data gaps needed for allocation, 2 ft increments, focused COCs, TOC, grain size

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Downtown Reach Considerations
(surface sediment and sediment traps)

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Downtown Reach

Previous Surface Sediment Sampling Studies

- Previous investigations:
  - 2008 investigation by ODEQ included 81 surface grabs and 36 subsurface sediment samples to identify target cleanup areas
  - 2010 (Phase II) another sampling event by ODEQ in focus areas
  - 2014 Kleinfelder investigation
- Several sediment cleanup investigations under ODEQ:
  - RM 12.2W (former Portland Gas Manufacturing MGP Facility)
  - RM 13.1 and 13.5E (PGE, one cap in 2015, other in design)
  - RM 13.6 (Zidell property, completed 2011)
  - RM 15W

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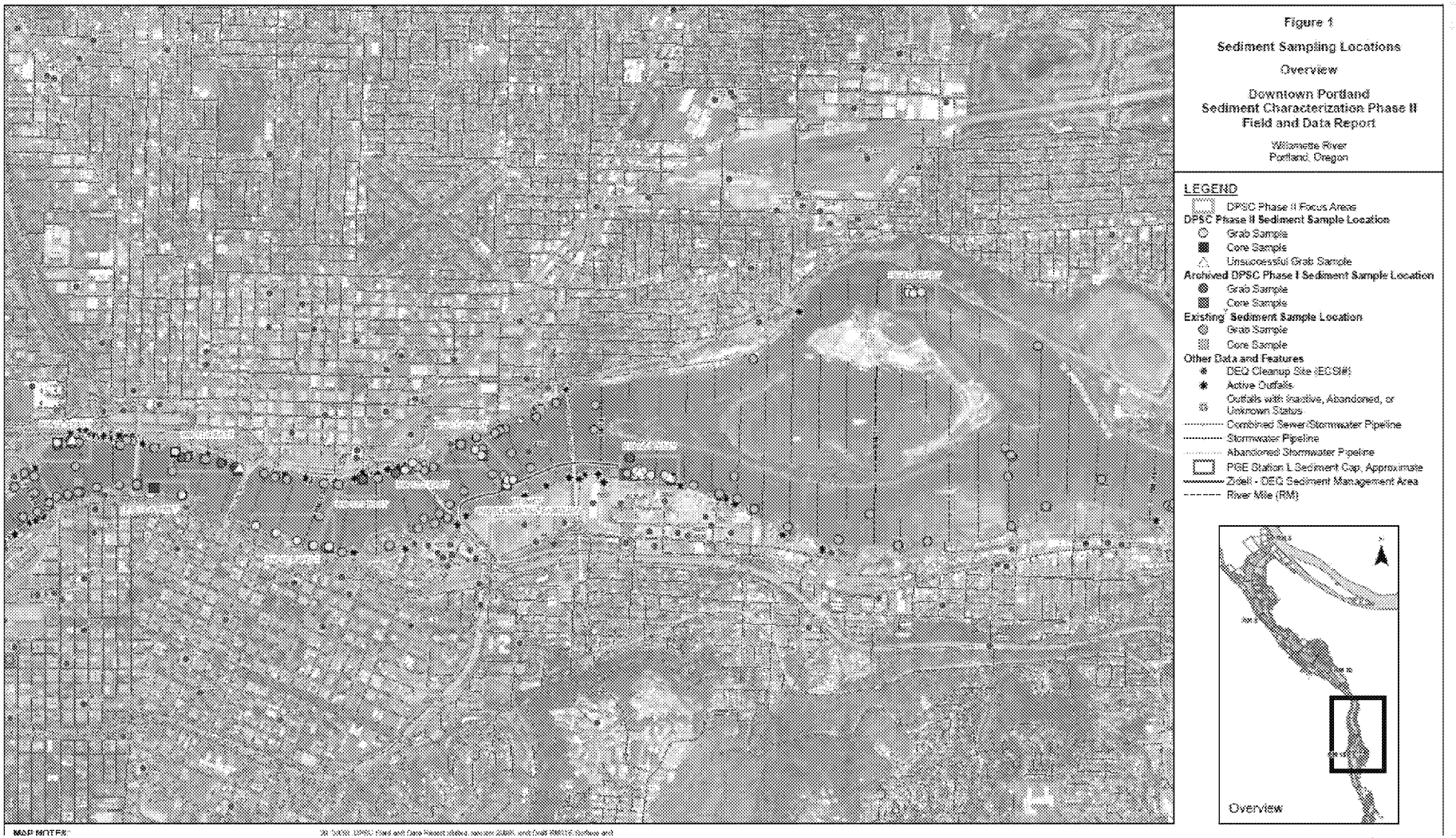
Downtown Reach
Historical Sediment Sampling Locations



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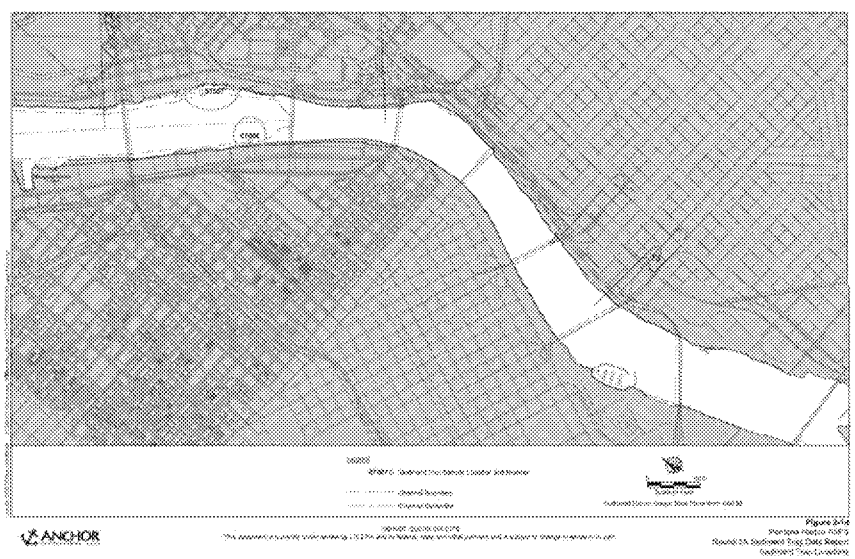
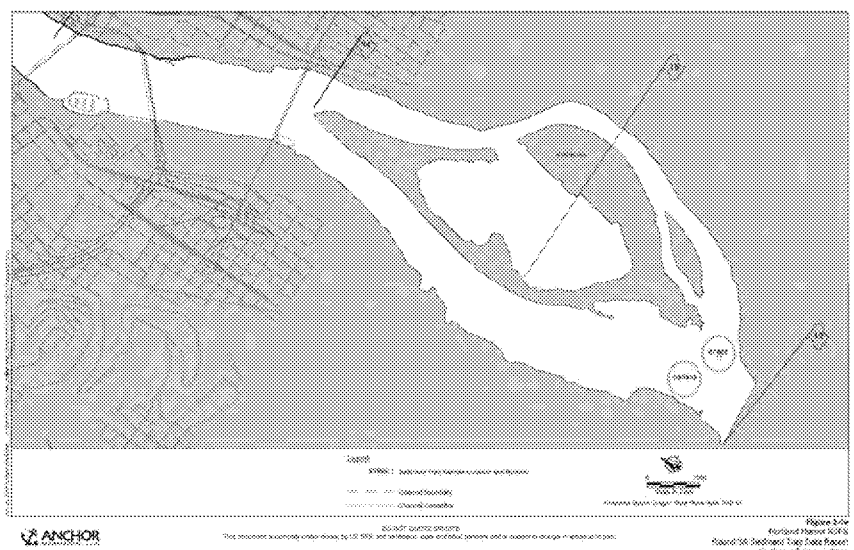
Sediment Trap Sampling

