



Allied Paper, Inc./Portage Creek/Kalamazoo River

Operable Unit 5, Area 6
Lake Allegan Association
March 21, 2023



Objectives

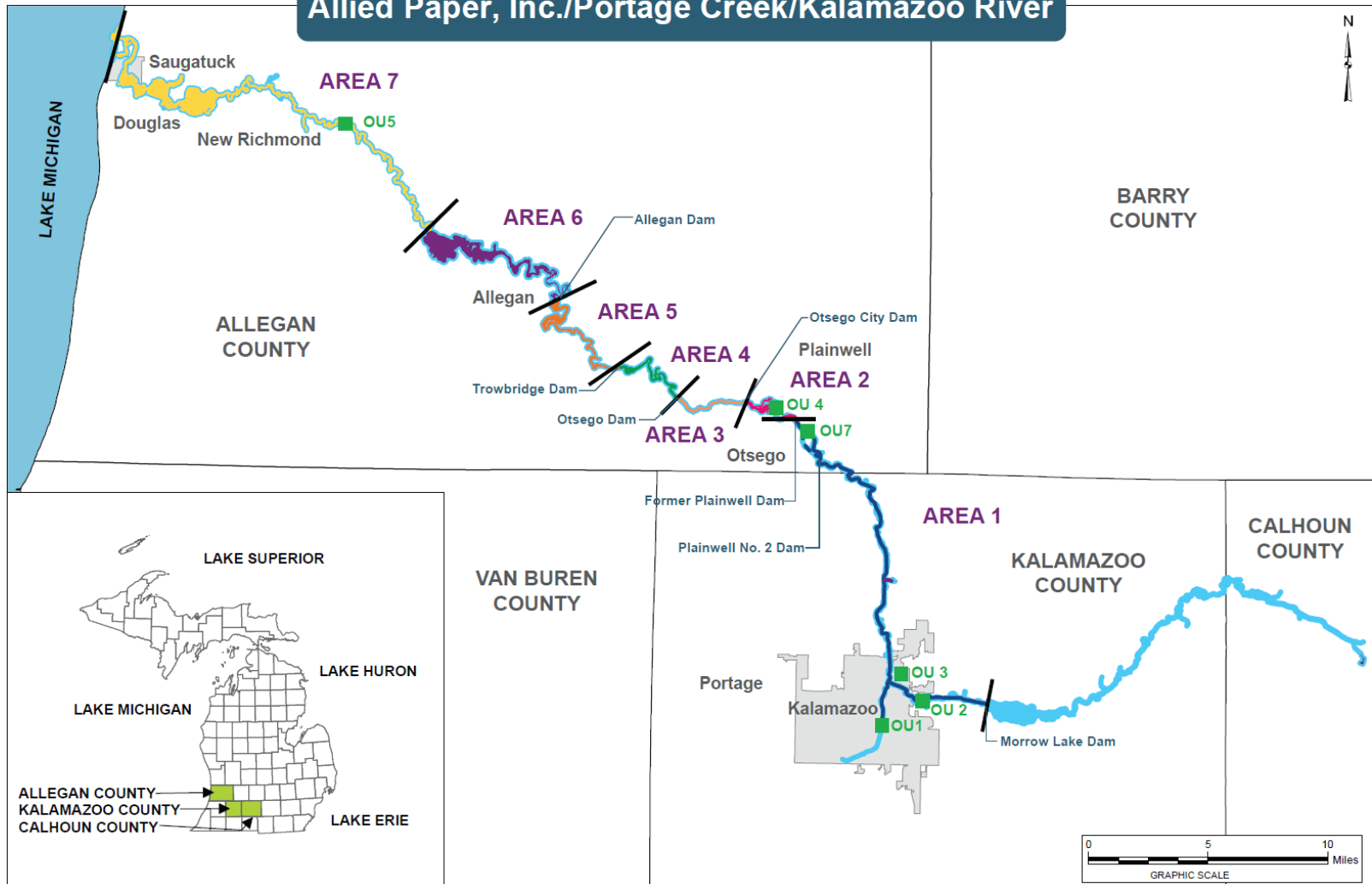


- **Allied Paper, Inc./Portage Creek/Kalamazoo River Site Overview**
- **Operable Unit 5, Area 6 (Lake Allegan) Superfund Investigation**
- **Lake Allegan Carp Investigation**
- **Area 6 Schedule**

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site



Allied Paper, Inc./Portage Creek/Kalamazoo River



Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site



- **Operable Unit 1: Allied Paper Landfill**
- **Operable Unit 2: Willow Boulevard and A-Site Landfill**
- **Operable Unit 3: King Highway Landfill**
- **Operable Unit 4: 12th Street Landfill**
- **Operable Unit 5: Portage Creek and 80 miles of Kalamazoo River**
- **Georgia Pacific/Hawthorn Mill Properties**
- **Operable Unit 7: Plainwell Mill Property**

PCB Sources



Did you know?

- PCBs were used in carbonless copy paper as a carrier for the ink

Carbonless Copy Paper & PCBs

- PCBs released into waste-water during recycling process
- PCBs entered waste stream from 1957-1971



Regulatory History

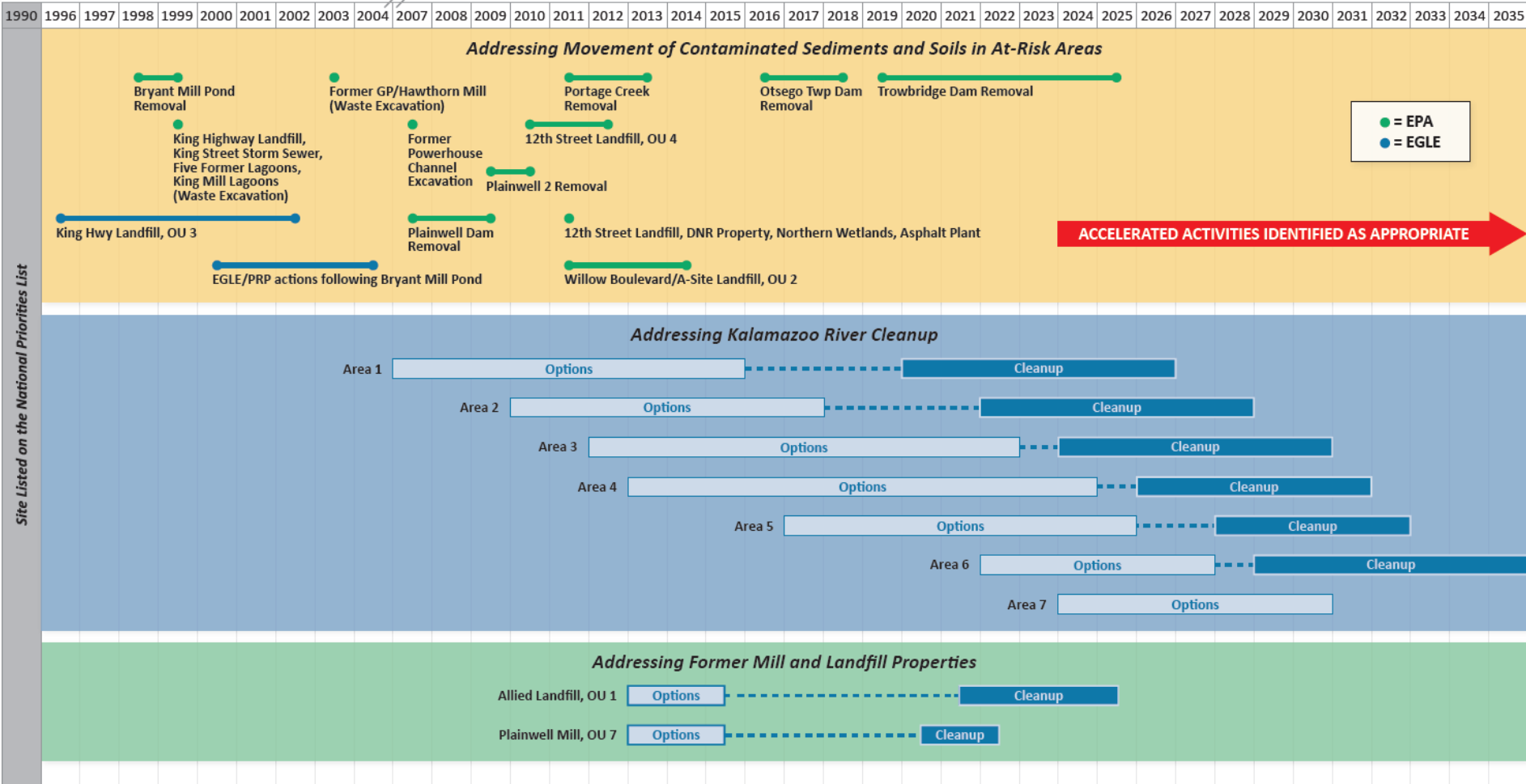


- **August 1990: Site placed on NPL**
 - State of Michigan lead
- **2007: AOC for Supplemental RI/FS for Kalamazoo River Georgia-Pacific and Millennium Holdings**
 - US EPA lead
- **2009: Lyondell/Millennium Holdings bankruptcy Georgia-Pacific conducting all work under AOC (\$50m OU1/\$50m River)**
- **2017: UAO International Paper and GP to conduct RD/RA in Area 1**
- **2020: CD with NCR: Area 4 TCRA, Area 2 RD/RA, possibly Area 3 RD/RA**

