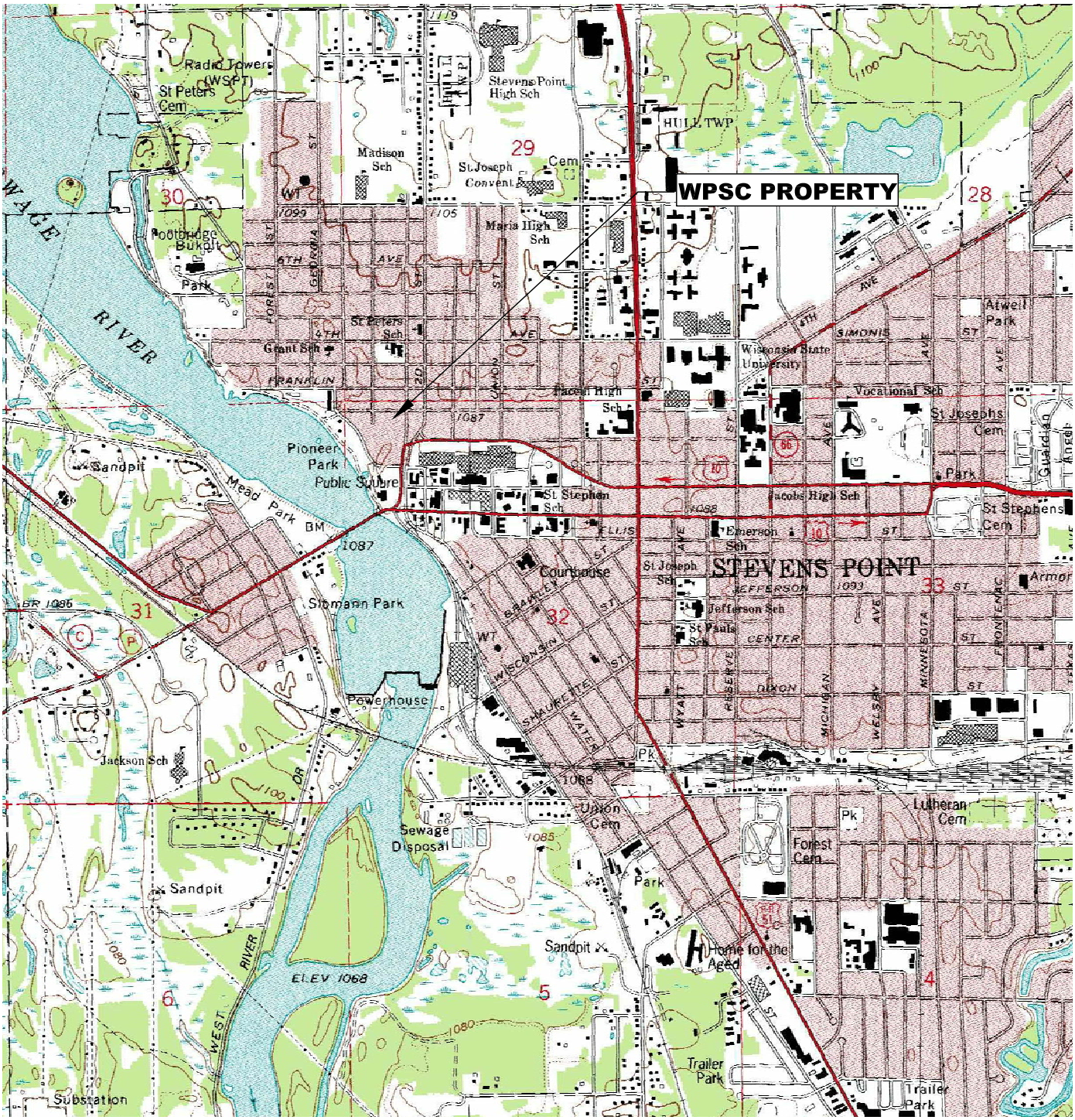
FIGURES



SOURCE: DIGITAL DOWNLOAD FROM
http://STORE.USGS.GOV.
USGS 7.5 MINUTE QUADRANGLE,
STEVENS POINT, WIS.
DATED 1970. REVISED 1991.

QUADRANGLE LOCATION

N

0 2000 4000

SCALE IN FEET

CONTOUR INTERVAL 10 FEET

LOCATION MAP

WPSC
FORMER STEVENS POINT MGP SITE
STEVENS POINT, WISCONSIN

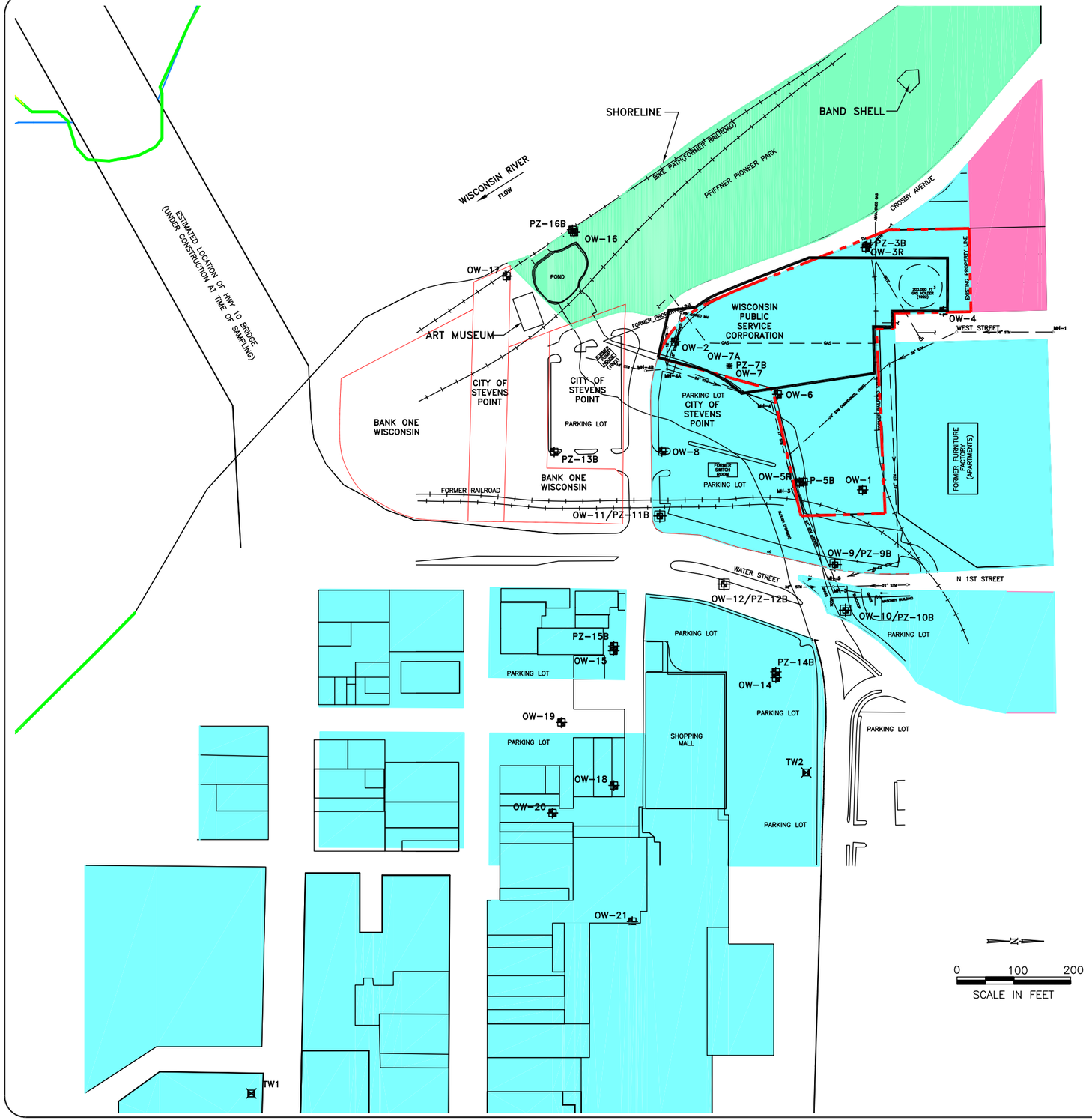
NATURAL RESOURCE TECHNOLOGY

DRAWN BY: RLH 05/28/08 APP'D BY: JMK DATE: 05/28/08

PROJECT NO.
1177

DRAWING NO.
1177–A01

FIGURE NO.
1



LEGEND

- OW-1 — WATER TABLE OBSERVATION WELL
- P-5B — PIEZOMETER
- OW-9 /PZ-9B — WATER TABLE/PIEZOMETER WELL NEST
- TW1 — TEMPORARY WELL
- COMMERCIAL/CENTRAL BUSINESS/LIGHT INDUSTRIAL
- CONSERVANCY
- RESIDENTIAL
- APPROXIMATE PARCEL BOUNDARIES AND PARCEL OWNER
- APPROXIMATE CURRENT WPSC PROPERTY BOUNDARY
- APPROXIMATE FORMER FACILITY EXTENT
- MH-1 — STORM SEWER MANHOLE
- HYDRANT
- UTILITY POLE
- WTR — WATER LINE
- GAS — GAS LINE
- STM — STORM SEWER
- MGP — MANUFACTURED GAS PLANT
- FORMER BUILDINGS
- FORMER MGP PROCESS STRUCTURES
- FORMER RAILROAD

NOTES:

1) SUBSURFACE UTILITY LINE AND FORMER STRUCTURES/BUILDINGS LOCATIONS ARE APPROXIMATE.