Summary of 2007 Round 3A of the RI

- Four sediment traps deployed near RM 11.9 and 16.5
- Sampled quarterly to evaluate quantity of accumulated sediment and analyze for total PCB Aroclors and Congeners in select samples





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EPA's Plan for Downtown Reach Sampling

- Downtown Reach is between RM 11.9 and 16.5, bounded by the Site and Upstream Reach
- EPA's Sampling Plan proposes:
  - 60 surface sediment samples (0 to 30 cm) (Table 3 says 30 samples)
  - 4 sediment trap samples
  - 30 SMB tissue samples (15 from each side, five 3-fish carp composites)
  - 6 surface water samples in Downtown Reach at RM 11.8 and RM 16.5
- Traps co-located with surface water, 2 samples per transect, 3 SW samples per transect at 2 depths, quarterly for 1 year
- Analyze for all sediment and surface water COCs (ROD Table 17) plus TOC and DOC at Year 0 (surface water)

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Summary/Discussion

Downtown Reach - Sediment Sampling

- If sampled, ensure fine grained/mobile materials are targeted (most likely to be transported downstream to Site)
  - Target soft, fine grained sediment with higher % fines and TOC
  - Before each event, do a pre-survey to identify areas of soft sediment; sample these areas as spatially-randomized, non-fixed locations
  - Include sediment traps to assure that fine grain/mobile materials suspended in the water column are characterized
- 40 samples appropriate for statistical robustness (downtown and upstream combined)
- Overall, move the upstream sample area to include the Downtown Reach could be beneficial to help characterize upstream sources to the Site, determine what is achievable, and may be used for equivalency analysis

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Summary/Discussion
Downtown Reach - Other Media

- Surface water sampling – alignment with two upstream transects in Pre-RD scope plan
- SMB tissue sampling – initially proposed 10 SMB samples in upstream area, add 15 to achieve EPA target in upstream/ downtown combined for equivalency analysis (Table A-1)
- Pre-RD group and EPA in alignment on value of incorporating the Downtown Reach into the sampling design

	Pre-RD Group	EPA Plan	Description
Downtown Reach		X	Move some samples into Downtown Reach in fine-grained areas, focused COCs; add 15 SMB samples
Sediment Traps		X	2 traps at two upstream transects at RM 11.8 and RM 16, 3 events, focused COCs, line of evidence for COC migration into site

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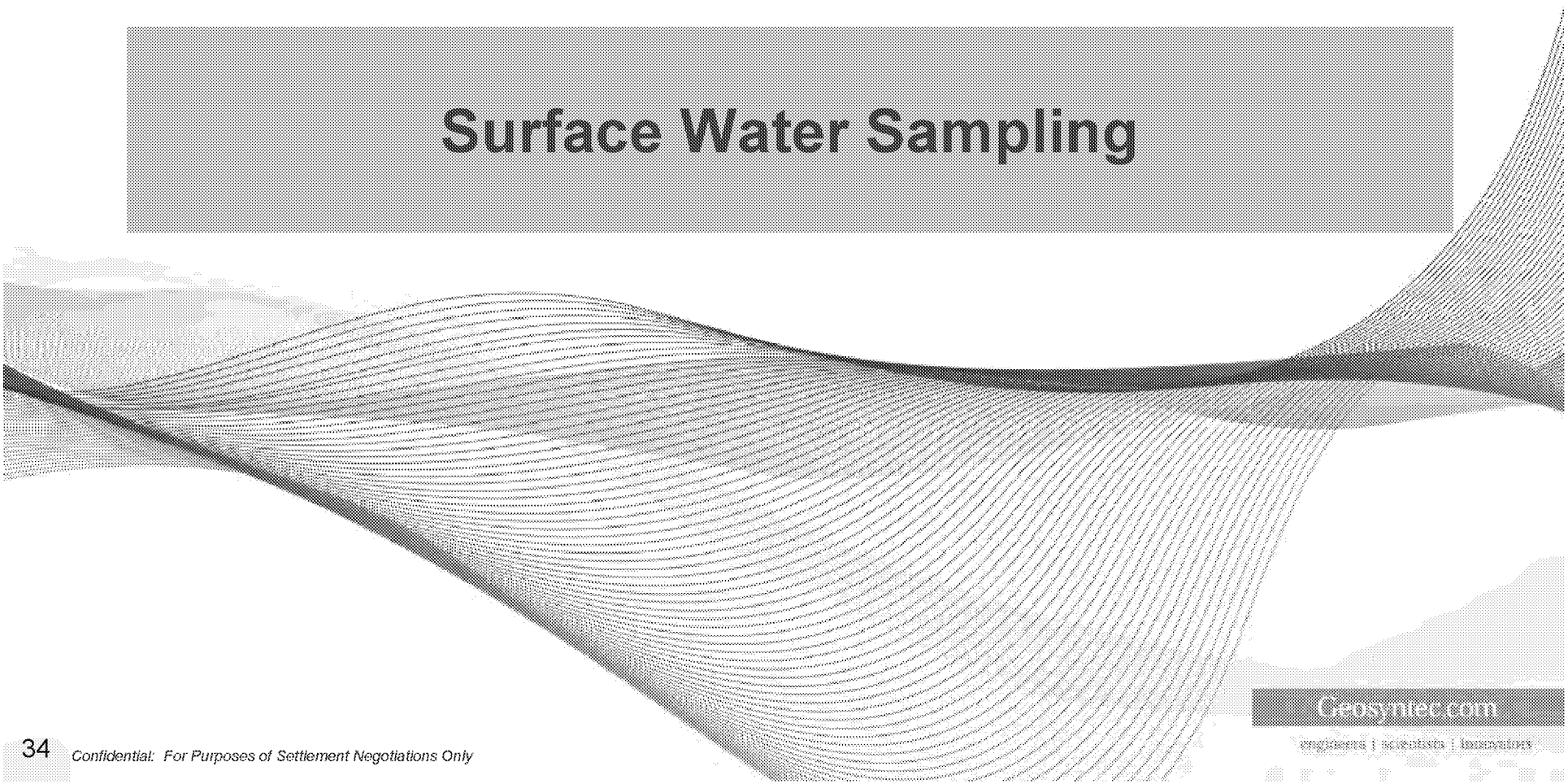
Surface Water Sampling



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Overview: Surface Water Sampling

- The Pre-RD group and EPA are in general alignment on transects, 3 seasonal sampling events, and 3 locations per transect, total and dissolved testing
- Our plan is different, we propose vertical compositing and EPA plan has near-surface and near-bottom samples
- We differ in analyte list and passive sampling methods

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Surface Water Sampling
EPA Plan for Pre-RD Studies

- Background-based surface water cleanup levels not established in the ROD due to the lack of data available; all COCs
- For baseline sampling, use peristaltic pump and XAD high volume samplers at 5 transects near site boundary (RM 1.9, upper Multnomah, 6, 11.8, and 16.5)
  - Each transect will have 3 sample locations: east-channel, mid-channel, and west-channel
  - At each sample location, single-point near bottom samples and single-point near surface samples will be collected
  - Semipermeable membrane device (SPMD) samplers will be deployed at RM 1.9, RM 6 and RM 11.8

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Summary of Surface Water Sampling