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Cleanup Timeline



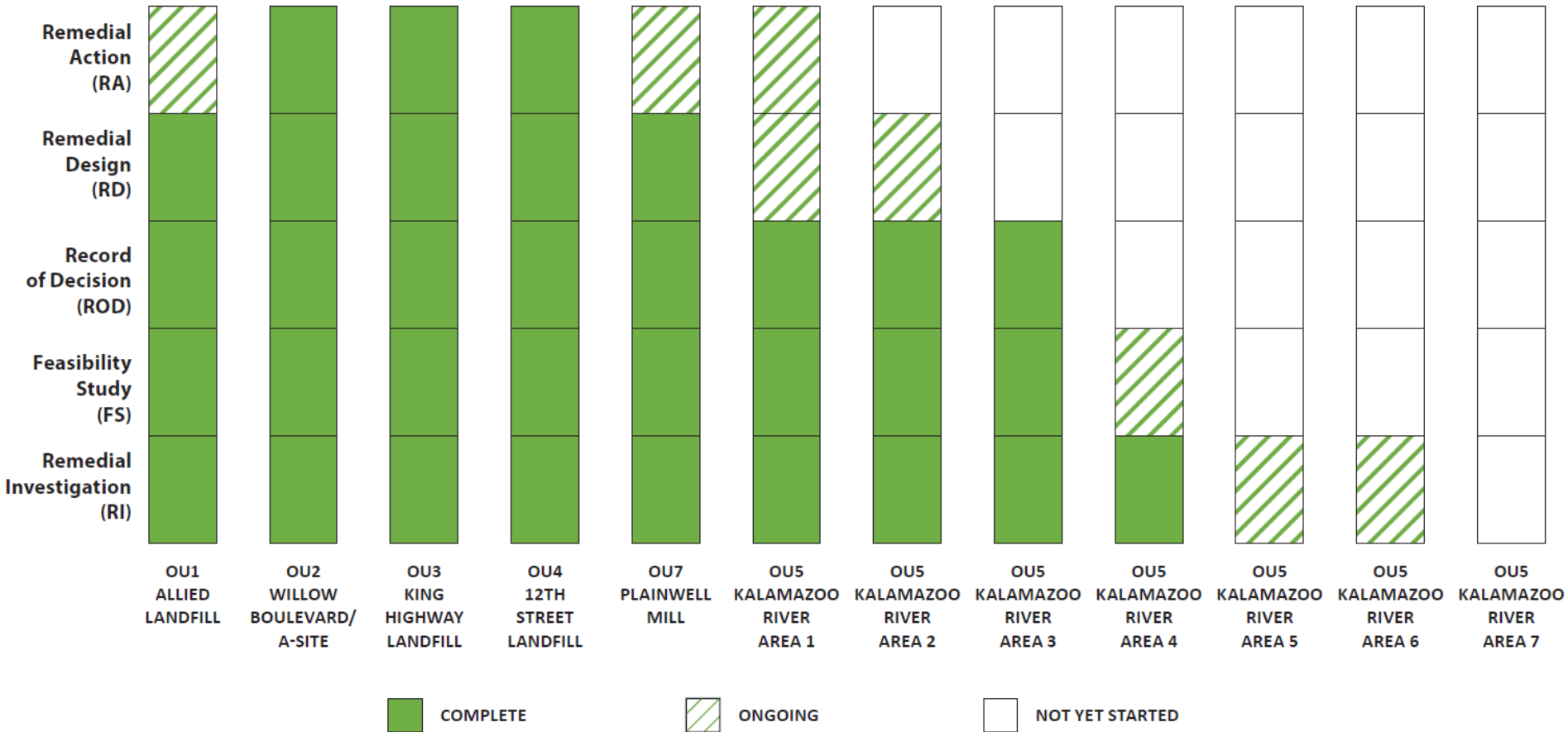
Allied Paper/Portage Creek/Kalamazoo River Site Cleanup Timeline



Operable Unit 5 (Kalamazoo River) Site Progress



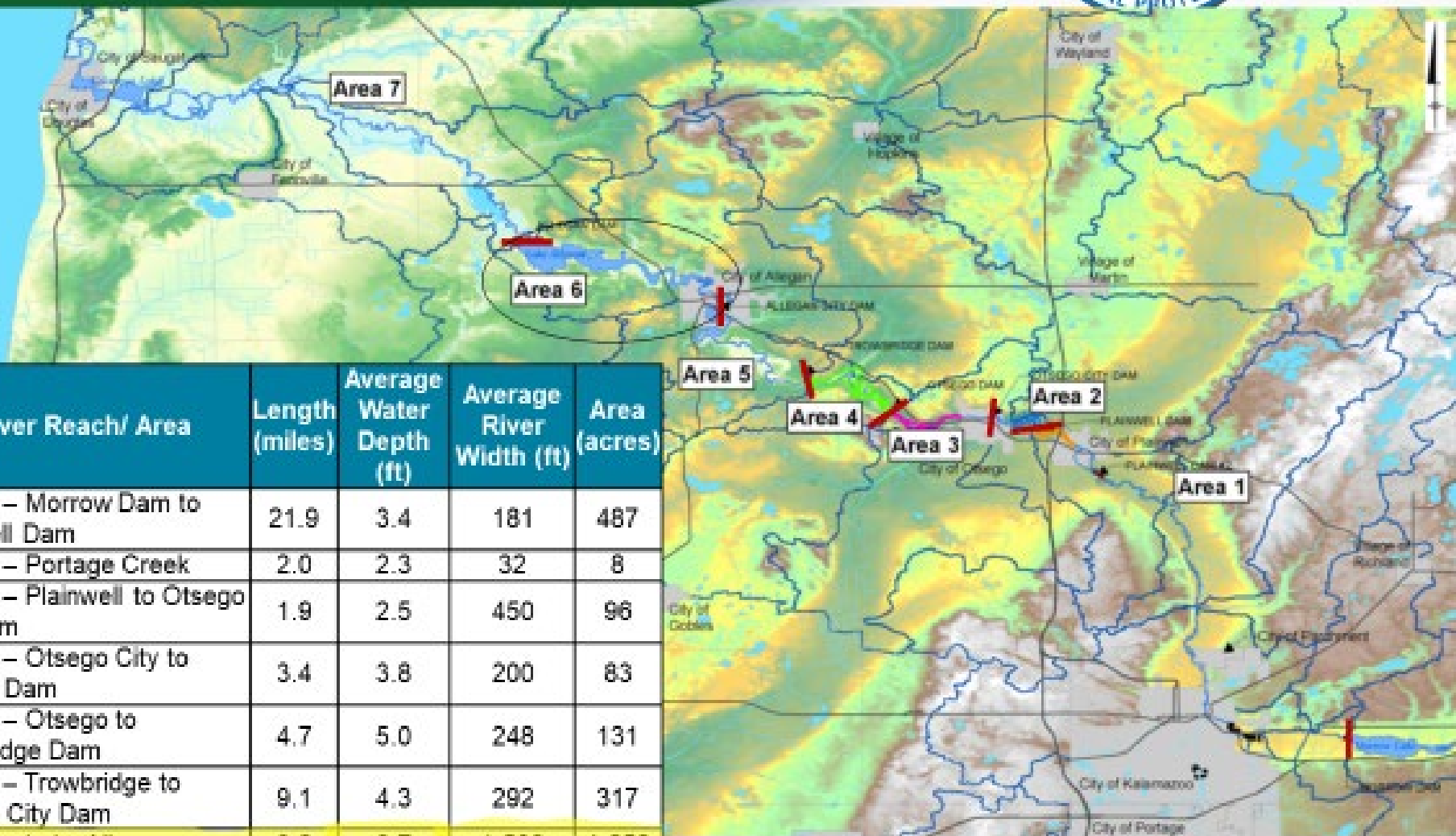
Allied Paper/Portage Creek/Kalamazoo River Site Cleanup Status Chart



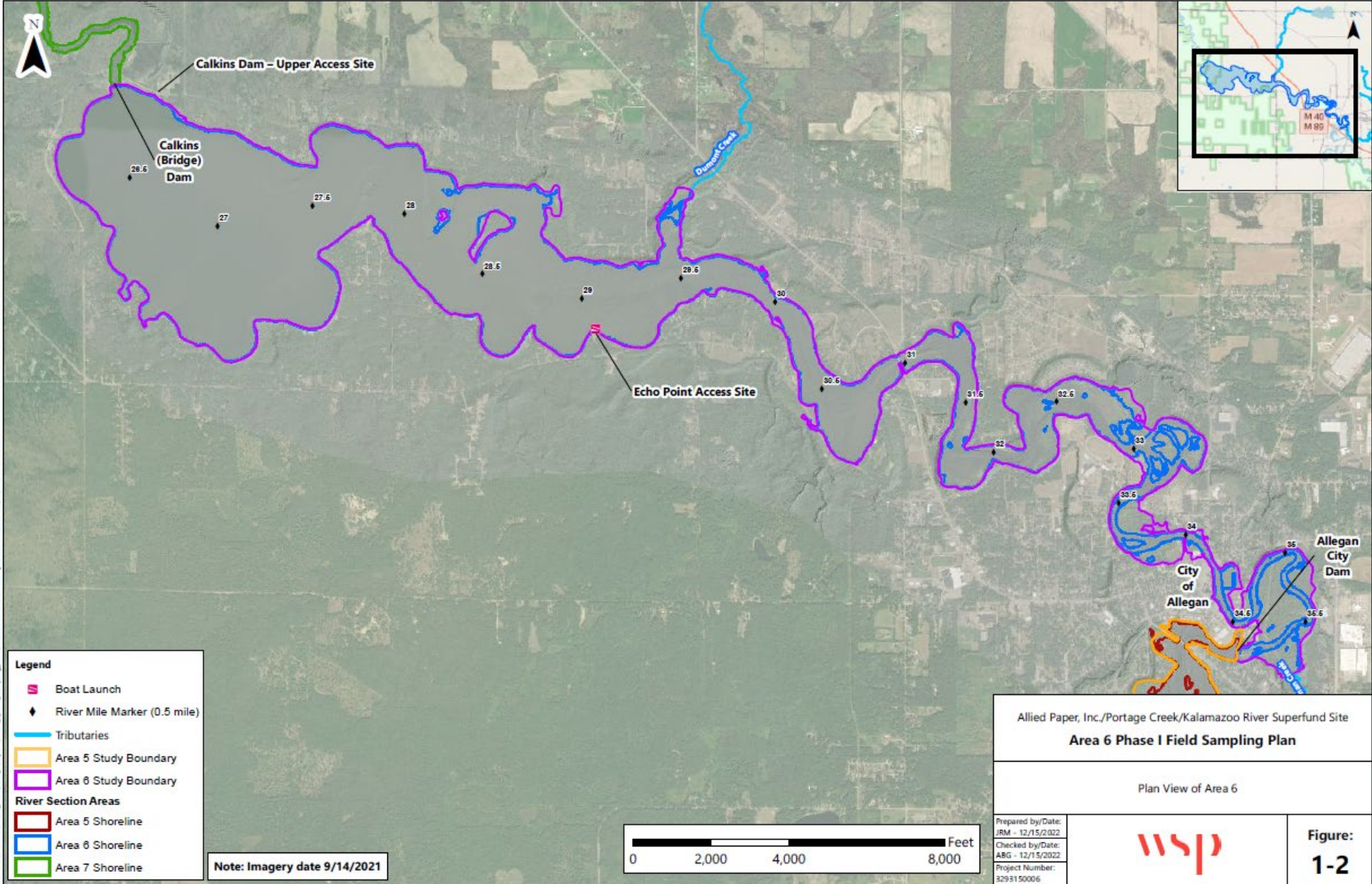


Operable Unit 5 Area 6 Lake Allegan

Area 6



River Reach/ Area	Length (miles)	Average Water Depth (ft)	Average River Width (ft)	Area (acres)
Area 1 – Morrow Dam to Plainwell Dam	21.9	3.4	181	487
Area 1 – Portage Creek	2.0	2.3	32	8
Area 2 – Plainwell to Otsego City Dam	1.9	2.5	450	96
Area 3 – Otsego City to Otsego Dam	3.4	3.8	200	83
Area 4 – Otsego to Trowbridge Dam	4.7	5.0	248	131
Area 5 – Trowbridge to Allegan City Dam	9.1	4.3	292	317
Area 6 – Lake Allegan	9.8	6.7	1,500	1,650
Area 7 – Allegan Dam to Lake Michigan	26	5.5	212	670