2) APPROXIMATE PARCEL BOUNDARIES WERE DEVELOPED FROM A MAP PROVIDED BY PORTAGE COUNTY PLANNING AND ZONING DEPARTMENT.

SOURCE NOTES:

THIS MAP WAS DEVELOPED FROM DRAWINGS BY SIMON HYDRO-SEARCH, DATED 02/11/94, DRAWING NO. 3075-d8 AND DRAWING NO. 3075-d2, DATED 11/15/93, PROJECT 304533075, A MAP FROM THE CITY OF STEVENS POINT, DRAWING E2 M-1461, DATE UNKNOWN, A MAP FROM THE CITY OF STEVENS POINT, DRAWING A-3 M-1456, DATED 1986, AND DRAWINGS FROM WISCONSIN PUBLIC SERVICE CORP., WSK509.DWG AND STPTGAS.DWG. GAS LINE TAKEN FROM WSK509.DWG AND ABANDONED GAS LINE TAKEN FROM WPSC W.O. 001309B081, STEVENS POINT AREA MAP NO. 2106-252. ALL LOCATIONS INCLUDING UTILITIES ARE APPROXIMATE.

A SURVEY FROM WPSC DATED JANUARY 31, 2000 LOCATED WELLS AND BORINGS SB-207 THROUGH SB-216 INSTALLED JANUARY 2000.

A SURVEY FROM WPSC DATED 6/2/00 LOCATED MH-1, SG-1 AT BRIDGE AND RIVERS NORTH EDGE.

UNSURVEYED PORTION OF RIVER AND ISLAND FROM EARTHVISIONS U.S. TERRAIN SERIES © EARTHVISIONS, INC. 603-433-8500.

A SURVEY BY WPSC DATED AUGUST 15, 2007 LOCATED WELLS OW-14 THROUGH OW-17 AND BORINGS SB-309 THROUGH SB-321

TW-1 AND TW-2 SURVEYED BY WPSC ON DECEMBER 1, 2008.

OW-18 THROUGH OW-21 SURVEYED BY WPSC ON MARCH 1, 2011.

DRAWN BY: KNW DATE: 05/05/11
CHECKED BY: HMS DATE: 05/27/11
APPROVED BY: HMS DATE: 05/27/11
DRAWING NO: 1177-152-B01C
REFERENCE: NONE

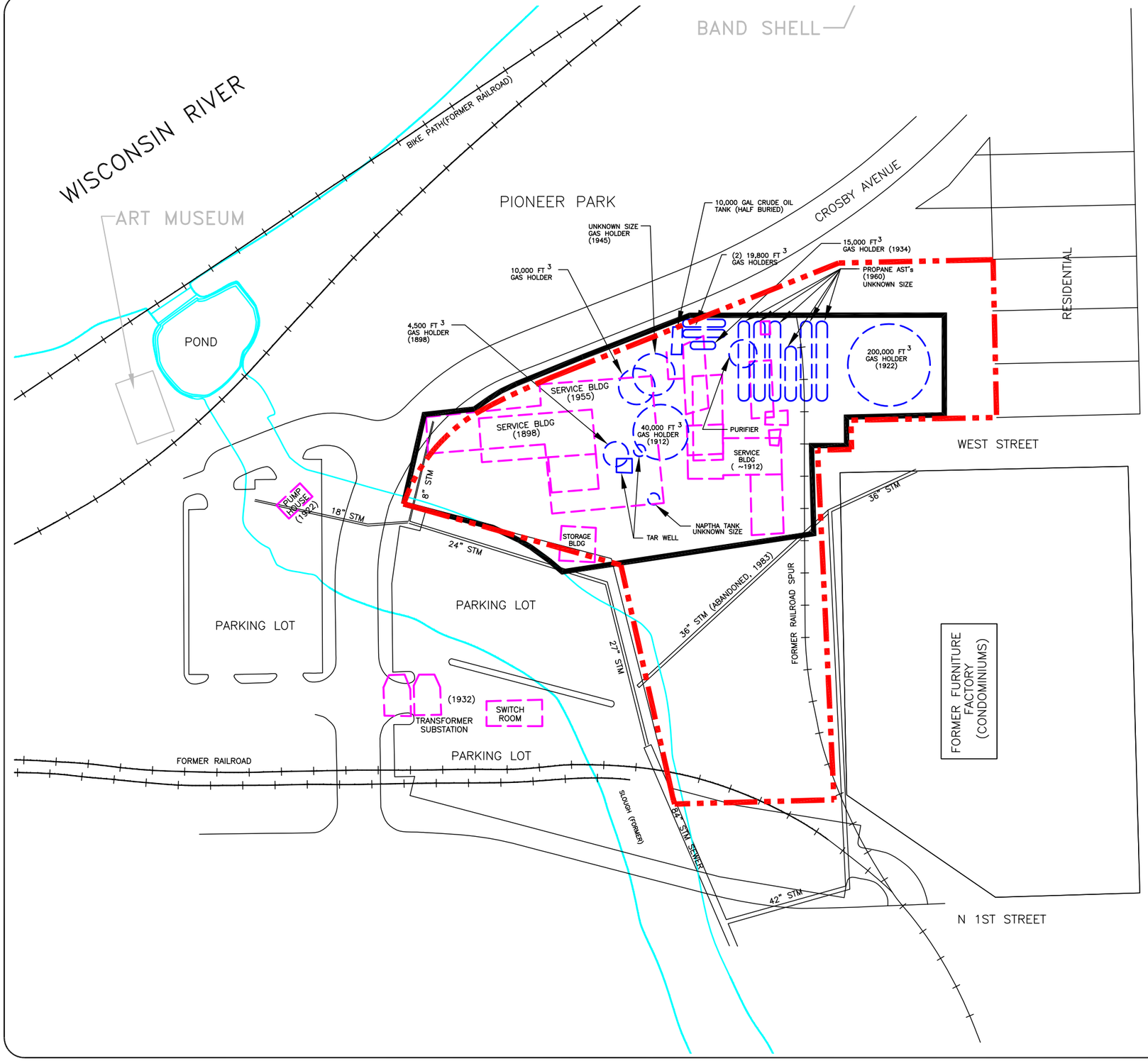
CURRENT SITE LAYOUT AND VICINITY

FEASIBILITY STUDY REPORT (REVISION 1)
WISCONSIN PUBLIC SERVICE CORPORATION
FORMER MANUFACTURE GAS PLANT, STEVENS POINT, WISCONSIN

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 1177/15.2

FIGURE NO. 2



LEGEND

- FORMER MGP PROCESS STRUCTURES
- FORMER BUILDINGS
- RAILROAD
- APPROXIMATE CURRENT WPSC PROPERTY BOUNDARY
- APPROXIMATE FORMER FACILITY EXTENT

N

0 50 100

SCALE IN FEET

SOURCE NOTE:
THIS MAP WAS DEVELOPED FROM DRAWINGS BY SIMON HYDRO-SEARCH, DATED 02/11/94, DRAWING NO. 3075-d8 AND DRAWING NO. 3075-d2, DATED 11/15/93, PROJECT 304533075.