Pre-RD Group Proposed Baseline Plan

- 8 transects
  - Add transects within Site, one per river segment, sensitive
  - RM 1.8, Multnomah channel entrance near RM 3, RM 4, RM 7, Swan Island Lagoon, RM 8.8, RM 11.6, and RM 16.2
  - Three vertically-averaged composite samples per transect
- 3 sampling events – high, low, flood
- Focused COCs (PCBs, dioxins/furans, PAHs, DDx)
- Peristaltic pump and PE passive sampling for good detection limits

	Pre-RD Group Plan	EPA Plan	Description
Surface Water Sampling	X	X	8 transects, 3 events, 3 samples per transect, for trend analysis, focused COCs, use passive samplers, discuss DLs/analytes

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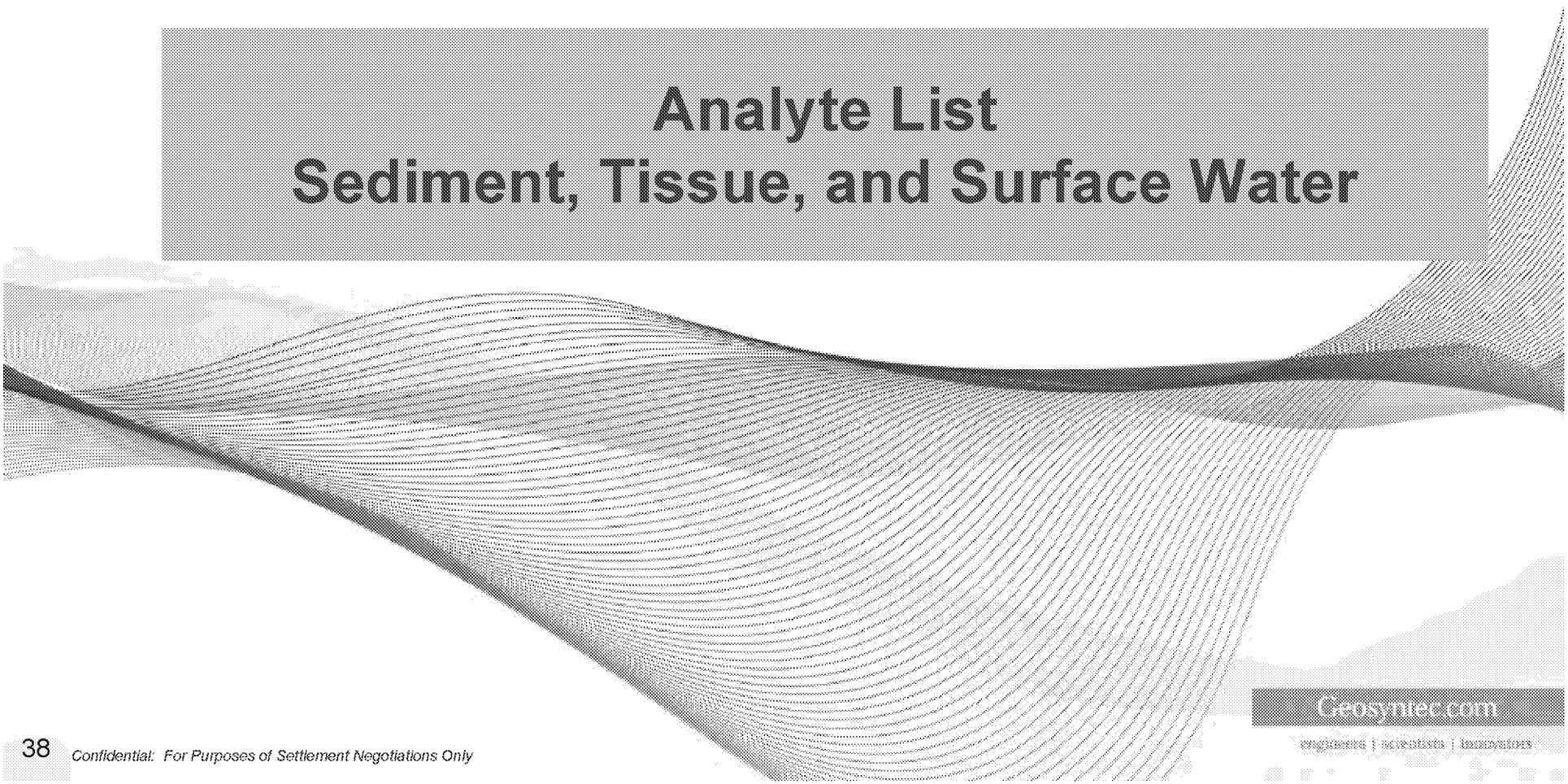
Analyte List
Sediment, Tissue, and Surface Water



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EPA's Analyte Plan

All COCs with Cleanup Levels in the ROD

- Sediment and Sediment Trap all COCs (ROD Table 17)
  - Metals
  - Pesticides
  - PAHs
  - PCBs
  - SVOCs
  - Dioxins/furans
  - TPH
  - TBT
  - TOC
- Surface water COCs (ROD Table 17) using XAD and SPMD
  - Metals
  - Pesticides
  - PAHs
  - PCBs
  - SVOCs
  - Dioxins/furans
  - Plus TOC and DOC at Year 0
- Tissue COCs (ROD Table 17)
  - Metals (Arsenic, Hg)
  - Pesticides
  - PAHs
  - PCBs
  - SVOCs (BEHP, PCP)
  - Dioxins/furans
  - PBDEs

Where we have alignment

Summary/Discussion
Analyte List

- Analysis of only Focused COC list (PCBs, DDx, PAHs, dioxins/furans) in sediment, tissue and surface water will (benefits):
  - Provide data on same COCs for all media, allowing for comparison across media (only 5 COCs have cross-media data)
  - Provide the most applicable and useful data on risk drivers at the Site for RAOs not met at T=0
  - Monitor COCs with site-wide distributions; other COCs best managed with SMA design/monitoring
  - Provide a manageable amount of data for trend analysis and remedial design
- FS Section 2.2.1: "focused COCs are those that the distribution encompasses the majority of the spatial extent of contaminants posing the majority of risk as identified in the baseline risk assessments"