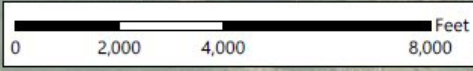
Legend

- Boat Launch
- River Mile Marker (0.5 mile)
- Tributaries
- Area 5 Study Boundary
- Area 6 Study Boundary

River Section Areas

- Area 5 Shoreline
- Area 6 Shoreline
- Area 7 Shoreline

Note: Imagery date 9/14/2021



Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Area 6 Phase I Field Sampling Plan	
Plan View of Area 6	
Prepared by/Date: JRM - 12/15/2022 Checked by/Date: ABG - 12/15/2022 Project Number: 32931 50006	
Figure: 1-2	

Area 6

Remedial Investigation



- **Historical sediment PCB sampling 1993/1994, 1999, 2000, and 2009. (819 samples)**
- **Pre-SRI sediment PCB sampling and analysis occurred in 2018 and 2020. (760 samples)**
- **Reconnaissance Sampling 2022**
- **Phase 1 SRI Sampling 2023**
- **Phase 2 SRI Sampling 2024**
- **2018-2024: Carp removal; and water quality and vegetation sampling and monitoring**

Table 3-1

Population Statistics of Total PCB Concentrations for Recon Sediment
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

	Interval ¹	Sample Count	Minimum ² (mg/kg)	Maximum ² (mg/kg)	Median ³ (mg/kg)	Mean ⁴ (mg/kg)	Standard Deviation ⁴ (mg/kg)
Riverine Zone (27 locations)	1	25	0.03	7.30	0.059	0.39	1.44
	2	26	0.02	32.50	0.038	1.35	6.35
	3	26	0.02	24.00	0.030	1.42	5.09
	4	26	0.02	4.80	0.030	0.26	0.93
	5	23	0.02	0.62	0.031	0.10	0.17
	6	3	0.19	0.50	0.45	NA	NA
	7	3	0.11	0.56	0.38	NA	NA
	8	2	0.43	11.90	6.17	NA	NA
	9	2	0.23	8.60	4.42	NA	NA
	10	1	0.03	0.03	NA	NA	NA
	11	1	0.03	0.03	NA	NA	NA
	12	1	0.03	0.03	NA	NA	NA
	All Intervals	139	0.02	32.50	0.03	0.82	3.77
Transition Zone (40 locations)	1	40	0.0265	0.72	0.28	0.29	0.25
	2	40	0.023	4	0.25	0.48	0.78
	3	40	0.02	20.4	0.24	1.14	3.46
	4	40	0.0285	19.1	0.046	1.54	3.71
	5	40	0.028	17.3	0.065	1.08	3.04
	6	12	0.049	32.9	0.32	6.78	12.07
	7	12	0.0295	12.1	0.09	2.18	3.99
	8	4	0.0415	0.39	0.195	NA	NA
	9	4	0.027	0.098	0.03475	NA	NA
	10	0	NA	NA	NA	NA	NA
	11	0	NA	NA	NA	NA	NA
	12	0	NA	NA	NA	NA	NA
	All Intervals	232	0.02	32.9	0.115	1.25	3.96
Lacustrine Zone (73 locations)	1	73	0.021	1.8	0.41	0.38	0.26
	2	73	0.02	1.8	0.53	0.49	0.32
	3	73	0.027	10.7	0.74	1.51	2.50
	4	71	0.0285	15.9	0.17	1.50	2.72
	5	70	0.0285	17.7	0.066	2.38	4.38
	6	27	0.023	16.1	2.1	3.78	4.82
	7	27	0.029	18.9	0.037	1.43	3.96
	8	6	0.0345	10	0.04275	NA	NA
	9	5	0.028	0.32	0.055	NA	NA
	10	0	NA	NA	NA	NA	NA
	11	0	NA	NA	NA	NA	NA
	12	0	NA	NA	NA	NA	NA
	All Intervals	425	0.02	18.9	0.41	1.41	2.98

Prepared by: SCA 10/24/22

Checked by: JHG 01/05/23

Notes:

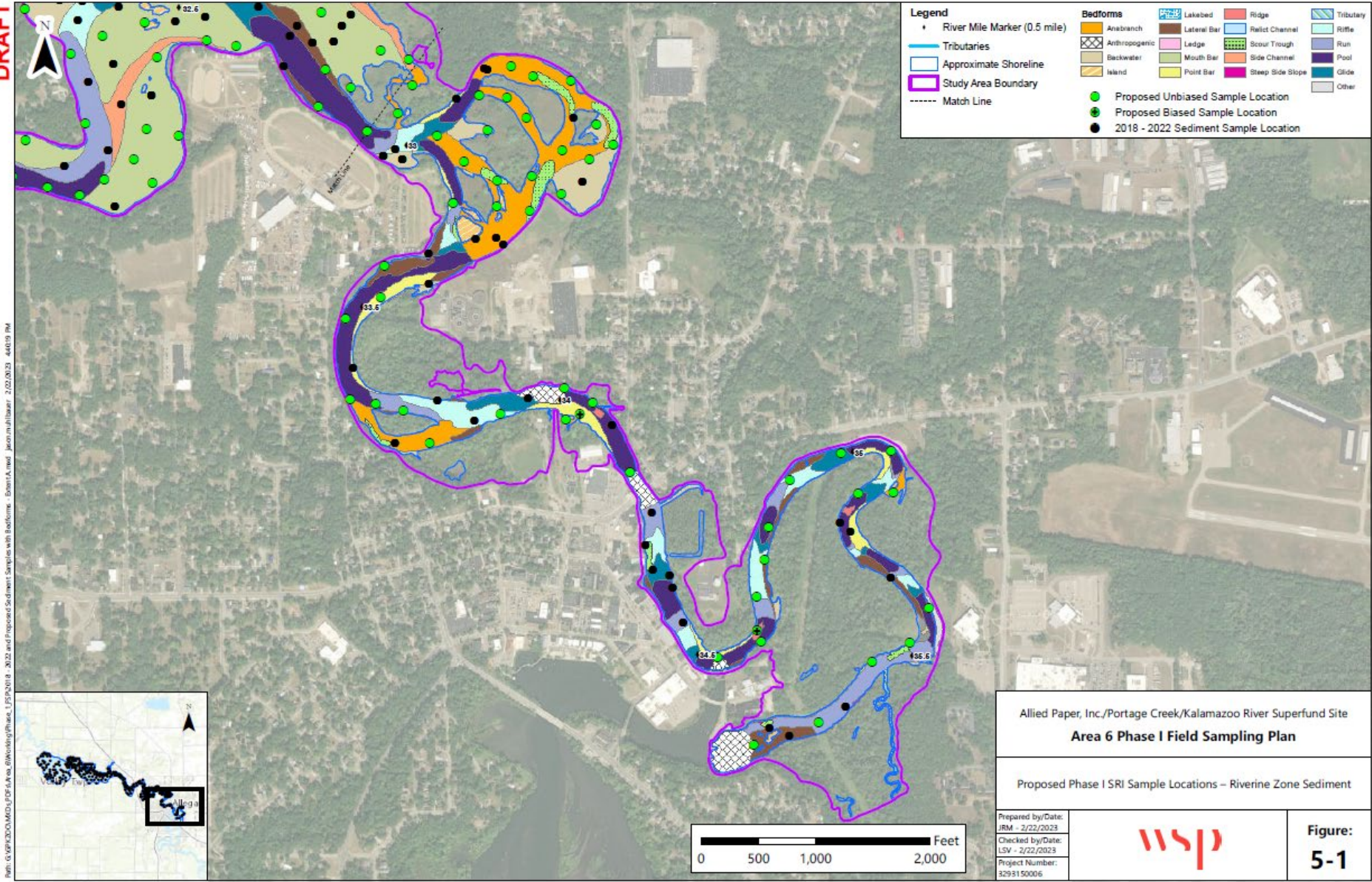
PCB - polychlorinated biphenyl

IPWC - interval participation weighted concentration

mg/kg - milligrams per kilogram

NA - no/not enough data available to obtain statistics

1. Sample depth intervals for IPWCs are defined as follows:



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Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Area 6 Phase I Field Sampling Plan

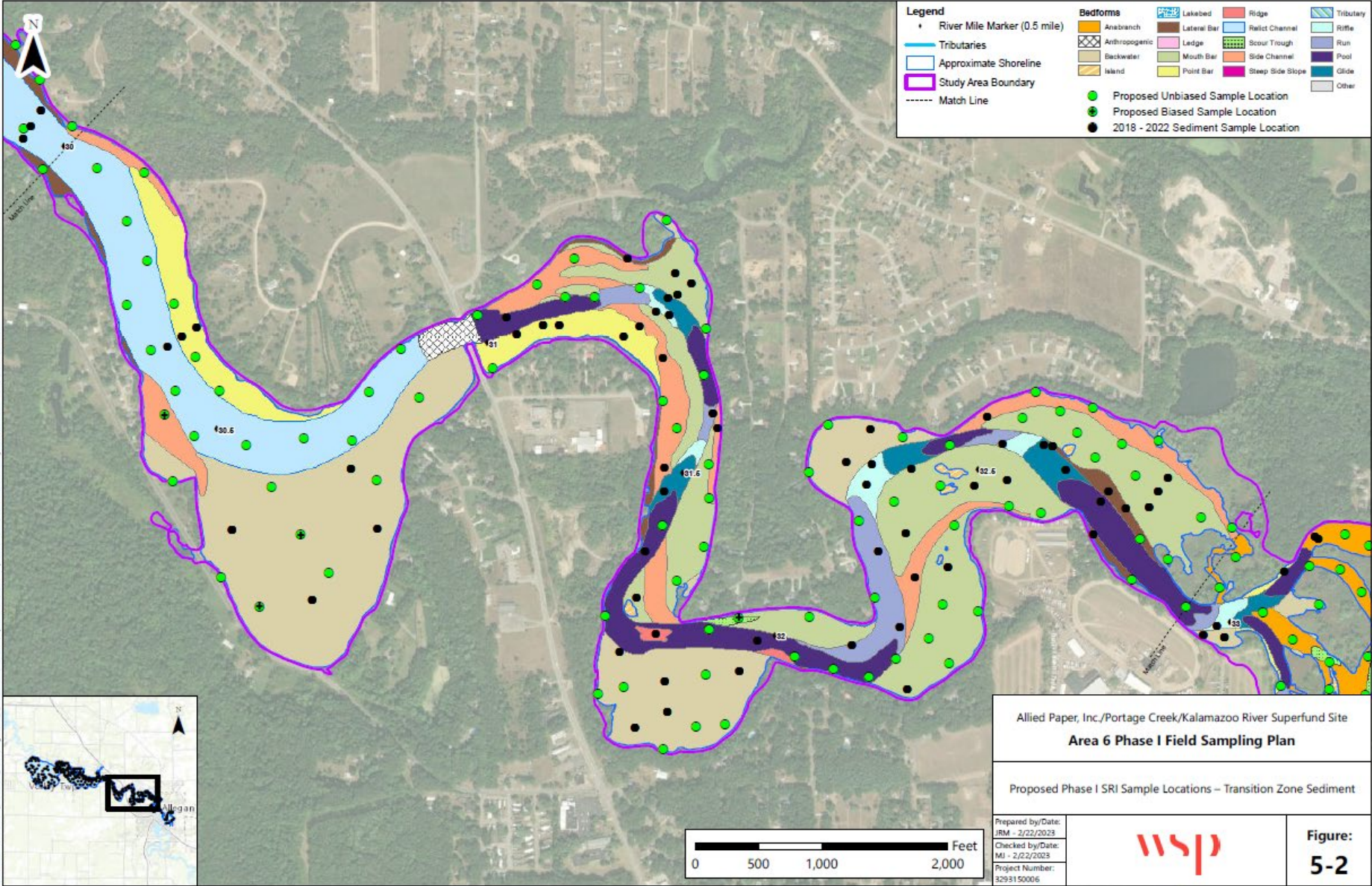
Proposed Phase I SRI Sample Locations – Riverine Zone Sediment