DRAWN BY: HMS DATE: 12/22/08
CHECKED BY: HMS DATE: 12/22/08
APPROVED BY: JMK DATE: 01/02/09
DRAWING NO: 1177-15-B13C
REFERENCE: NONE

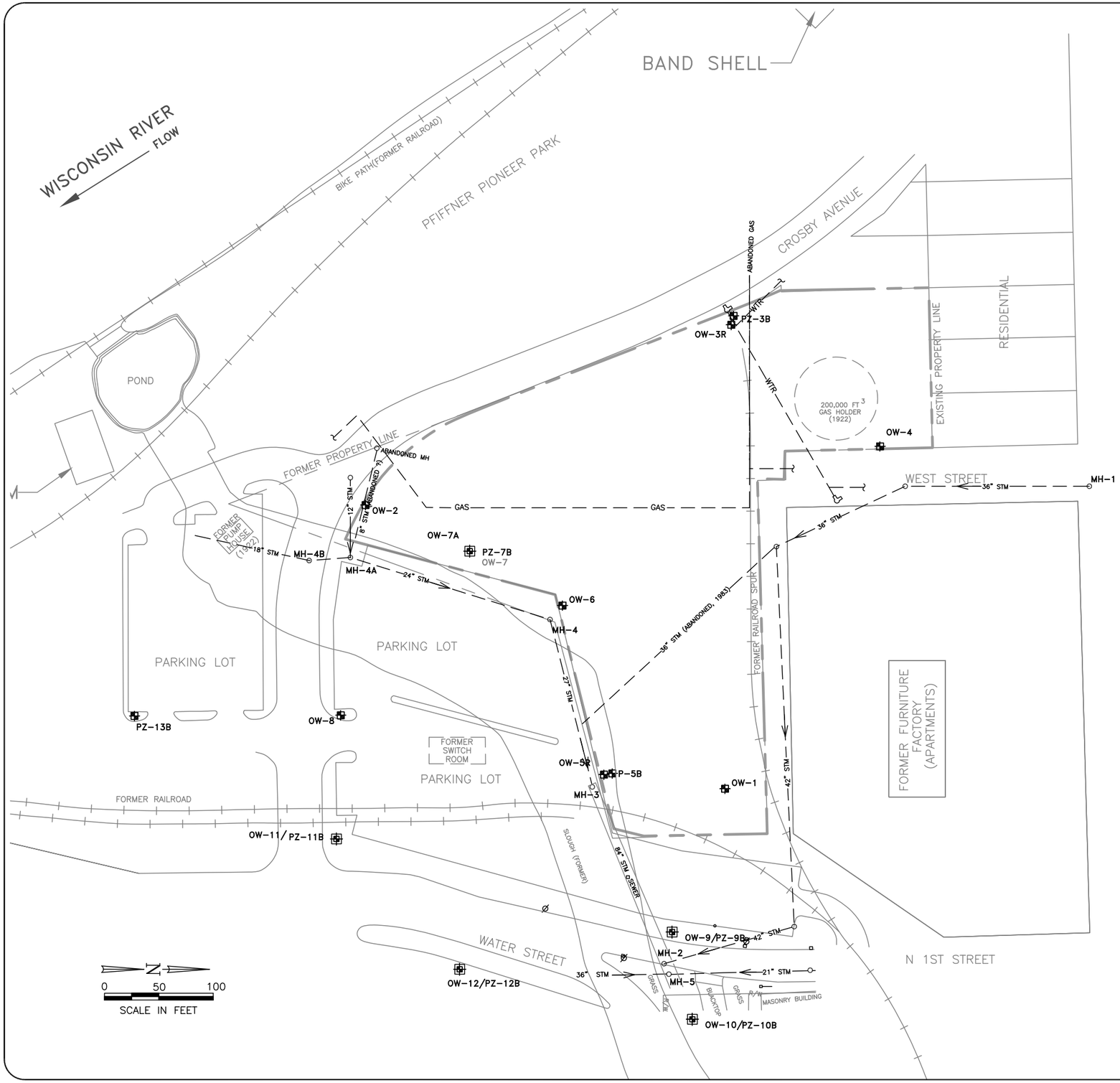
FORMER MGP STRUCTURE LOCATIONS

FEASIBILITY STUDY REPORT
WISCONSIN PUBLIC SERVICE CORPORATION
FORMER MANUFACTURE GAS PLANT, STEVENS POINT, WISCONSIN

NATURAL RESOURCE TECHNOLOGY

PROJECT NO.
1177/15

FIGURE NO.
3



LEGEND

- OW-1 — WATER TABLE OBSERVATION
- OW-9 /PZ-9B — WATER TABLE OBSERVATION/ NESTED MONITORING WELL
- P-5B — PIEZOMETER
- MH-1 — STORM SEWER MANHOLE
- HYDRANT
- UTILITY POLE
- WTR — WATER LINE
- GAS — GAS LINE
- STM — STORM SEWER
- MGP — MANUFACTURED GAS PLANT
- FORMER BUILDINGS
- FORMER MGP PROCESS STRUCTURES
- FORMER RAILROAD

NOTES:
SUBSURFACE UTILITY LINE AND FORMER STRUCTURES/BUILDINGS LOCATIONS ARE APPROXIMATE.

SOURCE NOTES:
THIS MAP WAS DEVELOPED FROM DRAWINGS BY SIMON HYDRO-SEARCH, DATED 02/11/94, DRAWING NO. 3075-d8 AND DRAWING NO. 3075-d2, DATED 11/15/93, PROJECT 304533075, A MAP FROM THE CITY OF STEVENS POINT, DRAWING E2 M-1461, DATE UNKNOWN, A MAP FROM THE CITY OF STEVENS POINT, DRAWING A-3 M-1456, DATED 1986, AND DRAWINGS FROM WISCONSIN PUBLIC SERVICE CORP., WSK509.DWG AND STPTGAS.DWG. GAS LINE TAKEN FROM WSK509.DWG AND ABANDONED GAS LINE TAKEN FROM WPSC W.O. 001309808l, STEVENS POINT AREA MAP NO. 2106-252. ALL LOCATIONS INCLUDING UTILITIES ARE APPROXIMATE.
A SURVEY FROM WPSC DATED JANUARY 31, 2000 LOCATED WELLS AND BORINGS SB-207 THROUGH SB-216 INSTALLED JANUARY 2000.
A SURVEY FROM WPSC DATED 6/2/00 LOCATED MH-1, SG-1 AT BRIDGE AND RIVERS NORTH EDGE.
UNSURVEYED PORTION OF RIVER AND ISLAND FROM EARTHVISIONS U.S. TERRAIN SERIES © EARTHVISIONS, INC. 603-433-8500.