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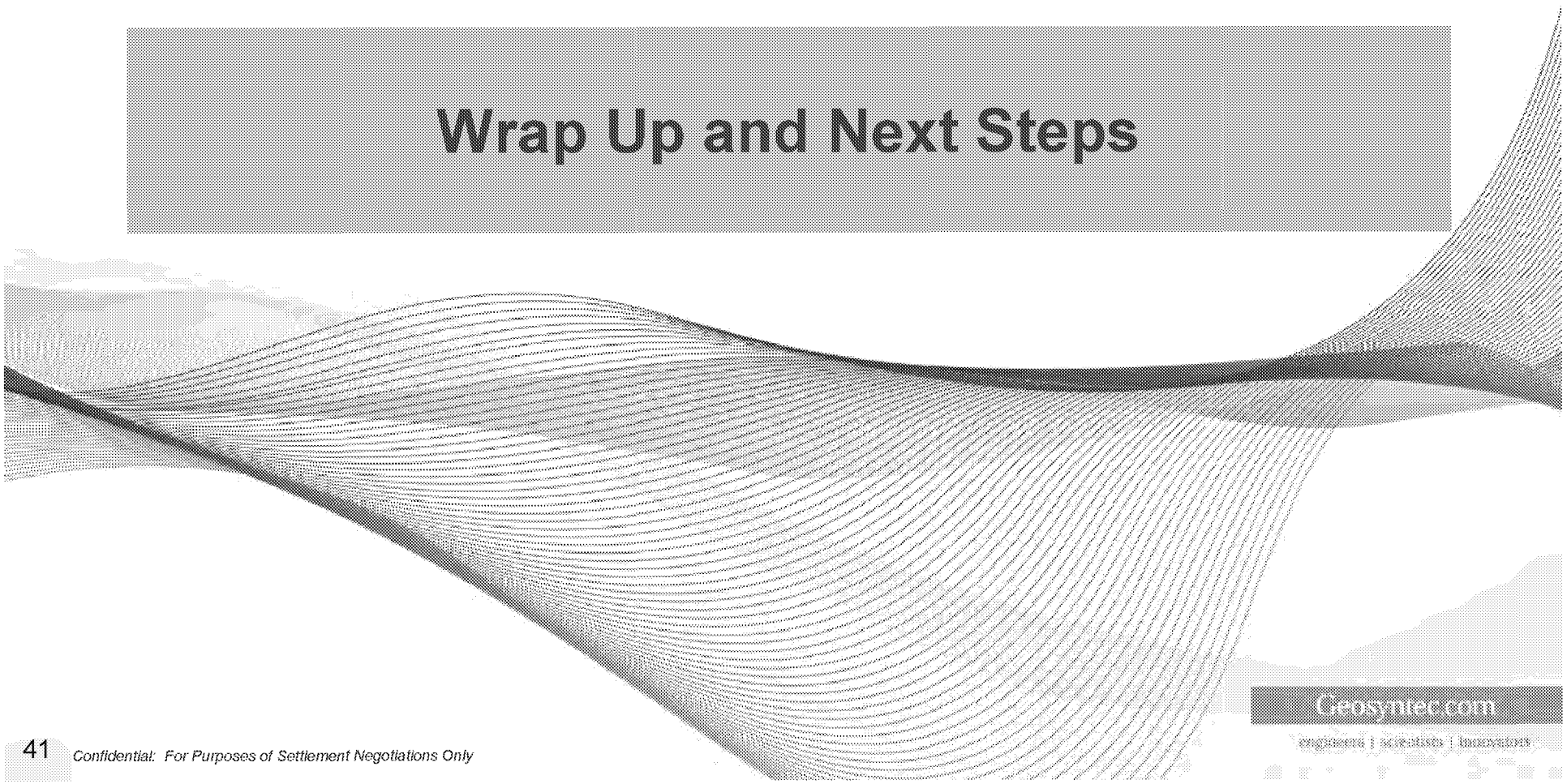
Wrap Up and Next Steps



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Scope Alignment

Revisit and summarize scope items

	Pre-RD Group Plan	EPA Plan	Description	Current Status
Bathymetry	X		Site-wide coverage	
Surface Sediment Sampling	X	X	Adjust to unbiased robust sampling program for 8 segments (~300 samples) plus SMA sampling at 300 ft spacing focused COCs	
Fish Tissue Sampling (SMB)	X	X	SMB tissue sampling for focused COCs for trend analysis; whole body and calculate fillet; add Downtown Reach?	
Other Biota Tissue		X	Not proposed	
Surface Water Sampling	X	X	8 transects, 3 events, 3 samples per transect, for trend analysis, focused COCs, add passive samplers	
Subsurface Sediment Coring	X	X	90 SMA cores to fill data gaps needed for allocation, 2 ft increments, focused COCs, TOC, grain size	
Fish Acoustic Tracking Study	X		See memo, results will inform tissue data analysis and use of SMB to monitor remedy effectiveness	
Camera Survey of Anglers	X		See memo; results could be useful for development of ICs	
PW Sampling Upstream	X		8 stations, metals, help determine PW background for COC metals	
Downtown Reach		X	40 grabs in fine-grained areas, focused COCs, 15 SMB	
Sediment Traps		X	Place 2 traps at two upstream transects at RM 11.8 and RM 16, 3 events, focused COCs, line of evidence for COC migration into site	

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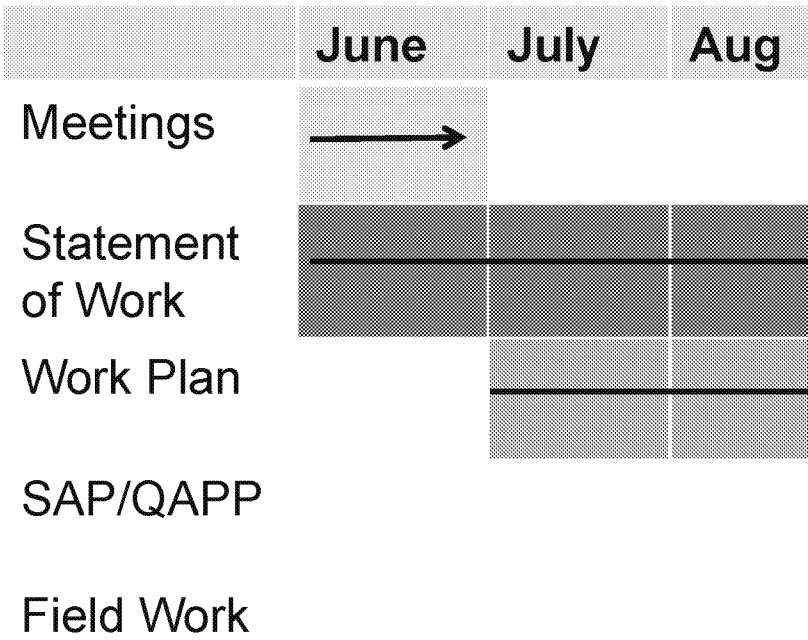
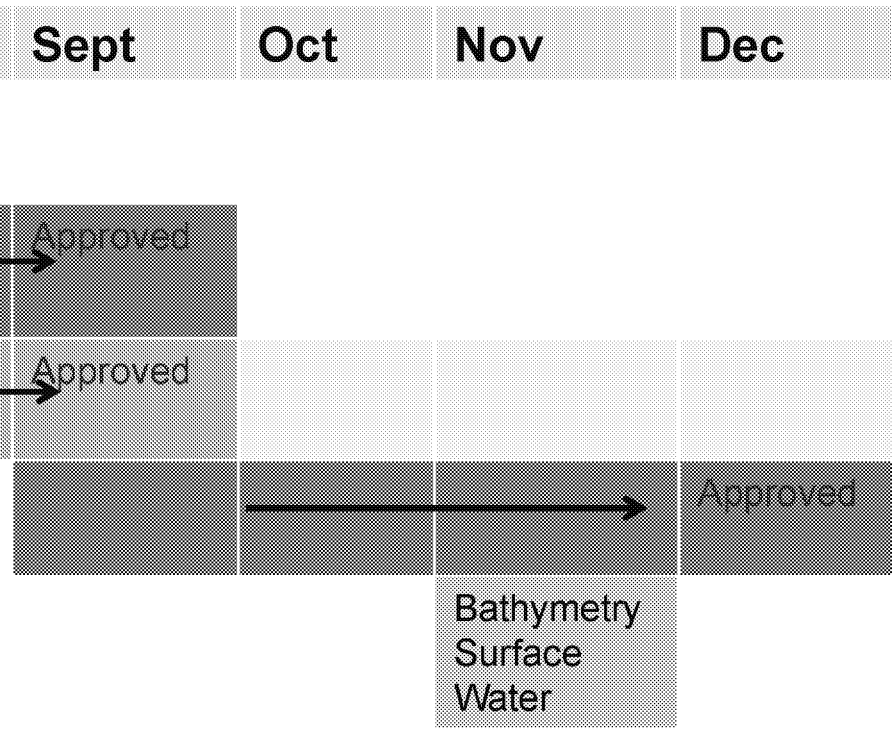