Prepared by/Date:
 JRM - 2/22/2023
 Checked by/Date:
 LSV - 2/22/2023
 Project Number:
 3293150006



Figure:
5-1

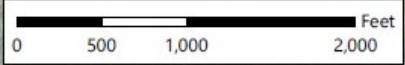
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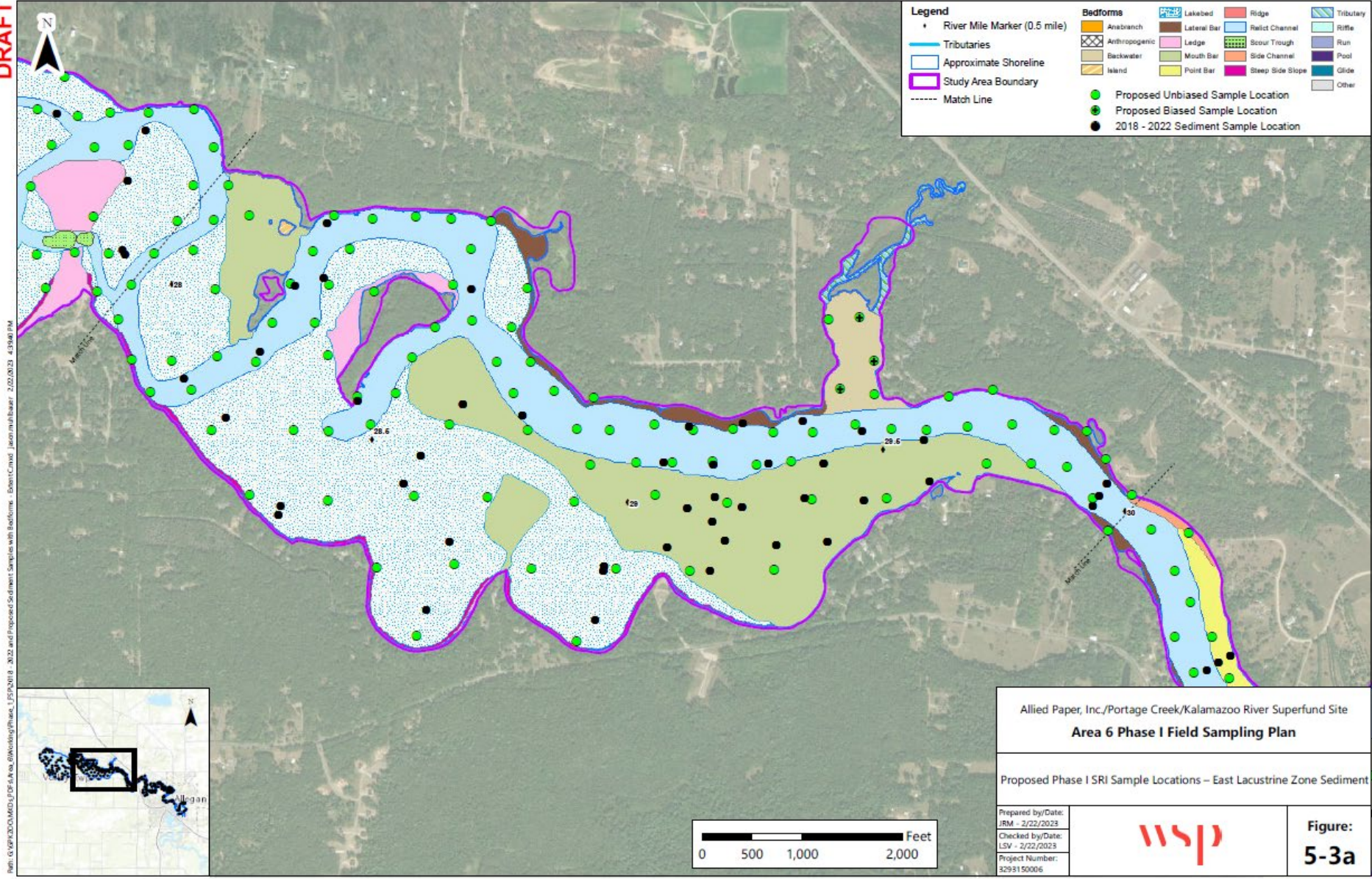
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Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Area 6 Phase I Field Sampling Plan
 Proposed Phase I SRI Sample Locations – Transition Zone Sediment

Prepared by/Date:
JRM - 2/22/2023
 Checked by/Date:
MJ - 2/22/2023
 Project Number:
3293150006



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Path: G:\PROJECTS\Kalamazoo River Superfund Site\Phase I\Area 6\Working\Phase I_SRI\2018 - 2022 and Proposed Sediment Samples with Bedforms - Export\Caid Jason.mxd Date: 2/22/2023 4:39:04 PM

Legend

- River Mile Marker (0.5 mile)
- Tributaries
- Approximate Shoreline
- Study Area Boundary
- Match Line

Bedforms

- Anabranch
- Anthropogenic
- Backwater
- Island
- Lakebed
- Lateral Bar
- Ledge
- Mouth Bar
- Point Bar
- Ridge
- Relict Channel
- Scour Trough
- Side Channel
- Steep Side Slope
- Tributary
- Riffle
- Run
- Pool
- Glide
- Other

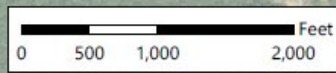
- Proposed Unbiased Sample Location
- Proposed Biased Sample Location
- 2018 - 2022 Sediment Sample Location

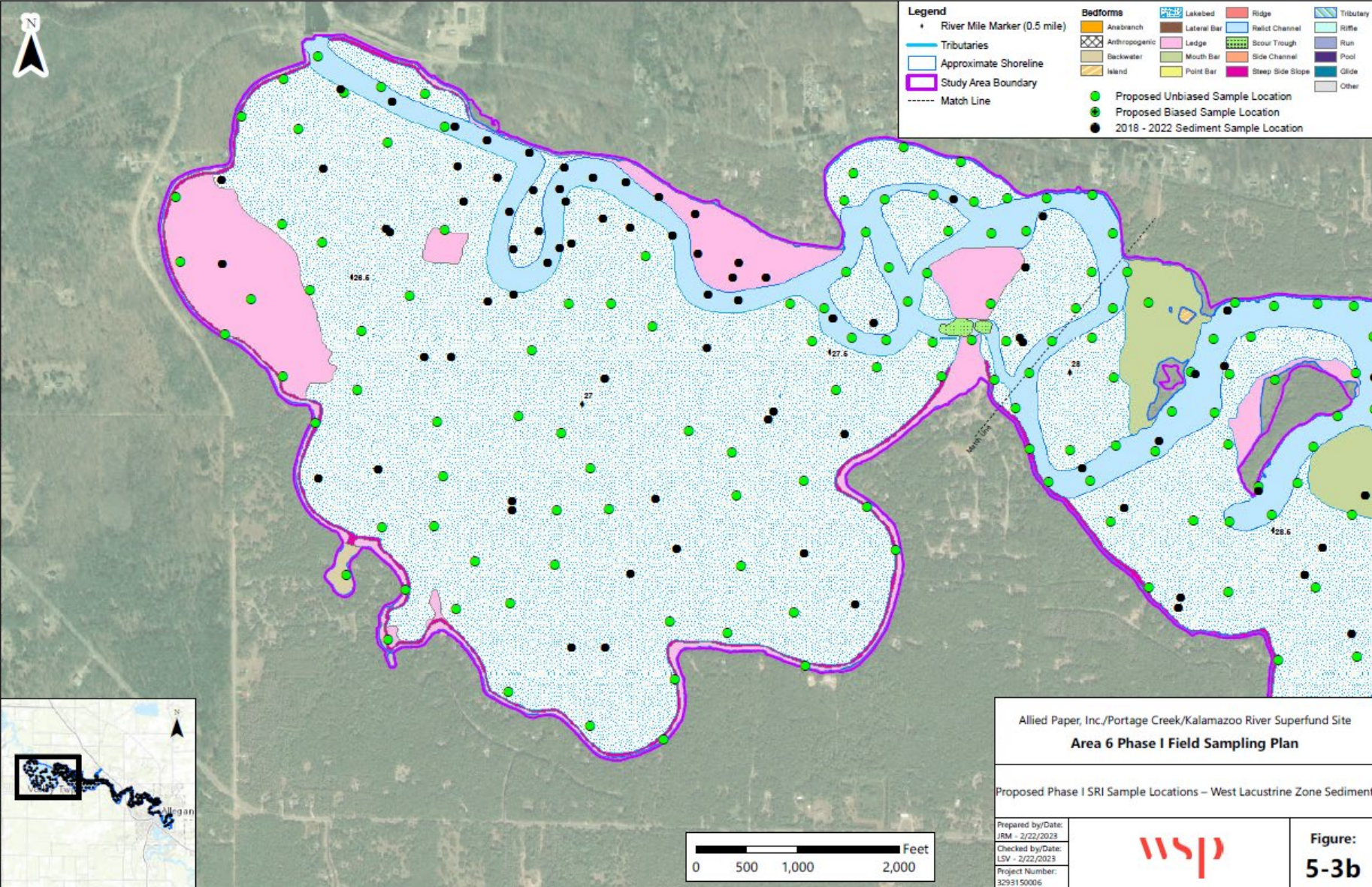


Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Area 6 Phase I Field Sampling Plan