UNDERGROUND UTILITIES

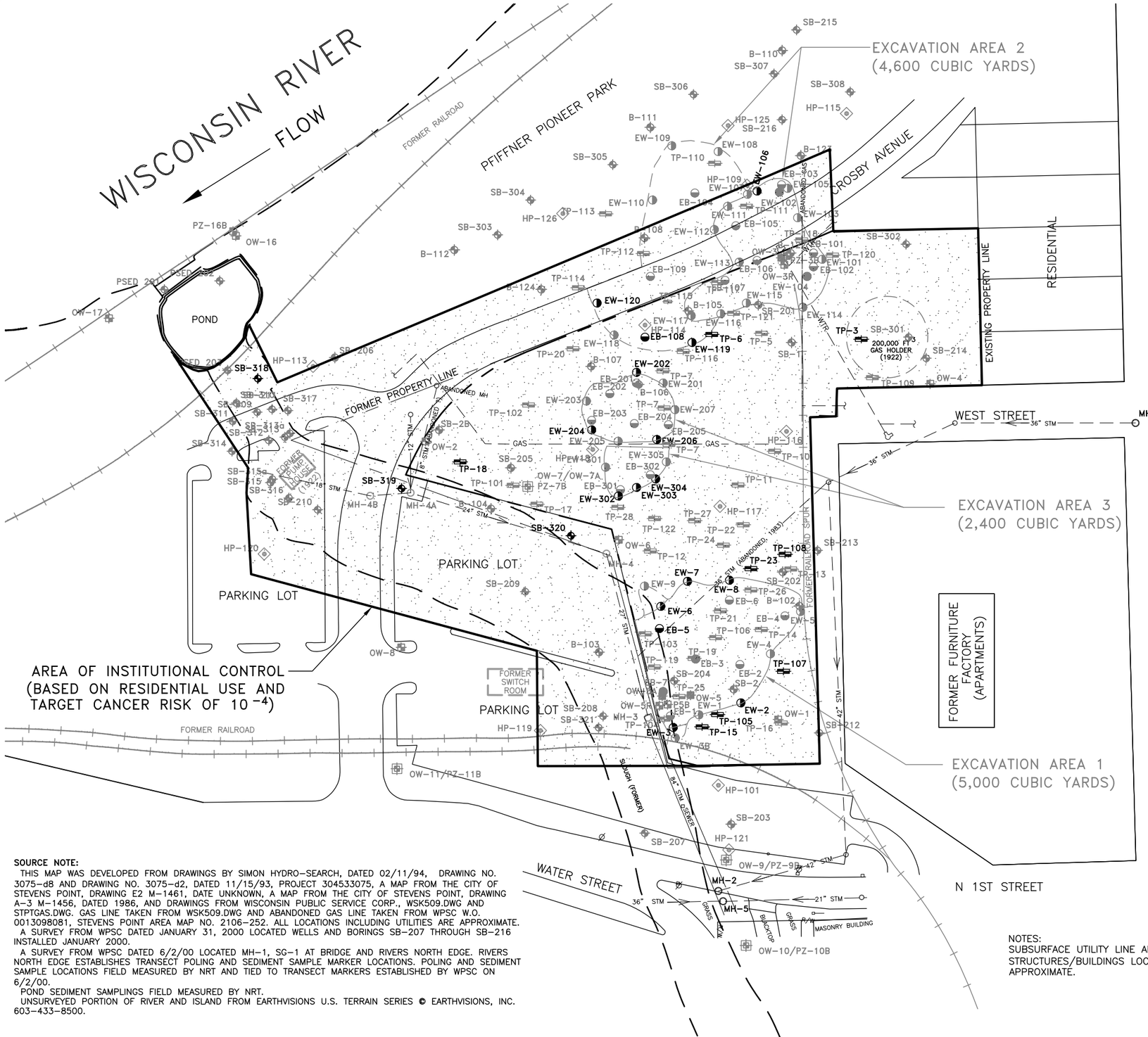
FEASIBILITY STUDY REPORT
WISCONSIN PUBLIC SERVICE CORPORATION
FORMER MANUFACTURED GAS PLANT, STEVENS POINT, WISCONSIN

DRAWN BY: HMS	DATE: 12/22/08	
CHECKED BY: HMS	DATE: 12/22/08	
APPROVED BY: JMK	DATE: 01/02/09	
DRAWING NO: 1177-15-B14		
REFERENCE: NONE		

NATURAL RESOURCE TECHNOLOGY

PROJECT NO.
1177/15

FIGURE NO.
4



LEGEND

- SB-207 — SOIL BORING (NRT)
- OW-1 — INVESTIGATION WELL
- P5B — BEDROCK WELL
- OW-9/PZ-9B — NESTED MONITORING WELL/BEDROCK WELL
- DEEP EXCAVATION (AVERAGE DEPTH IS 9–10 FEET)
- SHALLOW EXCAVATION (AVERAGE DEPTH IS 2 FEET)
- HP-120 — HYDRO–PUNCH
- EB-1 — EXCAVATION BASE SAMPLE
- EB-3 — SOIL SAMPLE WHICH WAS EXCAVATED
- EW-1 — EXCAVATION WALL SAMPLE
- OW-3 — ABANDONED INVESTIGATION WELL
- SB-206 — SOIL BORING (HISTORICAL NRT)
- B-124 / SB-1 — BOREHOLE
- TP-3 — TEST PIT
- MH-1 — STORM SEWER MANHOLE
- HYDRANT
- UTILITY POLE
- WTR — WATER LINE
- GAS — GAS LINE
- STM — STORM SEWER
- MGP — MANUFACTURED GAS PLANT
- FORMER BUILDINGS
- FORMER MGP PROCESS STRUCTURES
- FORMER RAILROAD
- INSTITUTIONAL CONTROL FOR SOIL

NOTE: BOLD SAMPLE LOCATIONS INDICATE SOIL CONCENTRATIONS EXCEED THE TARGET CANCER RISK OF 10^{-4} FOR RESIDENTIAL USE.

NOTES:
SUBSURFACE UTILITY LINE AND FORMER STRUCTURES/BUILDINGS LOCATIONS ARE APPROXIMATE.

0 50 100 200
SCALE IN FEET

SOURCE NOTE:
THIS MAP WAS DEVELOPED FROM DRAWINGS BY SIMON HYDRO–SEARCH, DATED 02/11/94, DRAWING NO. 3075–d8 AND DRAWING NO. 3075–d2, DATED 11/15/93, PROJECT 304533075, A MAP FROM THE CITY OF STEVENS POINT, DRAWING E2 M–1461, DATE UNKNOWN, A MAP FROM THE CITY OF STEVENS POINT, DRAWING A–3 M–1456, DATED 1986, AND DRAWINGS FROM WISCONSIN PUBLIC SERVICE CORP., WSK509.DWG AND STPTGAS.DWG. GAS LINE TAKEN FROM WSK509.DWG AND ABANDONED GAS LINE TAKEN FROM WPSC W.O. 0013098081, STEVENS POINT AREA MAP NO. 2106–252. ALL LOCATIONS INCLUDING UTILITIES ARE APPROXIMATE.
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A SURVEY FROM WPSC DATED 6/2/00 LOCATED MH–1, SG–1 AT BRIDGE AND RIVERS NORTH EDGE. RIVERS NORTH EDGE ESTABLISHES TRANSECT POLING AND SEDIMENT SAMPLE MARKER LOCATIONS. POLING AND SEDIMENT SAMPLE LOCATIONS FIELD MEASURED BY NRT AND TIED TO TRANSECT MARKERS ESTABLISHED BY WPSC ON 6/2/00.
POND SEDIMENT SAMPLINGS FIELD MEASURED BY NRT.
UNSURVEYED PORTION OF RIVER AND ISLAND FROM EARTHVISIONS U.S. TERRAIN SERIES © EARTHVISIONS, INC. 603–433–8500.

DRAWN BY: KNW | DATE: 12/22/08
CHECKED BY: HMS | DATE: 12/22/08
APPROVED BY: JMK | DATE: 01/02/09
DRAWING NO: 1177–1412–B26
REFERENCE: .