2017 Schedule



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Questions

related to schedule and statement of work

- Work Plan
  - Attached to Statement of Work (SOW)
  - Contents of Work Plan
- QAPP and SAP build upon RI/FS documents, amendments as needed
- Data analysis and evaluation
- Tier II data validation

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AOC Elements

- Focused well-defined tasks and goals
- Timely implementation
- Safeguards to ensure efficiency (e.g., expert panel)
- Support allocation
- Common understanding that we follow the data

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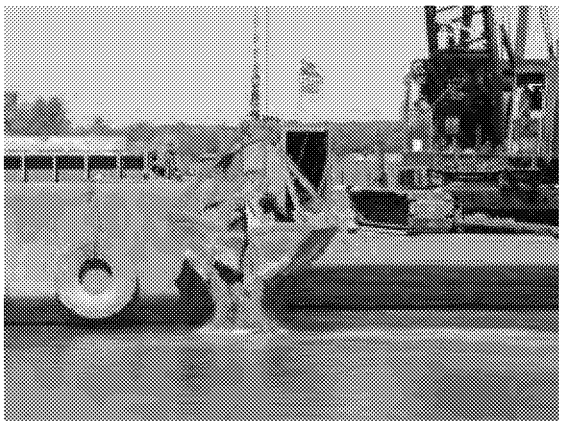
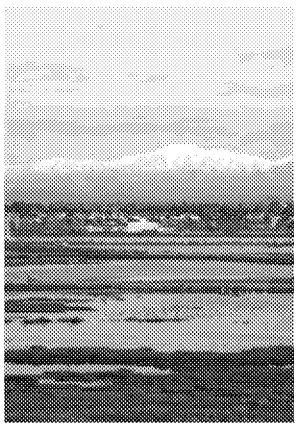
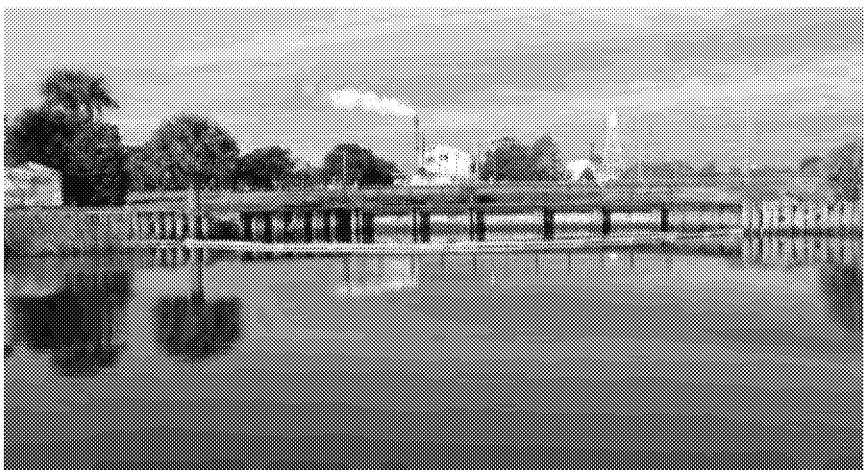
Next Steps

How do we get to September AOC

- Alignment of work items by end of August
  - So, we can write the Work Plan in September
  - Weekly meetings to refine scope
- Schedule meeting to review redline edits of AOC and SOW
- Summary meeting notes of consensus points







BACK-UP SLIDES

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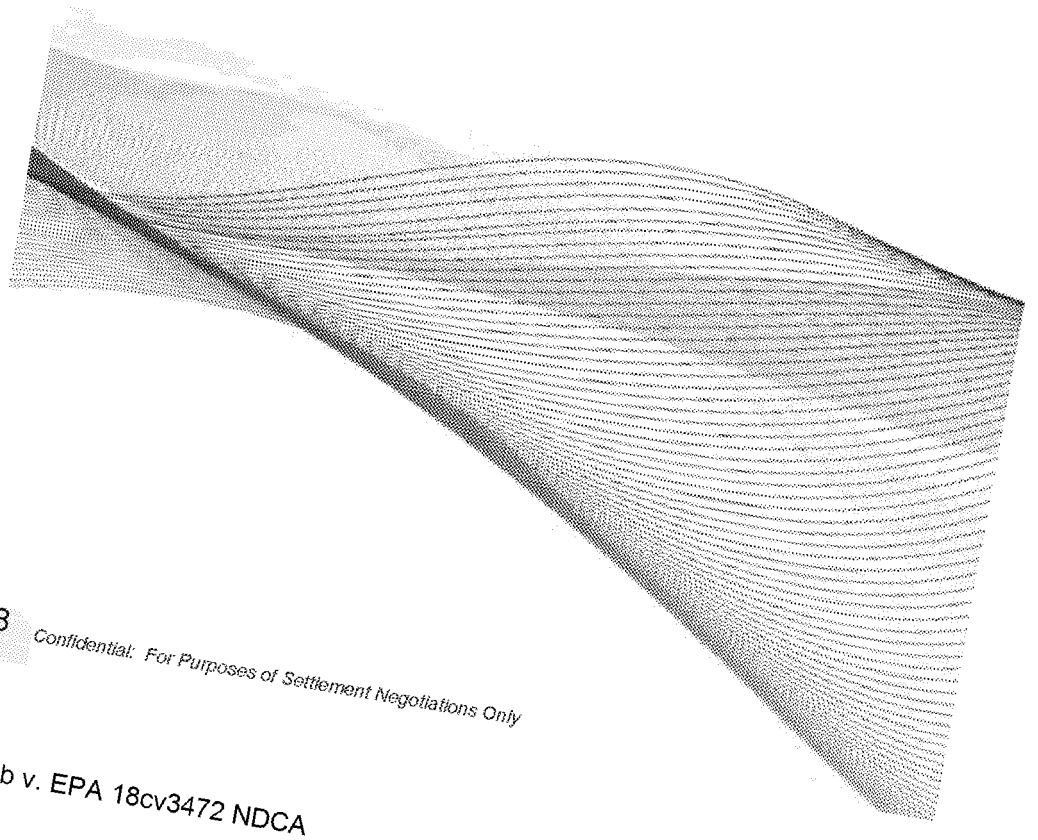
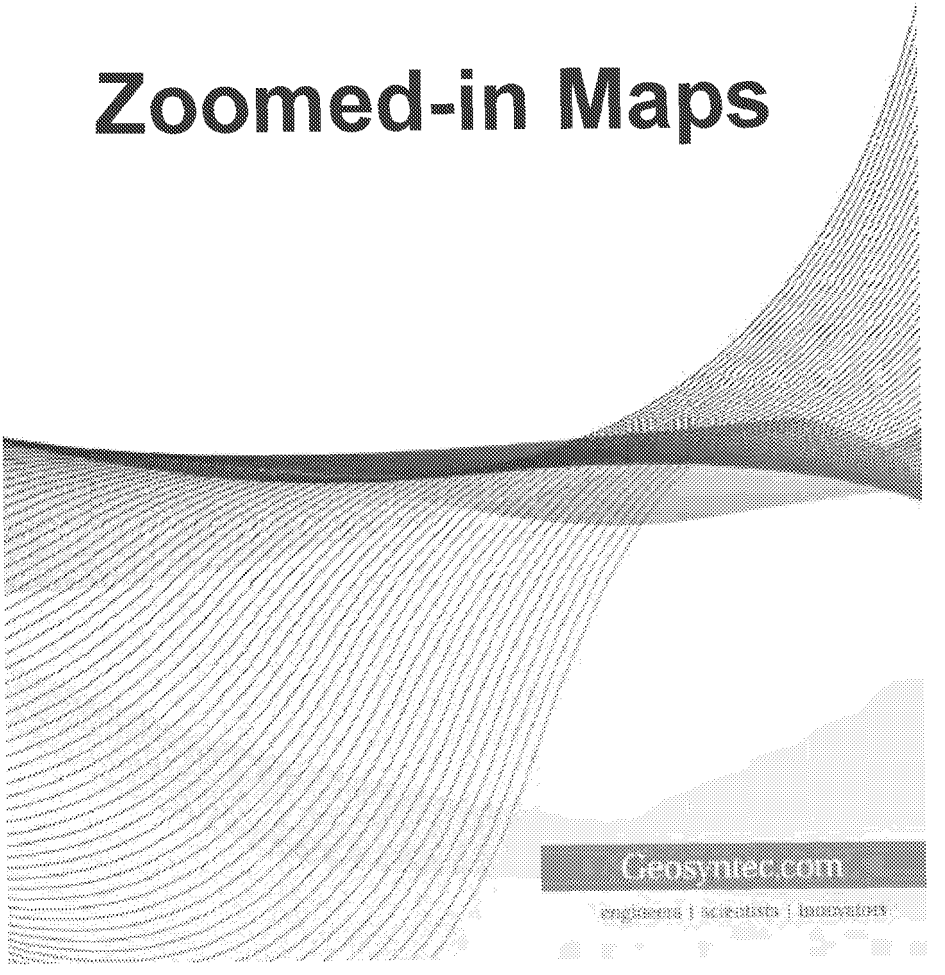