Proposed Phase I SRI Sample Locations – East Lacustrine Zone Sediment

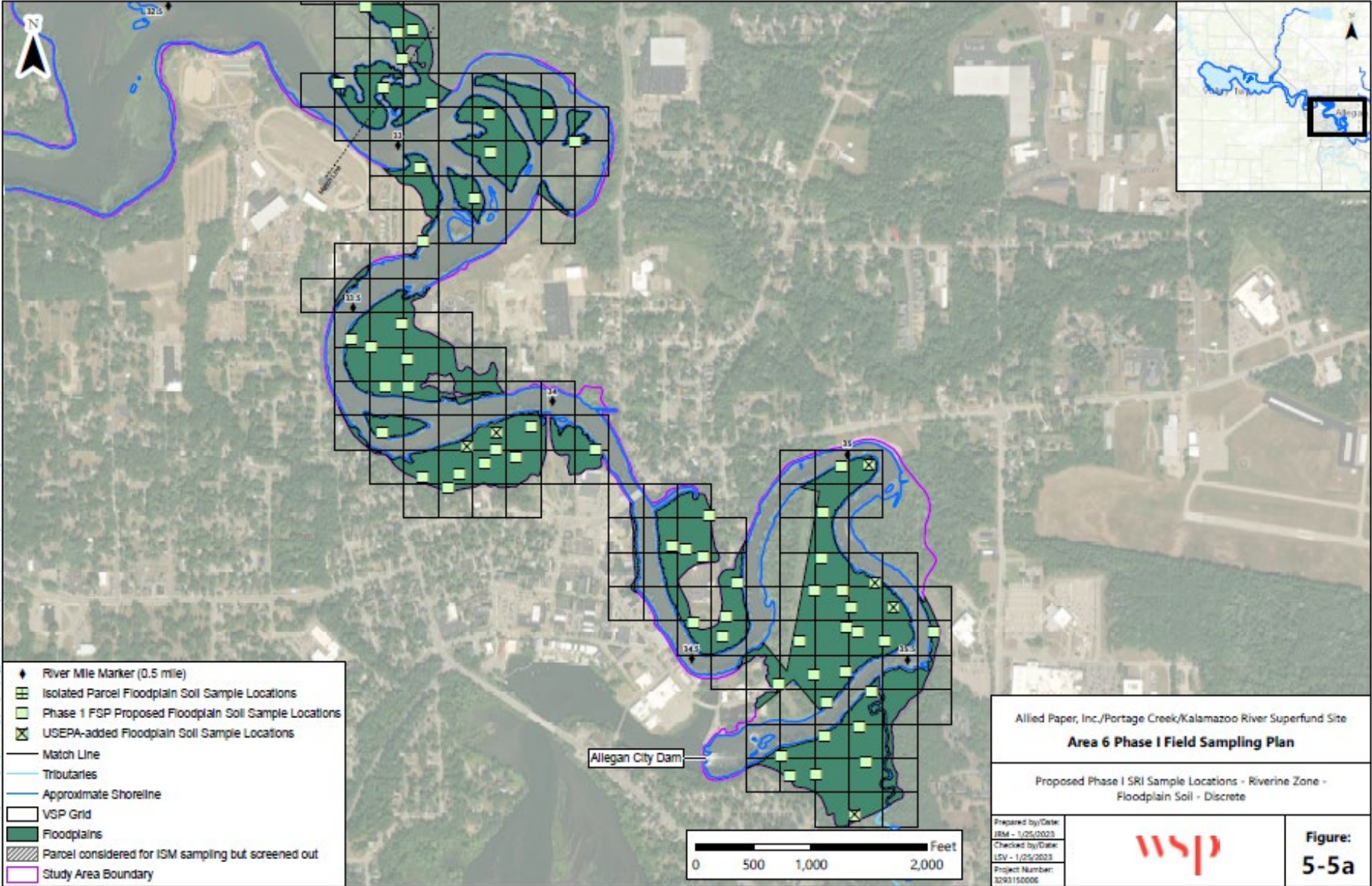
Prepared by/Date: JRM - 2/22/2023		Figure: 5-3a
Checked by/Date: LSV - 2/22/2023		
Project Number: 3293150006		





Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Area 6 Phase I Field Sampling Plan
 Proposed Phase I SRI Sample Locations – West Lacustrine Zone Sediment

Prepared by/Date: JRM - 2/22/2023 Checked by/Date: LSV - 2/22/2023 Project Number: 3293150006		Figure: 5-3b
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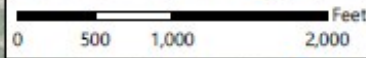


- ◆ River Mile Marker (0.5 mile)
- Isolated Parcel Floodplain Soil Sample Locations
- Phase 1 FSP Proposed Floodplain Soil Sample Locations
- ⊗ USEPA-added Floodplain Soil Sample Locations
- Match Line
- Tributaries
- Approximate Shoreline
- VSP Grid
- Floodplains
- ▨ Parcel considered for ISM sampling but screened out
- Study Area Boundary

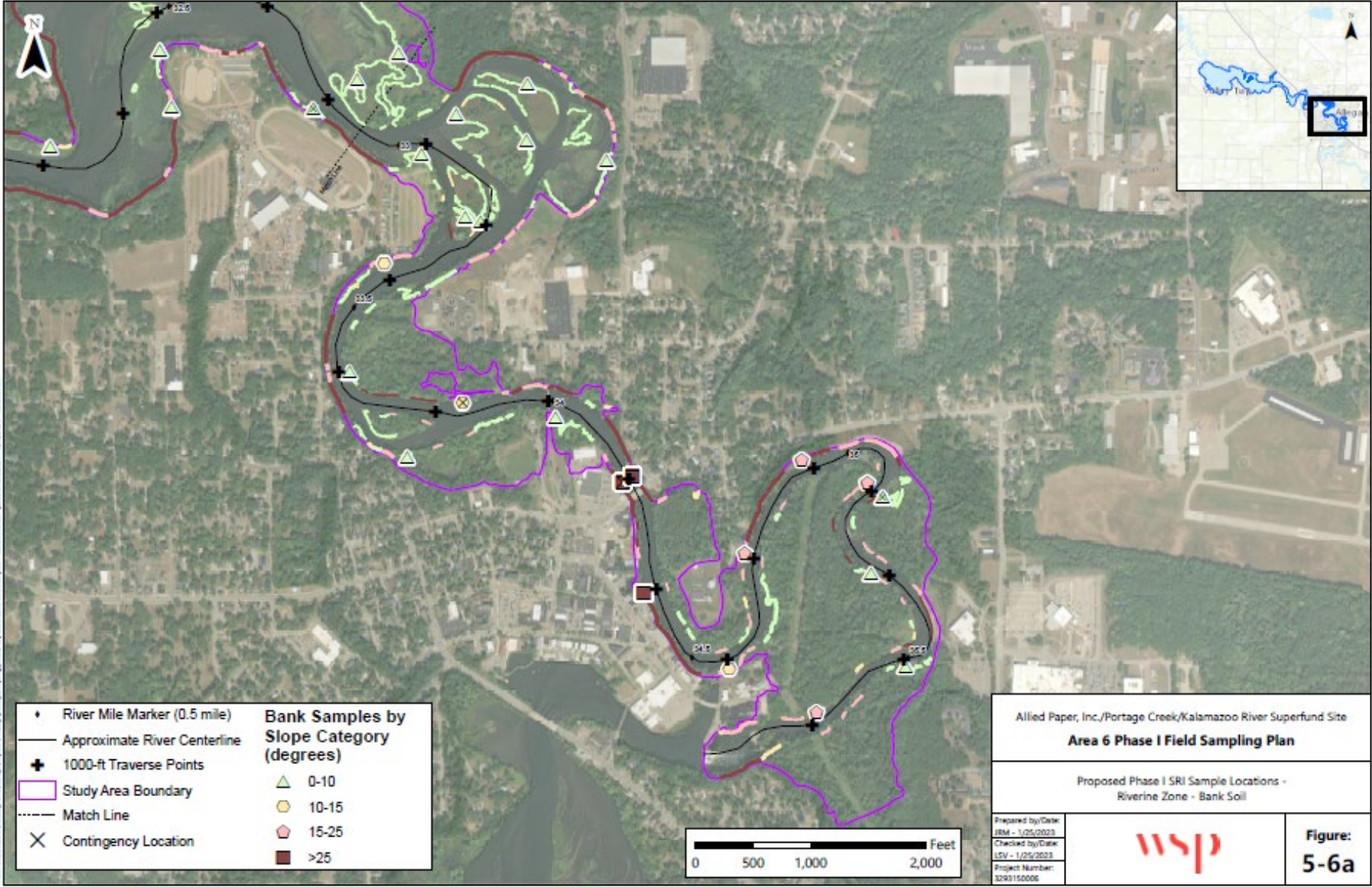
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Area 6 Phase I Field Sampling Plan

Proposed Phase I SRI Sample Locations - Riverine Zone -
 Floodplain Soil - Discrete

Prepared by/Date: JEM - 1/25/2023 Checked by/Date: LDV - 1/25/2023 Project Number: 3293150006	
Figure: 5-5a	




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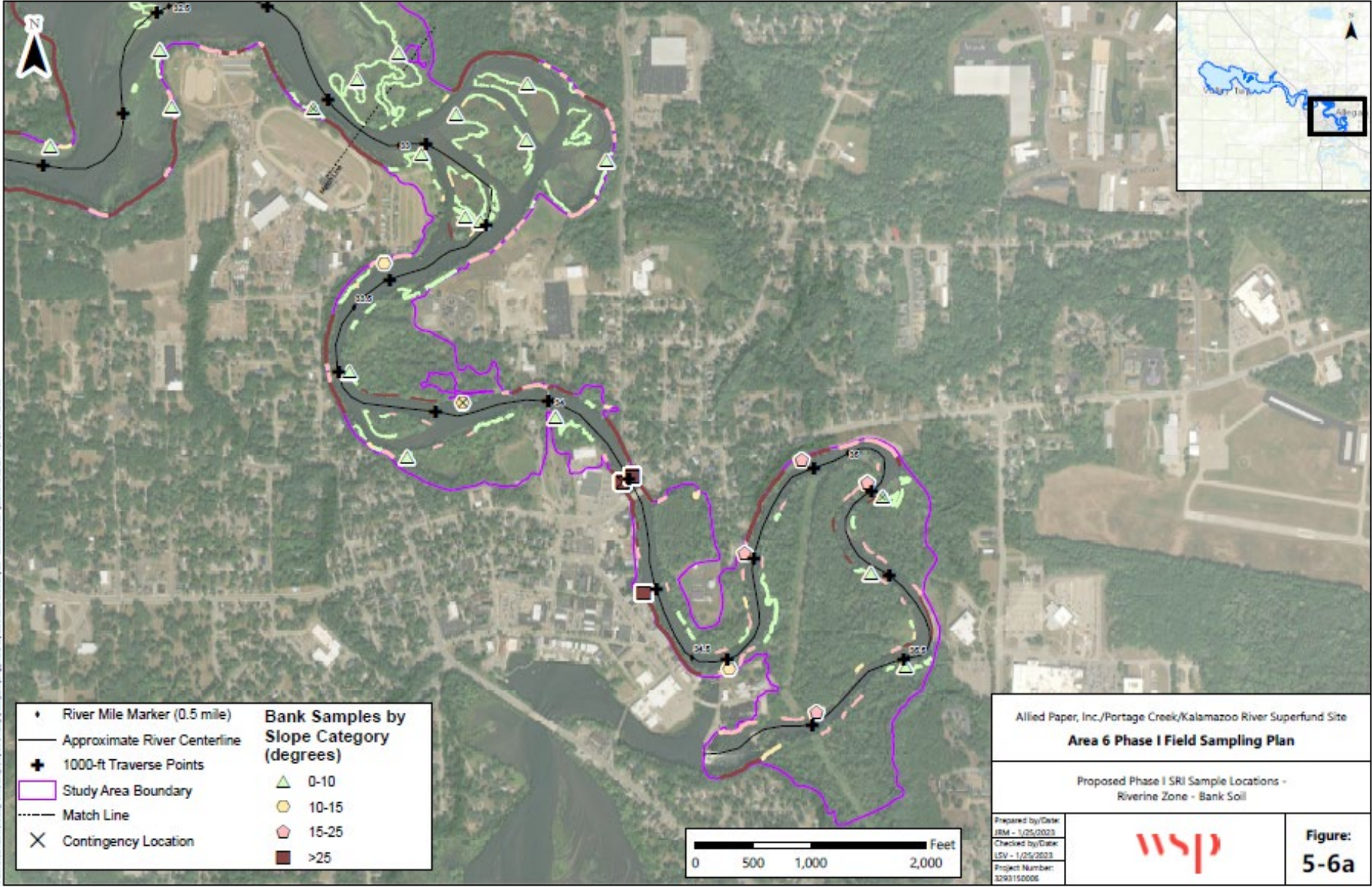
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◆	River Mile Marker (0.5 mile)	▲	0-10
—	Approximate River Centerline	●	10-15
+	1000-ft Traverse Points	◊	15-25
□	Study Area Boundary	■	>25
- - -	Match Line		
×	Contingency Location		