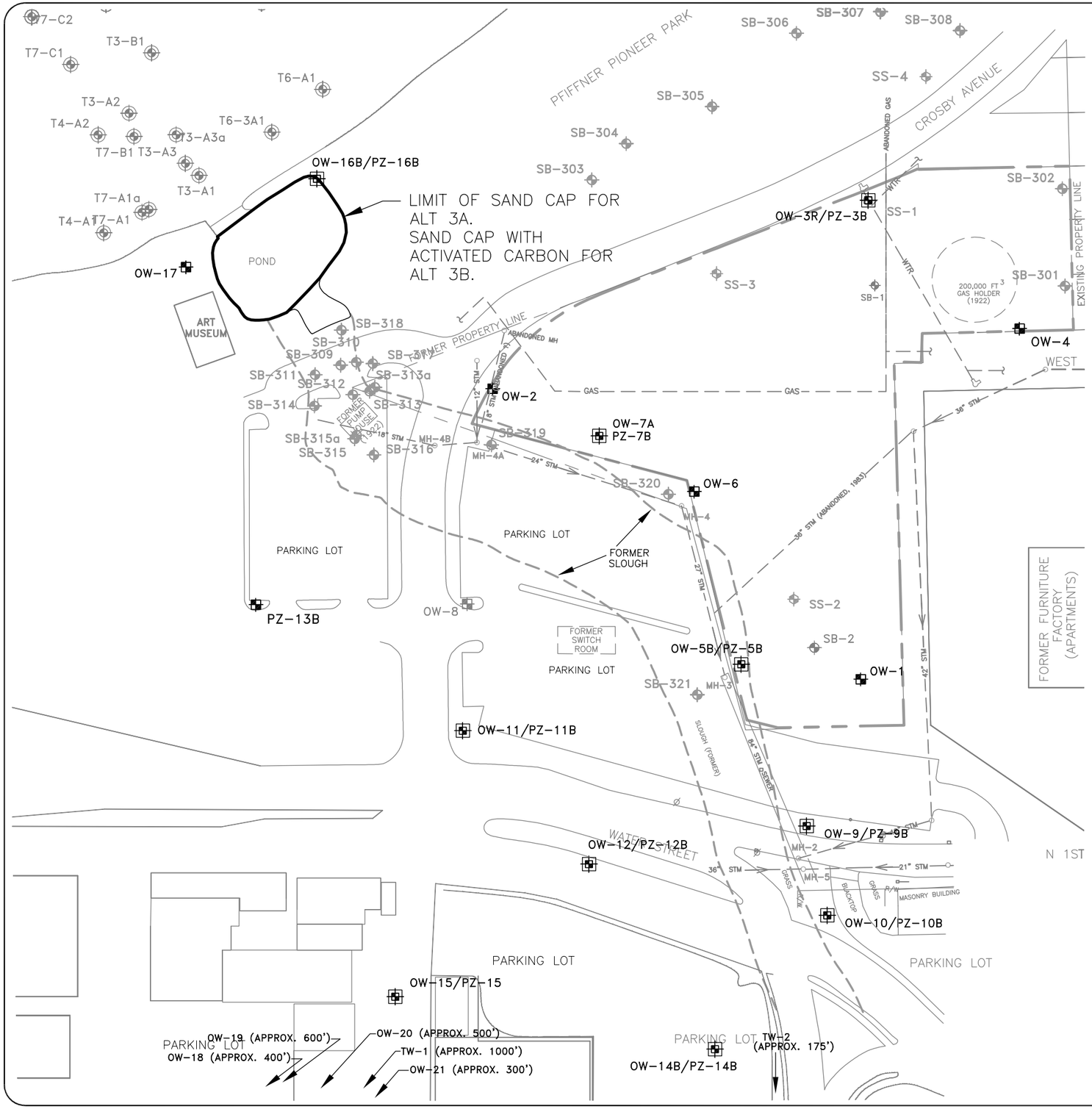
INSTITUTIONAL CONTROL AREA–SOIL

FEASIBILITY STUDY REPORT
WISCONSIN PUBLIC SERVICE CORPORATION
FORMER MANUFACTURED GAS PLANT, STEVENS POINT, WISCONSIN

NATURAL RESOURCE TECHNOLOGY

PROJECT NO.
1177/14.12

FIGURE NO.
5



LEGEND

- PZ-14B / OW-17 — WELL LOCATION (2007)
- SB-308 — SOIL BORING (2007)
- TW2 — TEMPORARY WELL
- OW-1 — WATER TABLE OBSERVATION WELL
- OW-8 — OW-8 WATER TABLE OBSERVATION WELL NOT SCHEDULED FOR SAMPLING
- OW-9 /PZ-9B — WATER TABLE OBSERVATION WELL NEST
- P-5B — PIEZOMETER
- SS-4 — EDI SURFACE SAMPLE (1986)
- T4-B1 — SEDIMENT SAMPLE
- MH-1 — STORM SEWER MANHOLE
- HYDRANT
- UTILITY POLE
- LIMIT OF SAND CAP
- WTR — WATER LINE
- GAS — GAS LINE
- STM — STORM SEWER
- MGP — MANUFACTURED GAS PLANT
- FORMER BUILDINGS
- FORMER MGP PROCESS STRUCTURES

SOURCE NOTE:
THIS MAP WAS DEVELOPED FROM DRAWINGS BY SIMON HYDRO-SEARCH, DATED 02/11/94, DRAWING NO. 3075-d8 AND DRAWING NO. 3075-d2, DATED 11/15/93, PROJECT 304533075, A MAP FROM THE CITY OF STEVENS POINT, DRAWING E2 M-1461, DATE UNKNOWN, A MAP FROM THE CITY OF STEVENS POINT, DRAWING A-3 M-1456, DATED 1986, AND DRAWINGS FROM WISCONSIN PUBLIC SERVICE CORP., WSK509.DWG AND STPTGAS.DWG, AND A DIGITAL FILE DOWNLOADED FROM www.gisinfo.co.portage.wi.us, ON 12/17/08. GAS LINE TAKEN FROM WSK509.DWG AND ABANDONED GAS LINE TAKEN FROM WPSC W.O. 0013098081, STEVENS POINT AREA MAP NO. 2106-252. ALL LOCATIONS INCLUDING UTILITIES ARE APPROXIMATE.
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POND SEDIMENT SAMPLINGS FIELD MEASURED BY NRT.
UNSURVEYED PORTION OF RIVER AND ISLAND FROM EARTHVISIONS U.S. TERRAIN SERIES © EARTHVISIONS, INC. 603-433-8500.

NOTES:
SUBSURFACE UTILITY LINE AND FORMER STRUCTURES/BUILDINGS LOCATIONS ARE APPROXIMATE.

N

0 50 100
SCALE IN FEET

DRAWN BY: RLH DATE: 05/31/11
CHECKED BY: HMS DATE: 05/31/11
APPROVED BY: HMS DATE: 05/31/11
DRAWING NO: 1177-152-B06
REFERENCE: NONE

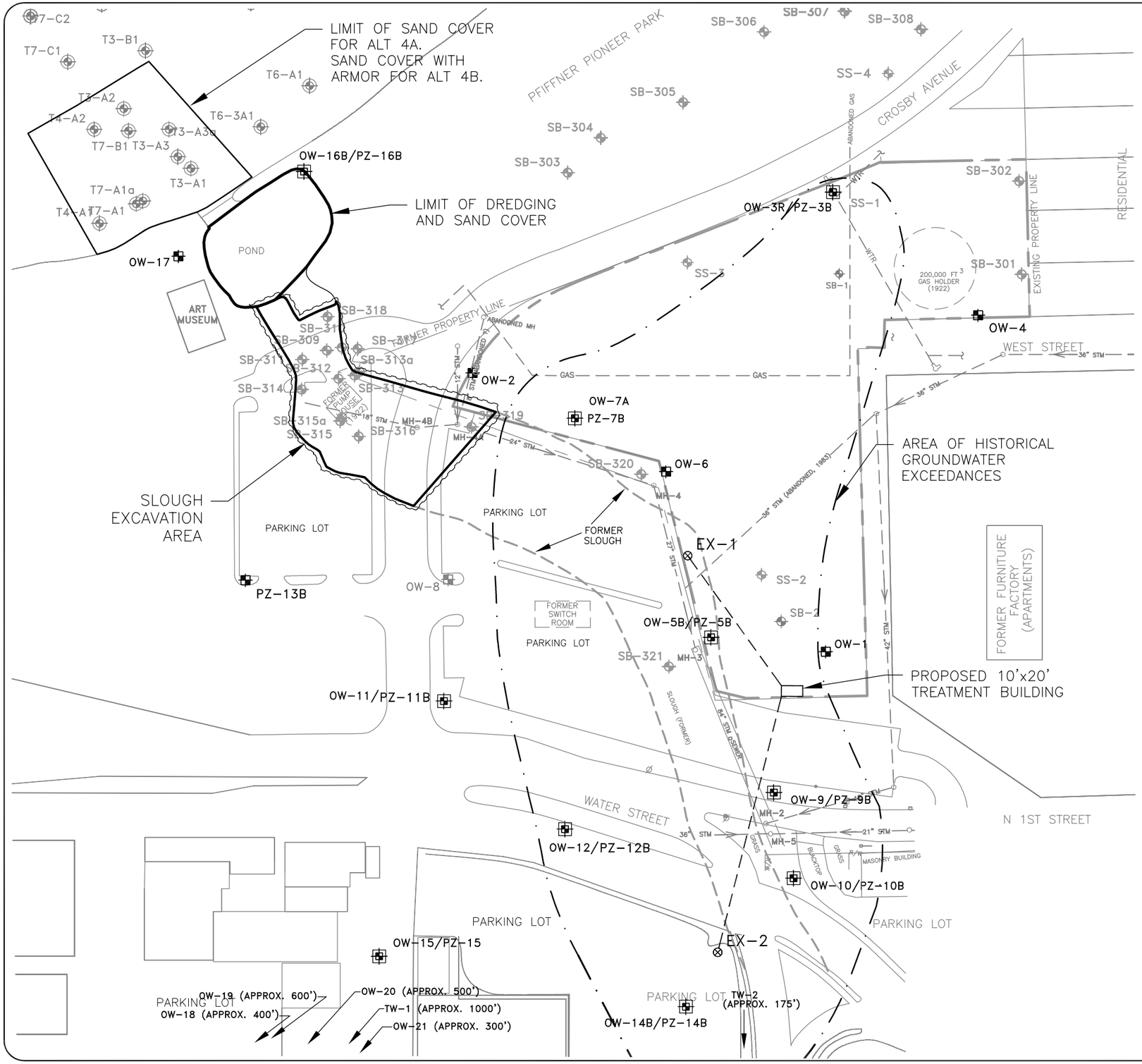
REMEDIAL ALTERNATIVES 3A & 3B

FEASIBILITY STUDY REPORT (REVISION 1)
WISCONSIN PUBLIC SERVICE CORPORATION
FORMER MANUFACTURED GAS PLANT, STEVENS POINT, WISCONSIN