Zoomed-in Maps



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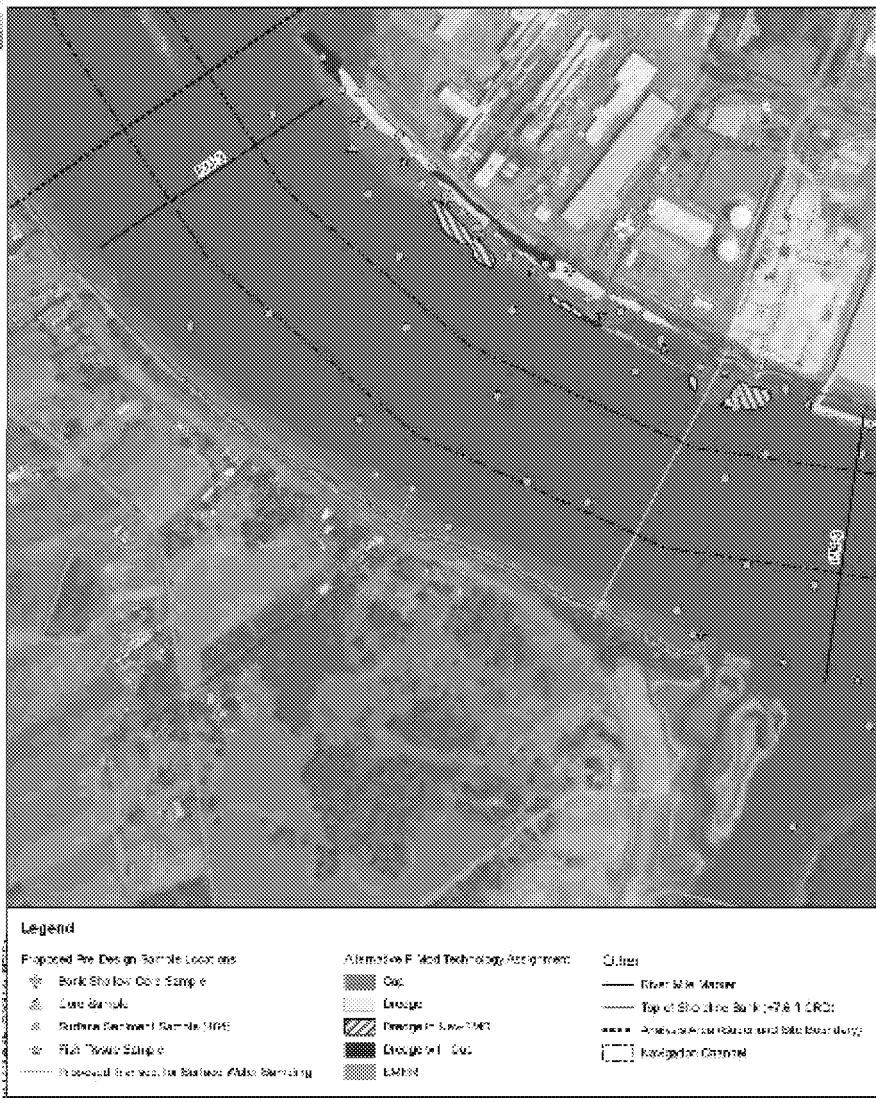
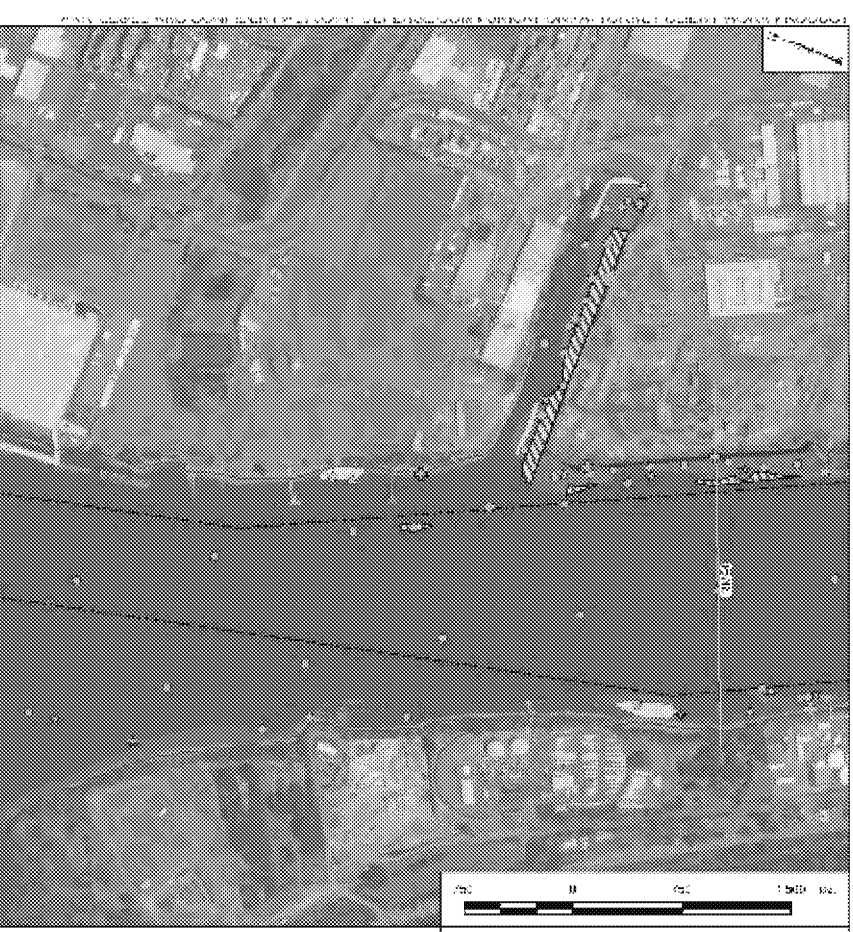