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site	
Area 6 Phase I Field Sampling Plan	
Proposed Phase I SRI Sample Locations - Riverine Zone - Bank Soil	
Prepared by/Date: JBM - 1/25/2023	
Checked by/Date: LSV - 1/25/2023	
Project Number: 3293150006	
Figure: 5-6a	




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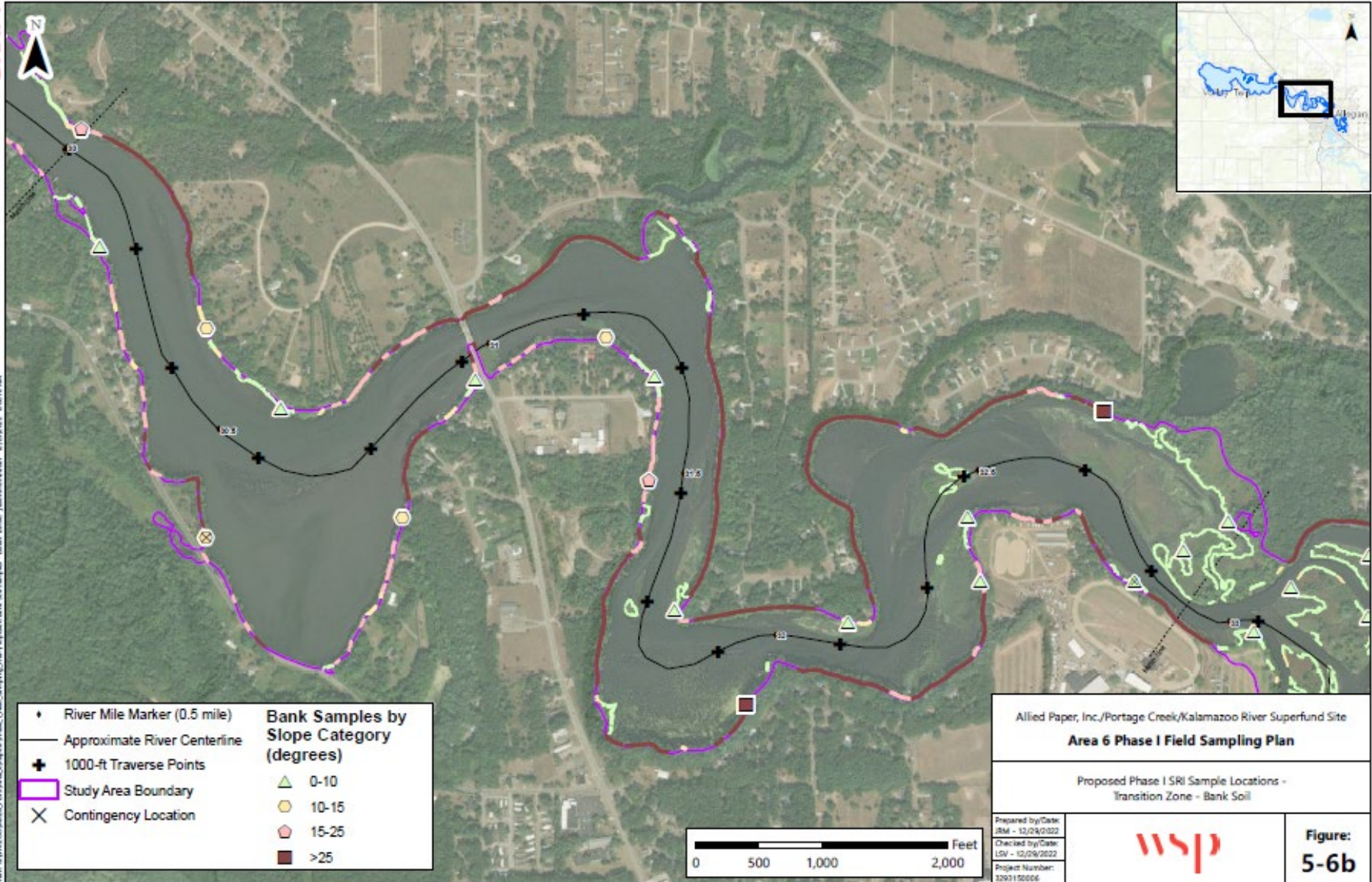
◆	River Mile Marker (0.5 mile)	▲	Bank Samples by Slope Category (degrees)
—	Approximate River Centerline	▲	0-10
+	1000-ft Traverse Points	●	10-15
□	Study Area Boundary	●	15-25
- - -	Match Line	■	>25
×	Contingency Location		

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Area 6 Phase I Field Sampling Plan	
Proposed Phase I SRI Sample Locations - Riverine Zone - Bank Soil	
Prepared by/Date: JBM - 1/25/2023 Checked by/Date: LSV - 1/25/2023 Project Number: 3293150006	
Figure: 5-6a	



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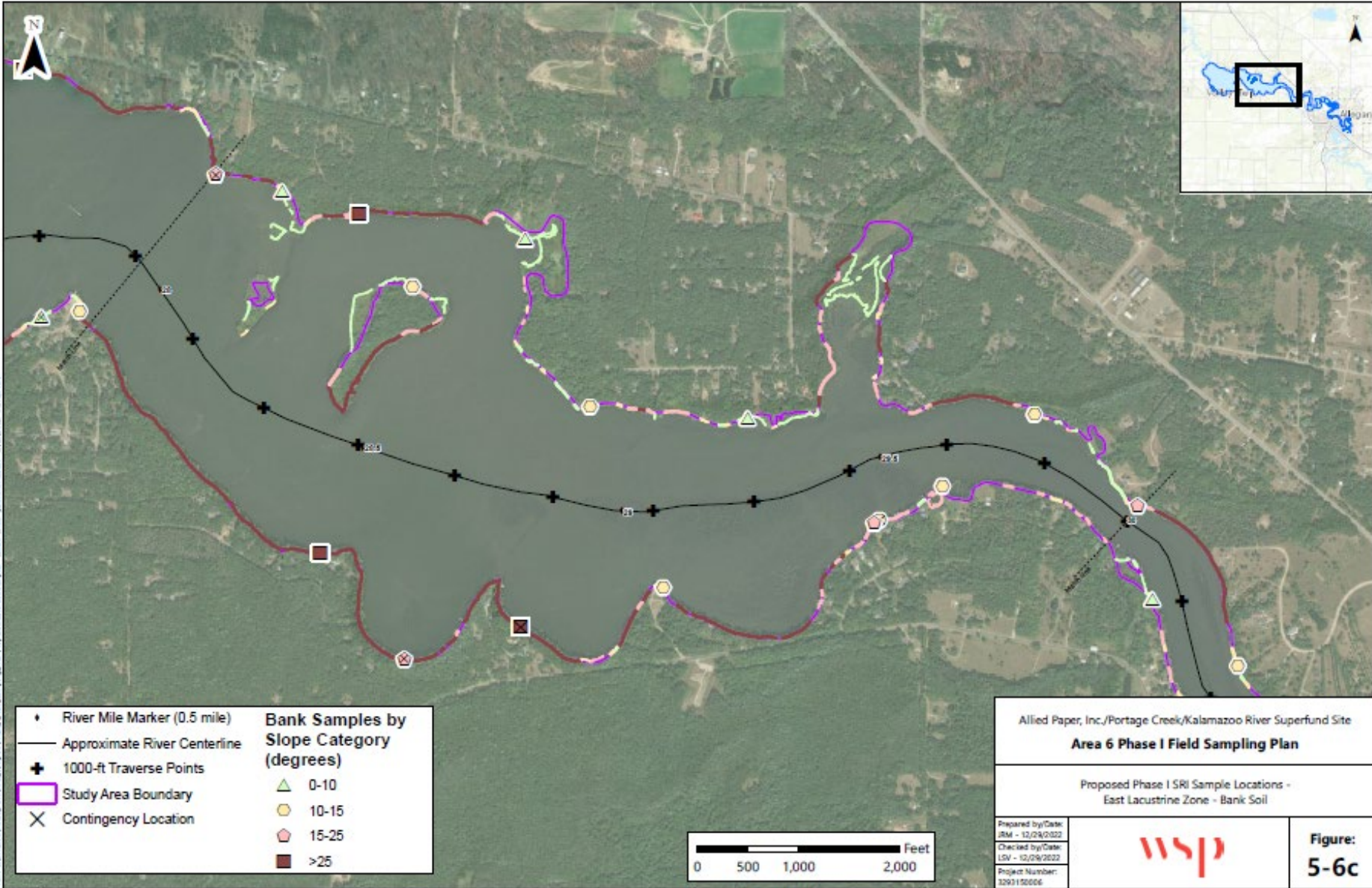


- ◆ River Mile Marker (0.5 mile)
 - Approximate River Centerline
 - ✚ 1000-ft Traverse Points
 - ▭ Study Area Boundary
 - ✕ Contingency Location
- | Bank Samples by Slope Category (degrees) | |
|--|-------|
| △ | 0-10 |
| ○ | 10-15 |
| ⬠ | 15-25 |
| ■ | >25 |

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Area 6 Phase I Field Sampling Plan

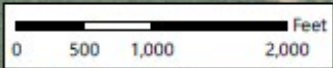
Proposed Phase I SRI Sample Locations -
 Transition Zone - Bank Soil


Prepared by/Date: JSM - 12/29/2022		Figure: 5-6b
Checked by/Date: LSV - 12/29/2022		
Project Number: 329150006		