NATURAL RESOURCE TECHNOLOGY

PROJECT NO.
1177/15.2

FIGURE NO.
6



LEGEND

- PZ-14B / OW-17 — WELL LOCATION (2007)
- SB-308 — SOIL BORING (2007)
- TW2 — TEMPORARY WELL
- OW-1 — WATER TABLE OBSERVATION WELL
- OW-8 — OW-8 WATER TABLE OBSERVATION WELL NOT SCHEDULED FOR SAMPLING
- OW-9 /PZ-9B — WATER TABLE OBSERVATION WELL
- P-5B — PIEZOMETER
- SS-4 — EDI SURFACE SAMPLE (1986)
- T4-B1 — SEDIMENT SAMPLE
- MH-1 — STORM SEWER MANHOLE
- HYDRANT
- UTILITY POLE
- LIMIT OF EXCAVATION
- LIMIT OF SAND COVER
- LIMIT OF DREDGING AND SAND COVER
- PROPOSED SHEET PILE
- WTR — WATER LINE
- GAS — GAS LINE
- STM — STORM SEWER
- MGP — MANUFACTURED GAS PLANT
- FORMER BUILDINGS
- STRUCTURES FORMER MGP PROCESS
- EX-1 — PROPOSED GROUNDWATER EXTRACTION WELL
- PROPOSED GROUNDWATER CONVEYANCE PIPING

SOURCE NOTE:
THIS MAP WAS DEVELOPED FROM DRAWINGS BY SIMON HYDRO-SEARCH, DATED 02/11/94, DRAWING NO. 3075-d8 AND DRAWING NO. 3075-d2, DATED 11/15/93, PROJECT 304533075, A MAP FROM THE CITY OF STEVENS POINT, DRAWING E2 M-1461, DATE UNKNOWN, A MAP FROM THE CITY OF STEVENS POINT, DRAWING A-3 M-1456, DATED 1986, AND DRAWINGS FROM WISCONSIN PUBLIC SERVICE CORP., WSK509.DWG AND STPTGAS.DWG, AND A DIGITAL FILE DOWNLOADED FROM www.gisinfo.co.portage.wi.us, ON 12/17/08. GAS LINE TAKEN FROM WSK509.DWG AND ABANDONED GAS LINE TAKEN FROM WPSC W.O. 0013098081, STEVENS POINT AREA MAP NO. 2106-252. ALL LOCATIONS INCLUDING UTILITIES ARE APPROXIMATE.
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POND SEDIMENT SAMPLINGS FIELD MEASURED BY NRT.
UNSURVEYED PORTION OF RIVER AND ISLAND FROM EARTHVISIONS U.S. TERRAIN SERIES © EARTHVISIONS, INC. 603-433-8500.

NOTES:
SUBSURFACE UTILITY LINE AND FORMER STRUCTURES/BUILDINGS LOCATIONS ARE APPROXIMATE.

N

0 50 100
SCALE IN FEET

REMEDIAL ALTERNATIVES 4A & 4B

FEASIBILITY STUDY REPORT (REVISION 1)
WISCONSIN PUBLIC SERVICE CORPORATION
FORMER MANUFACTURED GAS PLANT, STEVENS POINT, WISCONSIN

DRAWN BY: RLH	CHECKED BY: HMS	APPROVED BY: HMS
DATE: 05/31/11	DATE: 05/31/11	DATE: 05/31/11

DRAWING NO: 1177-152-B07
REFERENCE: NONE

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 1177/15.2

FIGURE NO. 7

TABLES

Table 1 - Preliminary ARARs and TBCs
Wisconsin Public Service - Former Stevens Point Manufactured Gas Plant Site
1111 Crosby Avenue, Stevens Point, Wisconsin
USEPA WIN000509983 / BRRTS # 02-50-000079 / FID # 750081200

Chemical-Specific ARARs/TBC

STANDARD, REQUIREMENT, CRITERIA, LIMITATION	CITATION	MEDIA	POTENTIAL ARAR / TBC	REQUIREMENT/COMMENTS
WISCONSIN				
Groundwater Quality Standards	Wis. Admin. Code (WAC) ch. NR 140	Groundwater	ARAR	Establishes groundwater quality standards; NR 140 enforcement standards equivalent to federal Safe Drinking Water Act maximum contaminant levels (MCL)
Soil cleanup standards	WAC chs. 720 and 722	Soil	ARAR	Includes generic, site specific, and performance-based soil cleanup standards; protects against groundwater contamination and direct contact exposure
Hazardous Waste	WAC chs. NR 660-679	Hazardous Waste	ARAR	Applies generally to the treatment, storage and disposal of identified hazardous wastes
Air Quality Standards	Wis Stat. ch. 285; WAC chs. NR 404, 415, 419, 431, 440, 445.	Air	ARAR	Establishes air pollution control standards for removal, treatment and disposal of contaminated sediments and surface water; includes control of dust or emissions from treatment systems, grading or other earth work
Control of Organic Compound Emissions	WAC § NR 419.07	Air	ARAR	Applies to all facilities and procedures used to remediate or dispose of soil or water contaminated with organic compounds which are direct air contaminant sources to their owners and operators.
Sediment Quality	WAC chs. NR 105 – 106; WDNR Guidance Document: "Assessing Sediment Quality in Water Bodies Associated with Manufactured Gas Plant Sites" (WDNR PUBL-WR-447-96, March 1996)	Sediment	To Be Considered (TBC)	DNR guidance document provides framework for investigating potential sediment contamination at MGP sites
Surface Water Quality Standards	Wis. Stats. ch. 281; WAC chs. NR 102-105, 207	Sediment	TBC	WQS applies to surface water; with respect to sediment, a TBC (WQS applicable to point source discharges are addressed as Action-specific ARARs)
FEDERAL				
Resource Conservation and Recovery Act (RCRA)	40 C.F.R. § 260 et seq. – waste characterization and handling requirement Land disposal restrictions (40 C.F.R. § 268)	Hazardous Wastes	ARAR	Establishes standard for hazardous waste characterization, storage, treatment and disposal; removed materials may be subject to RCRA requirements if a hazardous waste
Clean Air Act (CAA)	Air Quality Standards (40 C.F.R. § 50)	Air	ARAR	Establishes federal standards for various pollutants from mobile construction/ remediation sources
Clean Water Act (CWA) (Section 304)	Water quality standards (40 C.F.R.. § 131) Discharge of dredge/fill material (33 C.F.R. § 323) Federal Total Maximum Daily Loads (TMDLs) for impaired waters (40 C.F.R. § 130.7)	Surface Water	TBC	Federal WQS are ARARs for point source discharges where state has not adopted standards. Federal WQS are TBC for Wisconsin as Wisconsin has adopted WQS applicable to point source discharges from remedial action.