Zoomed In Maps

RM 1.8 to 4



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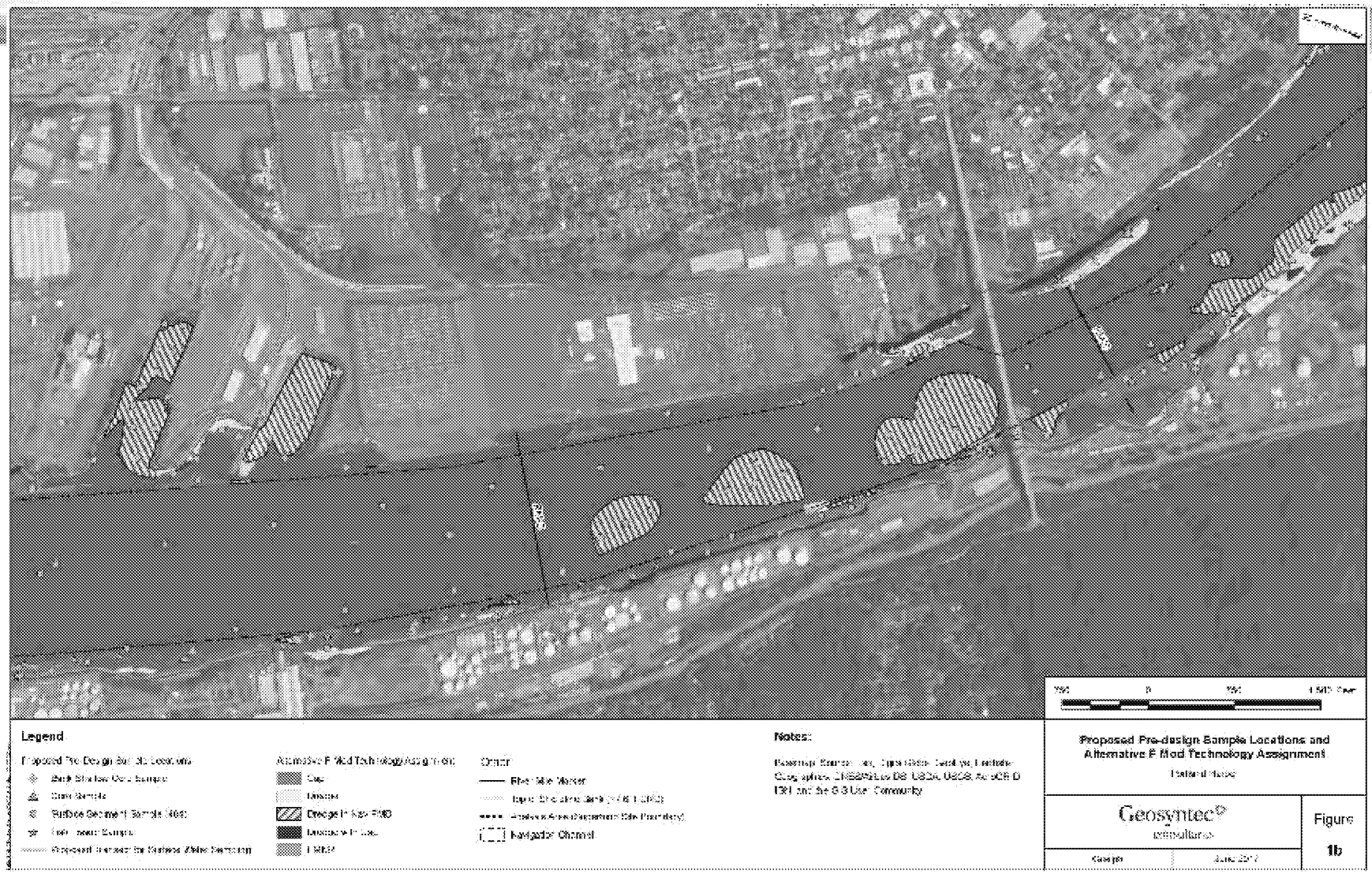
Zoomed In Maps
RM 4 to 6.5



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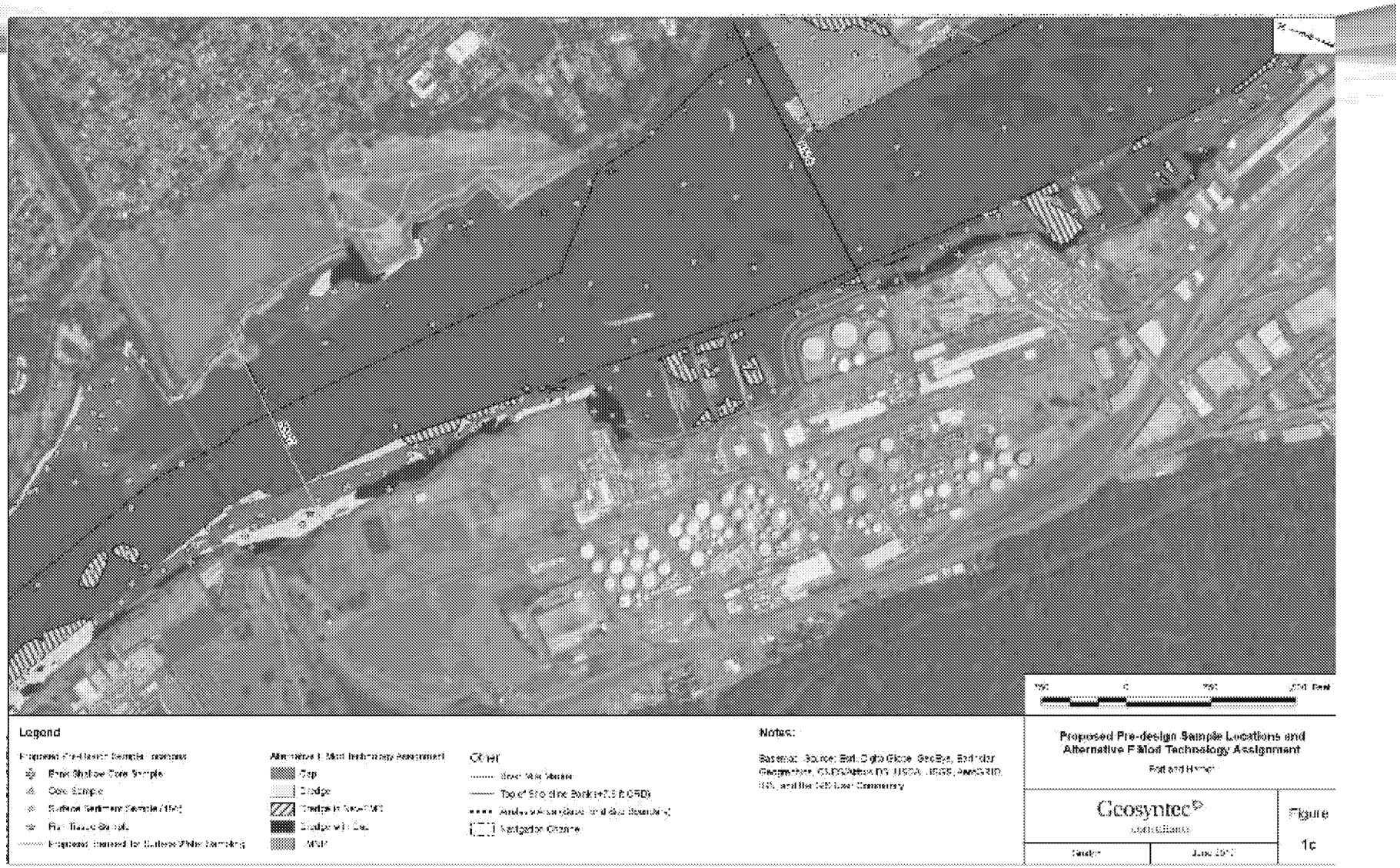
Zoomed In Maps
RM 6.7 to 8.5