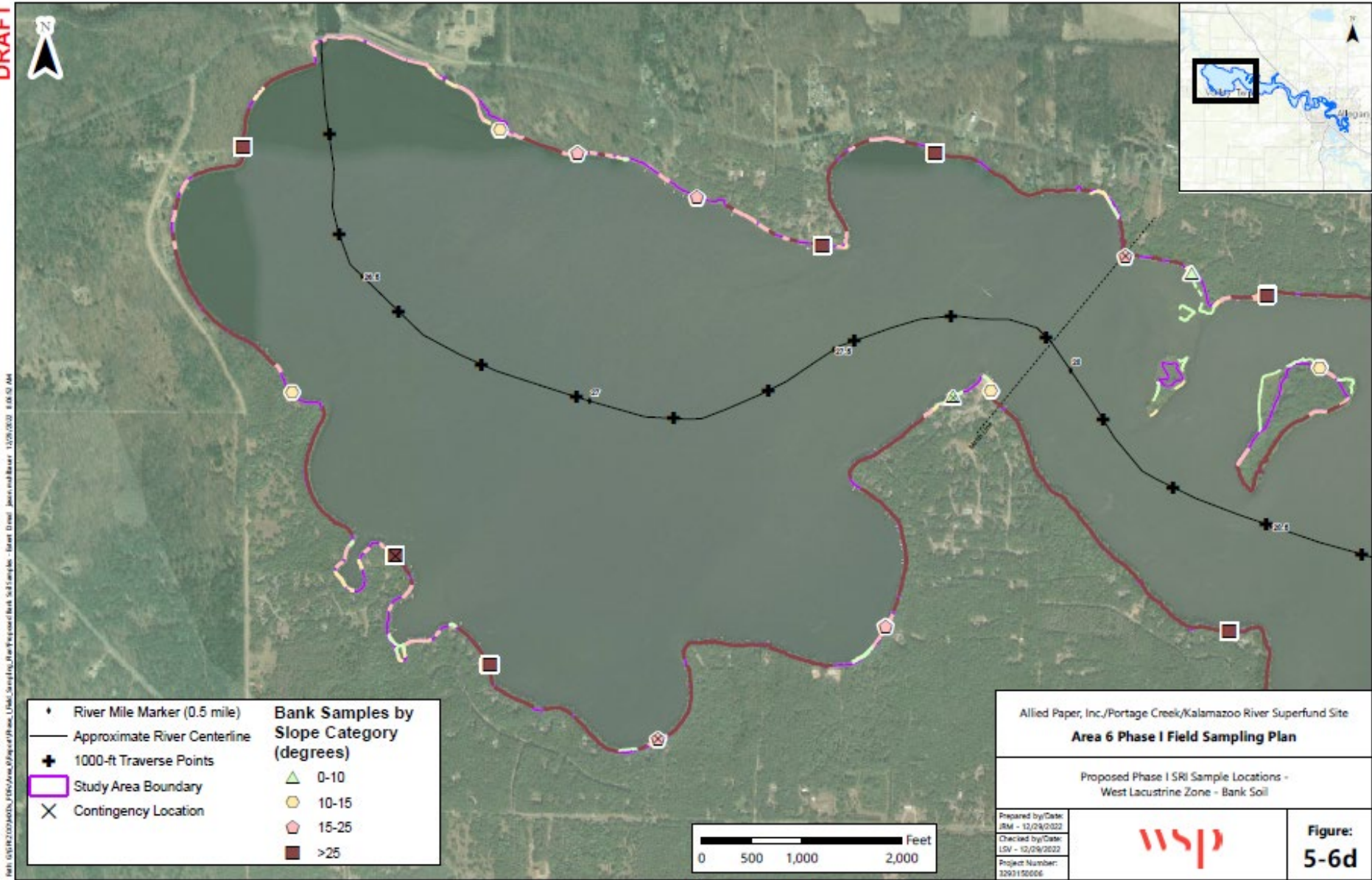
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◆	River Mile Marker (0.5 mile)	▲	0-10
—	Approximate River Centerline	●	10-15
+	1000-ft Traverse Points	◆	15-25
□	Study Area Boundary	■	>25
×	Contingency Location		

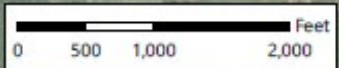


Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Area 6 Phase I Field Sampling Plan	
Proposed Phase I SRI Sample Locations - East Lacustrine Zone - Bank Soil	
Prepared by/Date JRM - 12/29/2022	
Checked by/Date LDV - 12/29/2022	
Project Number: 3293150006	
Figure: 5-6c	

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- ♦ River Mile Marker (0.5 mile)
 - Approximate River Centerline
 - + 1000-ft Traverse Points
 - ◌ Study Area Boundary
 - ✕ Contingency Location
- | Bank Samples by Slope Category (degrees) | |
|--|-------|
| ▲ | 0-10 |
| ● | 10-15 |
| ◡ | 15-25 |
| ■ | >25 |



Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Area 6 Phase I Field Sampling Plan

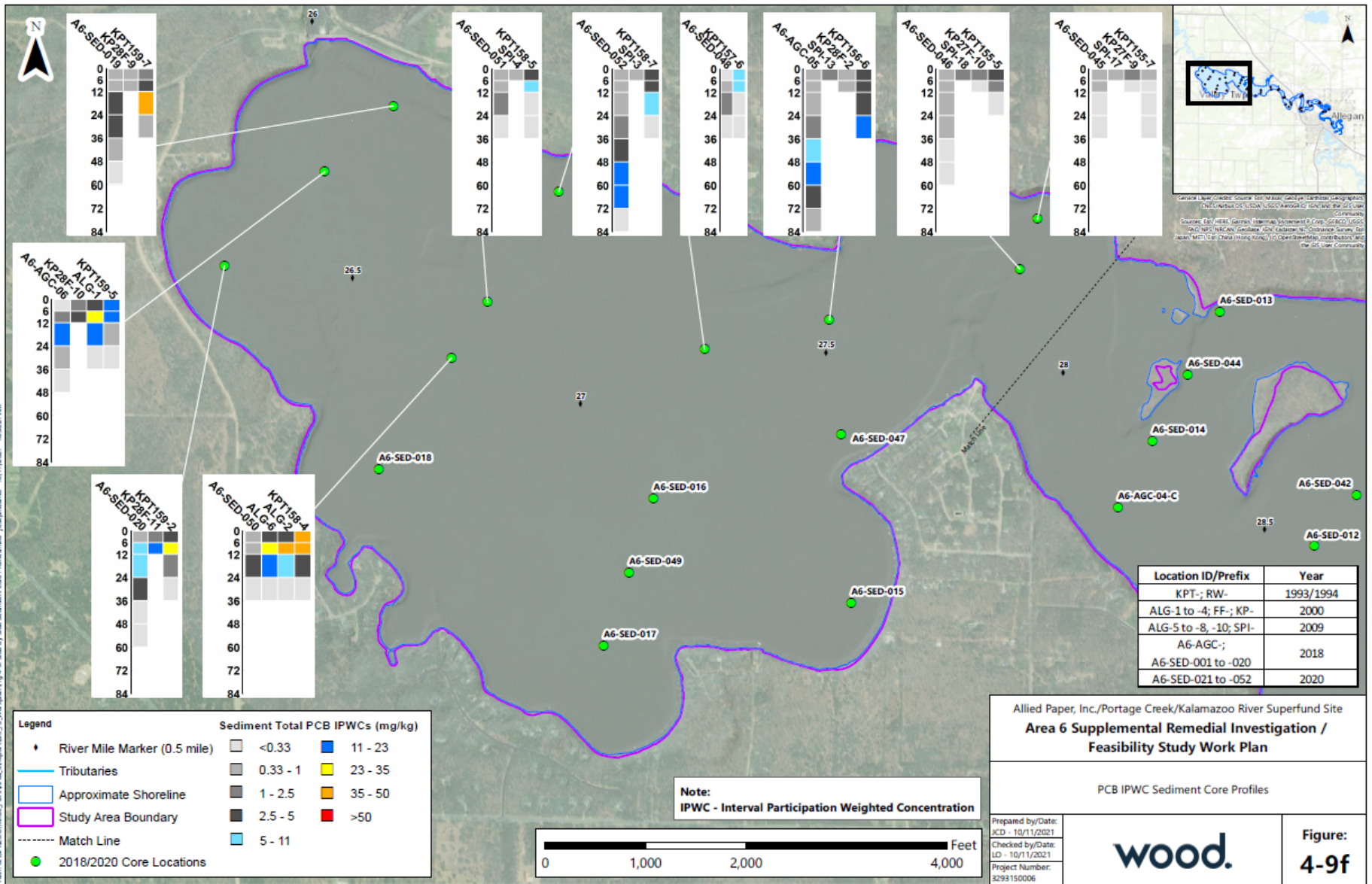
Proposed Phase I SRI Sample Locations -
 West Lacustrine Zone - Bank Soil

Prepared by/Date:
 JRM - 12/29/2022
 Checked by/Date:
 LSV - 12/29/2022
 Project Number:
 3293150006

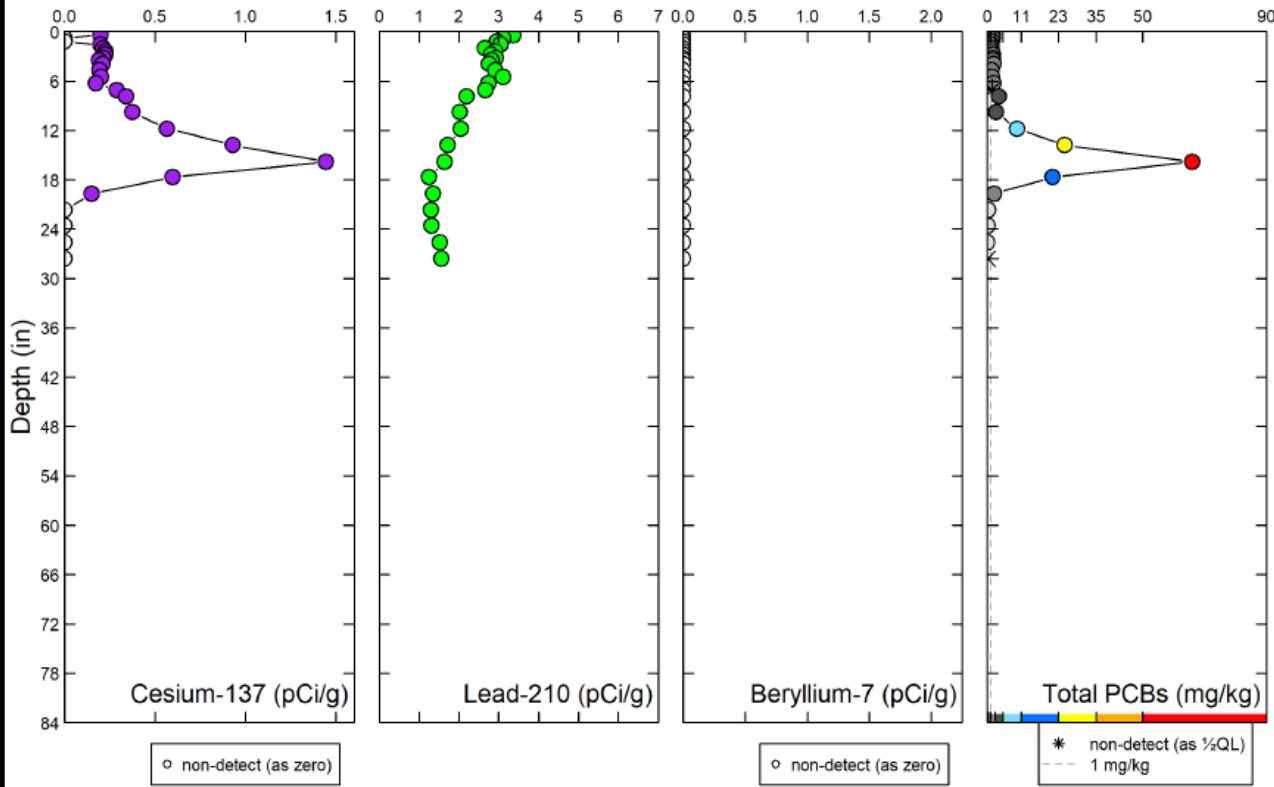


Figure:
5-6d

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ALG-7 (2009)