Table 1 - Preliminary ARARs and TBCs
Wisconsin Public Service - Former Stevens Point Manufactured Gas Plant Site
1111 Crosby Avenue, Stevens Point, Wisconsin
USEPA WIN000509983 / BRRTS # 02-50-000079 / FID # 750081200

Location-Specific ARARs/TBC

STANDARD, REQUIREMENT, CRITERIA, LIMITATION	CITATION	MEDIA	POTENTIAL ARAR / TBC	REQUIREMENT/COMMENTS
WISCONSIN				
Water Quality Standards for Wetlands	Water Quality Standards for Wetlands (WAC ch. NR 103)	Wetlands	**ARAR**	Establishes water quality standards for wetlands; applicable to all determinations that affect wetlands
FEDERAL				
National Environmental Policy Act (NEPA)	Floodplain Management Executive Order 11988 (40 C.F.R. Part 6, App. A)	Floodplains	ARAR	Regulates construction in floodplains and evaluates adverse effects associated with direct/indirect development of floodplains
CWA and NEPA	Wetlands: Permits for Dredge and Fill (CWA Section 404; 33 C.F.R. Part 330); Protection of Wetlands Executive Order 11990 (40 C.F.R. Part 6, App. A)	Wetlands	ARAR	Regulates construction/remediation in wetlands; requires that no activity that adversely affects a wetlands shall be permitted if a practicable alternative that has less effect is available
Fish and Wildlife Coordination Act	16 U.S.C. §§661-667e	Surface water body modification; endangered species; migratory species	ARAR	Requires coordination/consultation with Federal and State agencies to provide protection of fish and wildlife from actions that affect species and habitat; requires consultation with U.S. Fish and Wildlife Service prior to water body modification
Endangered Species Act (ESA)	Species/habitat protection (50 C.F.R. Parts 17 and 402)	Endangered/ threatened species and habitat	ARAR	Only relevant if threatened and/or endangered species are present in vicinity of site
Wild and Scenic Rivers Act	Waterway protection (36 C.F.R. § Part 297)	Rivers	ARAR	Establishes requirements to protect wild, scenic, or recreational rivers

Table 1 - Preliminary ARARs and TBCs
Wisconsin Public Service - Former Stevens Point Manufactured Gas Plant Site
1111 Crosby Avenue, Stevens Point, Wisconsin
USEPA WIN000509983 / BRRTS # 02-50-000079 / FID # 750081200

Action-Specific ARARs

STANDARD, REQUIREMENT, CRITERIA, LIMITATION	CITATION	MEDIA	POTENTIAL ARAR / TBC	REQUIREMENT/COMMENTS
WISCONSIN				
Water Quality Standards (WQS)	Wis. Stats. ch. 281; WAC chs. NR 102-105	Surface Waters	ARAR	Surface WQS are applicable only to point source discharges that may be part of a remedial action.
Water Quality Analytical Test Methods	WAC ch. NR 219	Surface Waters	ARAR	Establishes analytical test methods applicable to effluent limitations for discharges from point sources.
Miscellaneous Structures in Navigable Waters	Wis. Stats. ch. 30; WAC ch. NR 329	Surface waters; sediment	ARAR	Minimize adverse effects of structures in waterways; requires permits for structures placed on, and/or dredging of, the beds of navigable waters.
Wisconsin Pollutant Discharge Elimination System (WPDES)	Wis. Stat. ch. 283; WAC chs. NR 102, 104, 105, 106, 200, 207, 219, 220	Surface Waters	ARAR	Requires compliance with permit limitations for discharge to navigable waters (including water quality effluent limits, water quality standards, state performance standards and toxic and pretreatment effluent standards) for actions involving discharges of effluent associated with dredging operations.
Dredging Requirements	Wis. Stat. § 30.20; WAC chs. 345-47	Surface waters; sediment	ARAR (if dredging)	For specific types of dredging projects, establishes sediment sampling and analysis requirements, evaluation criteria for dredging sites and disposal sites, and monitoring requirements for dredging projects regulated by the State for the removal, transport and disposal of sediments
Solid Waste Management	Wis. Stats. ch. 289; WAC chs. NR 500-590	Solid waste	ARAR	Establishes storage, transportation and disposal requirements for managing solid waste
Hazardous Waste Management	Wis. Stat. ch. 291; WAC chs. NR 661, 662, 664	Hazardous Waste	ARAR	Applicable to wastes generated on-site during remedial action; identification and listing of hazardous waste; specifies requirements that apply to small quantity generators of hazardous waste; specifies general requirements that apply to the storage, treatment and disposal of hazardous waste
Hazardous Substance Discharge	WAC ch. NR 706	Hazardous Substances	ARAR	Notification procedures and responsibilities for discharger of hazardous substances that may occur during remedial work, including containment, cleanup, disposal and restoration
Groundwater Protection Standards	Groundwater Monitoring Well Requirements (WAC ch. NR 141)	Groundwater	ARAR	Provides standards for design, construction, installation, abandonment and documentation of groundwater monitoring wells
Endangered and Threatened Species protection	Wis. Stats. ch. 29.604; WAC ch. 27	Endangered/threatened species	ARAR	Applies only if threatened or endangered species exist at or in certain areas around site; establishes requirements for minimizing affects on such species
Soil Cleanup Requirements	WAC ch. NR 720	Soil	ARAR	(See above) Specifies soil criteria to be used in conjunction with remedial actions

Table 1 - Preliminary ARARs and TBCs
Wisconsin Public Service - Former Stevens Point Manufactured Gas Plant Site
1111 Crosby Avenue, Stevens Point, Wisconsin
USEPA WIN000509983 / BRRTS # 02-50-000079 / FID # 750081200

Action-Specific ARARs

STANDARD, REQUIREMENT, CRITERIA, LIMITATION	CITATION	MEDIA	POTENTIAL ARAR / TBC	REQUIREMENT/COMMENTS
FEDERAL				
CWA	National Pollutant Discharge Elimination System (NPDES) (40 C.F.R. §§ 122 and 125)	Surface waters	ARAR	Relevant for any wastewater discharge of treated groundwater to surface water body during course of remediation; establishes criteria and standards for imposing treatment requirements in permits.
CWA (Section 304)	Ambient Water Quality Criteria (40 C.F.R. Part 130)	Surface waters	ARAR	Ambient Water Quality Criteria for the protection of aquatic life and human health developed for discharging treated water to a navigable waterway
CWA	NPDES (40 C.F.R. Part 403)	Publicly Owned Treatment Works (POTW)	ARAR	Relevant to discharge of treated groundwater to POTW; establishes standards and requirements for discharge to a POTW
RCRA	Hazardous Waste Management System – General (40 C.F.R. Part 260) and Identification and Listing of Hazardous Waste (40 C.F.R. Part 261)	Offsite land disposal hazardous waste	ARAR	Identifies solid wastes subject to regulation as hazardous wastes and provides general standards for handling and disposal of hazardous wastes
RCRA	Standards for Hazardous Waste Generators (40 C.F.R. Part 262) and Hazardous Waste Transporters (40 C.F.R. Part 263)	Offsite land disposal hazardous waste	ARAR	General requirements for packaging, labeling, marking, and manifesting RCRA hazardous wastes for temporary storage and transportation offsite
RCRA	Land Disposal Restriction (40 C.F.R. Part 268)	Offsite land disposal hazardous waste	ARAR	Identifies hazardous wastes that are restricted from land disposal
RCRA	Municipal Solid Waste Landfills (40 C.F.R. Part 258)	Offsite land disposal non-hazardous waste	ARAR	Applicable to remedial actions that involve generation of non-hazardous waste; minimum national criteria for management of non-hazardous waste
U.S. Department of Transportation	Hazardous Waste Transport (49 C.F.R. Parts 107, 171 and 172)	Offsite land disposal hazardous waste	ARAR	Applies to transportation, packaging and labeling of hazardous materials on public roadways
Rivers and Harbors Act, Section 10	33 C.F.R. Parts 320-323	Navigable waterway	ARAR	Applicable to site capping activities on sediment or navigable waterway; prohibits unauthorized obstruction or alteration of any navigable waterway or activities that could impede navigation and commerce

Table 2 - General Response Actions
Wisconsin Public Service - Former Stevens Point Manufactured Gas Plant Site
1111 Crosby Avenue, Stevens Point, Wisconsin
USEPA WIN000509983 / BRRTS # 02-50-000079 / FID # 750081200

		Process Option		
General Response Action	**Remedial Technology**	**Soil**	**Groundwater**	**Sediment**
No Action	None	• None	• None	• None
Institutional Controls	Access and Use Restrictions	• Zoning Restrictions • Deed Covenants • Fencing/Signs	• Zoning Restrictions • Deed Covenants • Groundwater Use Restrictions	• Dredging Restrictions • Direct Contact and Anchoring Restrictions • Signs
	Environmental Monitoring	• None	• Groundwater Monitoring	• Sediment Monitoring
Containment	Barriers	• Soil Cover • Engineered Cover	• Hydraulic Containment • Vertical Barrier	• Capping
In-Situ Treatment	Physical	• Multi-phase Extraction • Solidification/Stabilization	• Air Sparging • Permeable Reactive Barrier • Multi-phase Extraction	• None
	Chemical	• Chemical Oxidation	• Chemical Oxidation	• None
	Thermal	• In-situ Heated Soil Vapor Extr	• None	• None
	Biological	• Bioventing • Phytoremediation • Enhanced In-situ Biodegradation	• Monitored Natural Attenuation • Phytoremediation • Enhanced In-situ Biodegradation	• Monitored Natural Recovery
Collection/Exctraction/Removal	Removal	• Excavation	• Interceptor Trenches • Extraction Wells	• Dredging
Ex-situ Treatment	Physical/Chemical	• None	• Activated Carbon • Air Stripping • Chemical/UV Oxidation • Separation	• None
	Thermal	• Thermal Desorption	• None	• None
	Biological	• Biopiles • Landfarming	• Bioreactors	• Landfarming
Discharge/Disposal	On-site	• Return to Excavation • Consolidation	• Reinjection • Discharge to Surface Water	• Water from dewatered sediment treated in on-site water treatment system and discharged to surface water
	Off-site	• Landfilling	• Publicly Owned Treatment Works	• Landfilling