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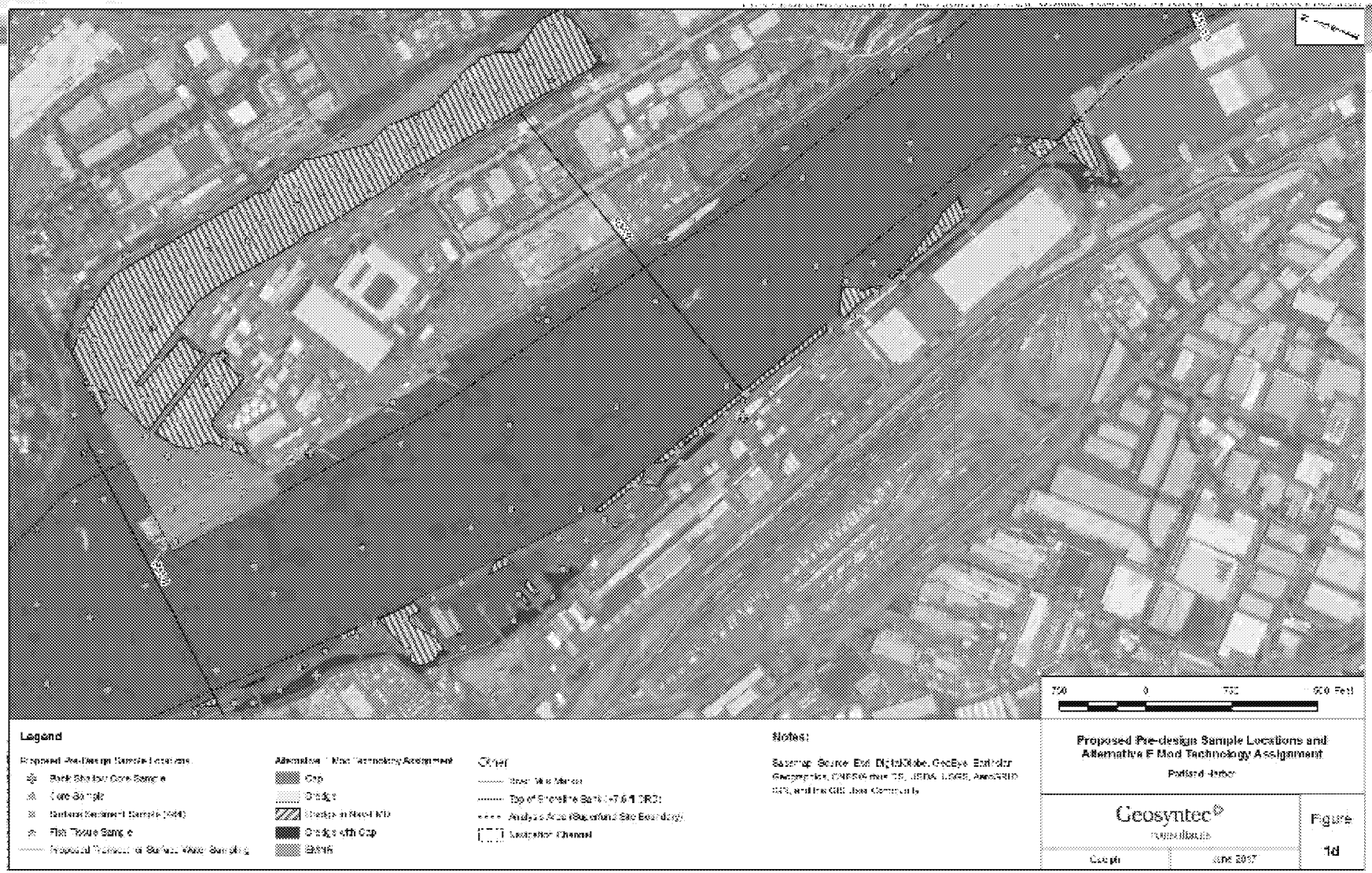
Zoomed In Maps
Swan Island Lagoon



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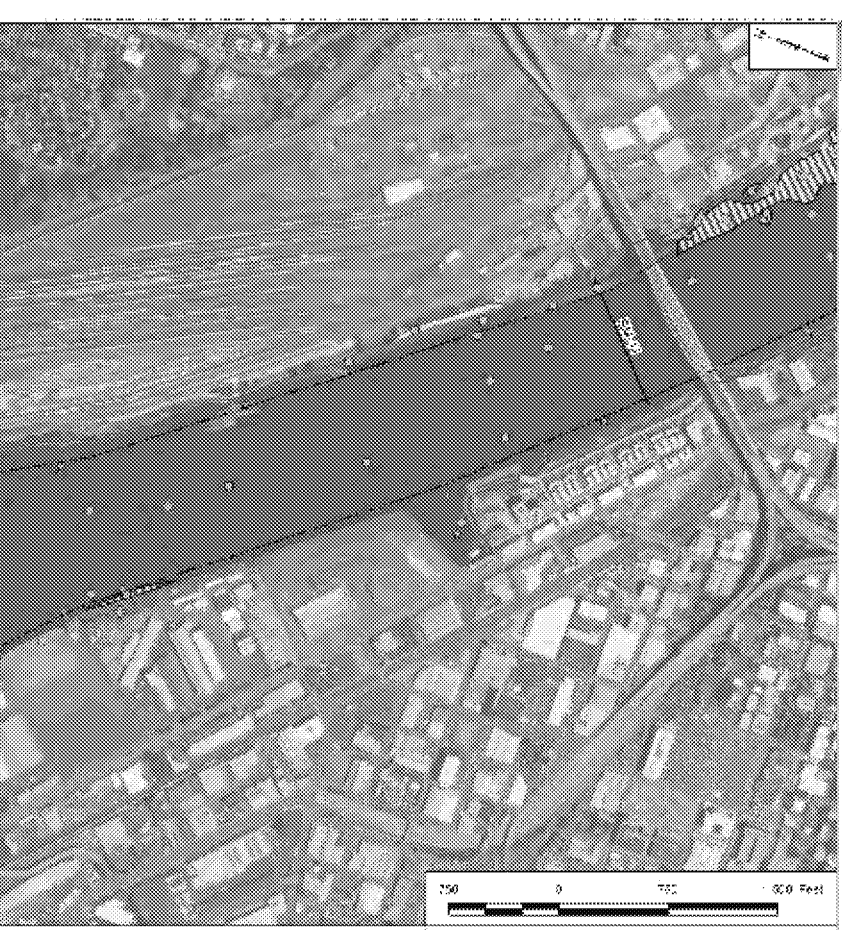
Zoomed In Maps
RM 9 to 11



Notes:

Basemap: Source: Esri, DigitalGlobe, FlexEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Proposed Pre-design Sample Locations and Alternative F Mod Technology Assignment

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Figure 1e

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Zoomed In Maps
RM 10 to 12