Cs Accumulation Rate = 0.8 cm/yr
Pb Accumulation Rate = 1.5 cm/yr

Notes:
cm/yr = centimeters per year
in = inches
mg/kg = milligrams per kilogram
pCi/g = picocuries per gram
QL = Quantitation Limit

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site		
Area 6 Supplemental Remedial Investigation / Feasibility Study Work Plan		
Historical Geochronology Core Results ALG-7 2009		
Prepared by/Date: LO - 7/12/21		Figure: 4-11f
Checked by/Date: LSV - 7/14/21		
Project Number 3293150006		

Lake Allegan Carp Removal



- **Carp disturb sediment**
- **Removal promotes sediment stability and lake recovery**
- **Obtain a biomass threshold below 90 lbs/acre (approx. 25,000 adult carp)**
- **180,000 carp in Lake Allegan**
- **150,000 total carp removed 2018-2022**
- **Additional carp investigations, surface water and vegetation monitoring**
- **Activities conducted by Georgia-Pacific with EPA support**



CARP FEEDING: Environmental Engineers

Feeding in the Bottom (a lot)

Uprooting plants (cover)

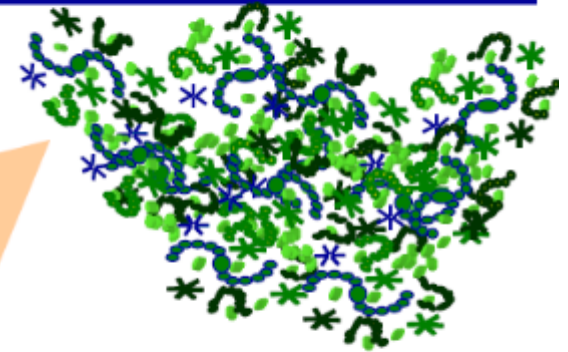
Taking food from birds and fish

Releasing nutrients from sediments

Growing

releasing nutrients

Algae bloom



Nutrients (N, P)

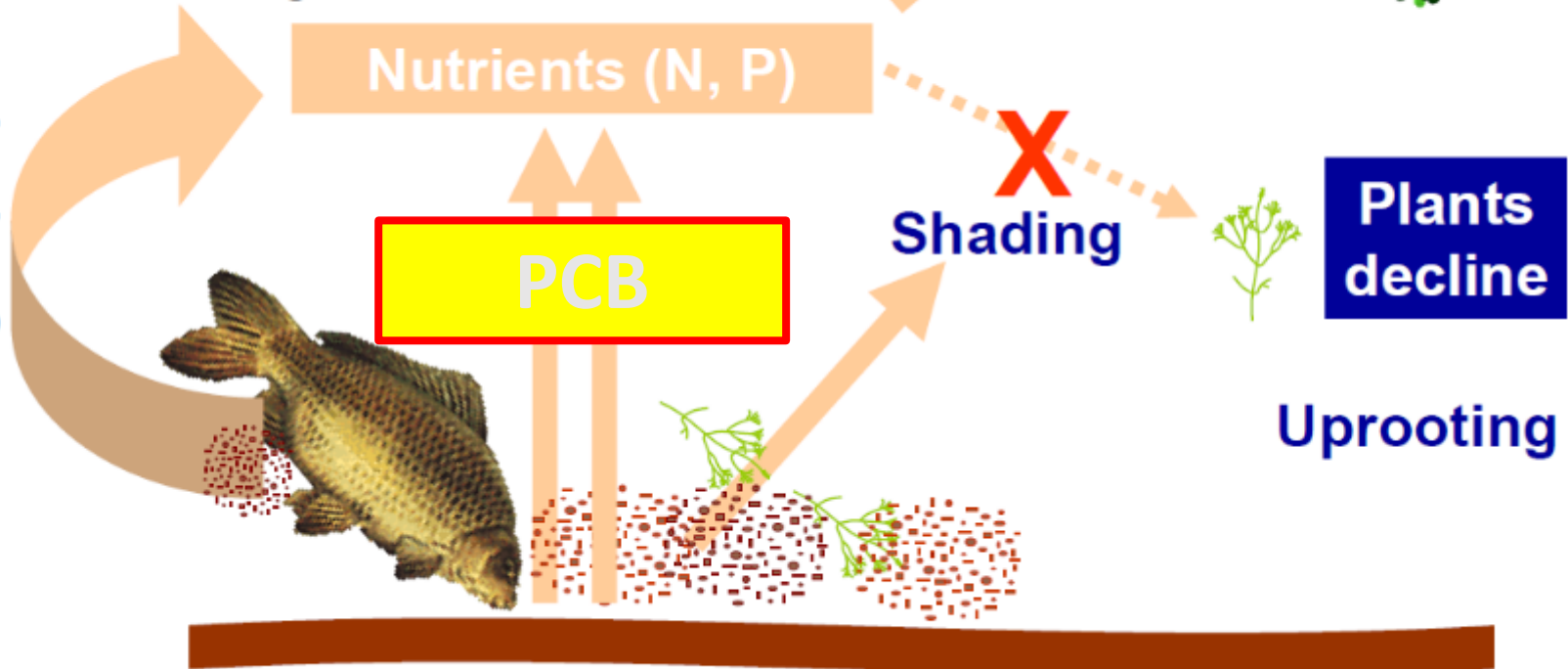
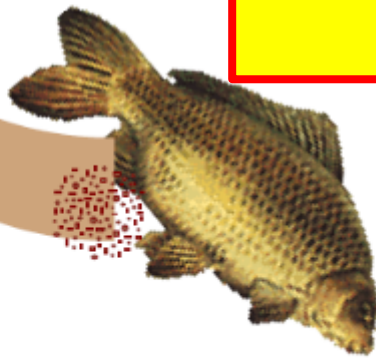
PCB

Shading

Plants decline

Uprooting

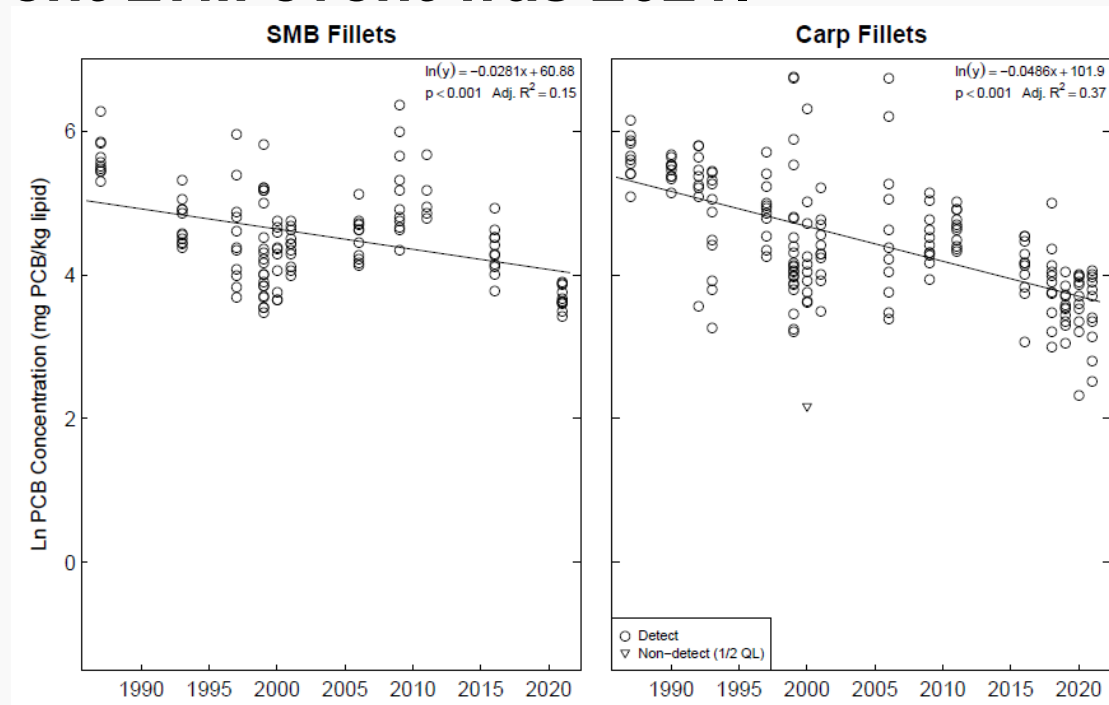
'Biological pump'



Fish Tissue Monitoring



- Long-term monitoring (LTM) data in background upstream areas and Lake Allegan (smallmouth, smallmouth YOY, carp).
- Routine LTM augmented with sampling in 2019 and 2020. Most recent LTM event was 2021.



Carp Removal Performance Indicators



- **Aquatic Vegetation Surveys and Fish Population Surveys Conducted in 2019 (baseline) and 2022**
- **44% increase in aquatic vegetation**
- **Aquatic species frequency and density increased**
- **Total number of individual fish captured in 2022 increased from 2019 (1,863) to 2022 (10,698)**
- **Total number of young-of-year fish increased from 2019 (5 individuals) to 2022 (6,781 individuals)**

Area 6 Superfund Schedule



- **Area 6 Remedial Investigation Sampling 2023/2024**
- **Area 6 Supplemental Remedial Investigation Report: 2025**
- **Area 6 Alternative Screening Technical Memo (ASTM): 2026**
- **Area 6 Feasibility Study (FS): 2027**
- **OU5 Area 6 Record of Decision (ROD): 2028**
- **Remedial Design/Remedial Action (RD/RA) Negotiations: 2029**
- **Remedial Design: 2030/2031**
- **Remedial Action: 2032**

Questions?



Jim Saric

EPA

Remedial Project Manager

312-886-0992

saric.james@epa.gov

<http://www.epa.gov/superfund/allied-paper-kalamazoo>