= Process option elimiated

Table 3 - Description of Potential Process Options
Wisconsin Public Service - Former Stevens Point Manufactured Gas Plant Site
1111 Crosby Avenue, Stevens Point, Wisconsin
USEPA WIN000509983 / BRRTS # 02-50-000079 / FID # 750081200

General Response Action and Remedial Technology	Description of Process Option	Effectiveness	Implementability	Relative Cost	Status for Remedial Alternative Assembly
Soil					
No Action - None	• No action taken to reduce or monitor site risks.	• No added risk during short term • Not proven or reliable	• Easy implementation	Low	Retained
Institutional Controls - Access and Use Restrictions	• Zoning Restrictions: Through community zoning ordinances, restrict land use within a given area.	• Could be conducted to address properties within entire impacted area • Minimal potential short term exposure risk • Administratively effective and reliable	• Require approval by third-party property owners, if any • Administratively implementable assuming property owner approval	Low	Retained
	• Deed Covenants: With legal instruments of property transfer (e.g., deeds, easements, mortgages, leases), limiting activities that would increase risk, and mange further development.	• Could be written and filed to address real estate within entire impacted area • Minimal potential short term exposure risk • Administratively effective and reliable	• Require approval by third-party property owners, if any • Administratively implementable assuming property owner approval	Low	Retained
	• Fencing/Signs: Controls that are installed to prevent access and/or warn of the presence of site-related contaminants.	• Could be configured to address entire impacted area • Minimal potential short term exposure risk • Effective and reliable in reducing direct exposure risk; ineffective for addressing COC in vadose zone soils from leaching to groundwater	• Requires approval by third-party property owners, if any • Easy implementation • Administratively implementable assuming property owner approval	Low	Retained
Collection/Extraction/ Removal	• Excavation: Contaminated soils are excavated followed by on-site or off-site treatment and/or disposal.	• Effective at reducing direct exposure risk and leaching of COCs from soil to groundwater • Combine with another process option to be effective • Moderate potential short term exposure risk (vapor, odors, and construction worker and community exposures) • Require engineering, erosion and access controls during construction for managing fugitive emissions, sediment, and public access	• Shoring may be required based on geotechnical evaluation and/or excavation areas adjacent to infrastructures • Require dewatering of excavations and treatment of generated wastewater • Limited by underground utilities, structures and depth of contamination	Moderate	Retained
Ex-situ Treatment	• Thermal Desorption: Excavated soil is processed through a thermal-desorption unit that uses indirect or direct heat exchange to vaporize organic contaminants and water. Thermal desorption generally heats the soil up to 1200°F, and off-gases are captured and thermally destroyed in an oxidizer at temperatures up to 2000°F.	• Combined with excavation; limited by the volume of contaminated soil excavated • Effective at reducing VOCs and PAHs concentrations; proven at other MGP sites • BTU, moisture content and sulfur could limit the effectiveness of treatment • Thermal treated soil could be beneficially reused as backfill • Moderate potential short term exposure risk (vapor, odors, and construction worker and community exposures) • Require engineering, erosion and access controls during construction for managing fugitive emissions, sediment, and public access	• Air permitting and monitoring are required • Soil requires processing prior to treatment • Limited qualified contractors and equipment • Limited to availability of space	Moderate to High	Eliminated (high moisture content limit effectiveness)
	• Biopiles: Excavated soils are mixed with soil amendments and placed in aboveground enclosures. It is an aerated static pile composting process in which compost is formed into piles and aerated with blowers or vacuum pumps.	• Effective at treating nonhalogenated VOCs and fuel hydrocarbons, but effectiveness vary in treating halogenated VOCs and SVOCs • High potential to require an air treatment system • Require air distribution system buried under the soil • Require engineering, erosion and access controls for managing fugitive emissions, sediment, and public access	• Limited to availability of space • Topography, erosion, climate, and soil type and permeability at the site dependant on implementability • Require permitting • Treatability and pilot testing is required	Moderate to High	Eliminated (difficult to implement)
	• Landfarming: Contaminated soil, sediment, or sludge is excavated, applied into lined beds, and periodically turned over or tilled to aerate the waste to promote volatilization of VOCs from media and to enhance biodegradation.	• Effective at treating highly volatile hydrocarbons • Marginally effective at treating PAHs • Potential for causing air pollution; therefore may require air treatment • Require engineering, erosion and access controls for managing fugitive emissions, sediment, and public access • Require a runoff collection facility, and possibly require treatment	• Limited to availability of space • Topography, erosion, climate, and soil type and permeability at the site dependant on implementability • Require permitting • Pilot testing would be required	Low to Moderate	Eliminated (difficult to implement; marginally effective with PAHs)
Discharge/Disposal - Off-site	• Landfilling: Treated or untreated soils are disposed of at an off-site state licensed landfill.	• Combined with excavation; thereby limited to the volume of contaminated soil excavated • Moderate potential short term exposure risk (vapor, odors, and construction worker and community exposures) • Effective at reducing direct exposure risk and leaching of COCs from soil to groundwater	• Transportation of the soil through populate areas may affect community acceptance due to noise, potential accidents, and use of carbon-based fuels. • Limited by disposal facility availability and approval	Moderate	Retained

Table 3 - Description of Potential Process Options
Wisconsin Public Service - Former Stevens Point Manufactured Gas Plant Site
1111 Crosby Avenue, Stevens Point, Wisconsin
USEPA WIN000509983 / BRRTS # 02-50-000079 / FID # 750081200

General Response Action and Remedial Technology	Description of Process Option	Effectiveness	Implementability	Relative Cost	Status for Remedial Alternative Assembly
Groundwater					
No Action - None	◆ No action taken to reduce or monitor site risks.	◆ No added risk during short term ◆ Not proven or reliable	◆ Easy implementation	Low	Retained
Institutional Controls - Access and Use Restrictions	◆ Groundwater Use Restrictions: Through community ordinance, require a permit for installation of groundwater wells and prohibit installation of new wells within the institutional control zone.	◆ Could be conducted to address properties within entire impacted area ◆ Minimal potential short term exposure risk ◆ Administratively effective and reliable; relies on local government action to establish, enforce and restrict	◆ Require approval by third-party property owners, if any ◆ Administratively implementable assuming property owner approval	Low	Retained
	◆ Deed Covenants: With legal instruments of property transfer (e.g., deeds, easements, mortgages, leases), prohibit installation and use of groundwater wells for potable and/or non-potable purposes, and mange further development.	◆ Could be written and filed to address real estate within entire impacted area ◆ Minimal potential short term exposure risk ◆ Administratively effective and reliable	◆ Require approval by third-party property owners, if any ◆ Administratively implementable assuming property owner approval	Low	Retained
Institutional Controls - Environmental Monitoring	◆ Groundwater Monitoring: Perform water quality analysis to monitor contaminant concentrations over time and to assess future environmental effects and compliance with remedial action objectives.	◆ Minimal potential short term exposure ◆ Could be combined with other process option to be more effective	◆ Easy implementation	Low	Retained
Containment - Barriers	◆ Hydraulic Containment: Isolate contamination by restricting or capturing groundwater flow from the contamination zone through the use of extraction wells or trenches.	◆ Groundwater treatment system required; operation and maintenance required ◆ Less effective in-situ remedial solution without combined with another process option ◆ DNAPL is difficult to extract from the subsurface ◆ Heterogeneous conditions and low permeabilities in the subsurface can limit effectiveness ◆ Low potential for short term exposures	◆ Implementability would be difficult with presence of extensive amounts of debris and subsurface structures ◆ Treatment process may not be available for treating some constituents (i.e. inorganics)	Low to Moderate	Retained
	◆ Vertical Barrier: Containment of contaminated groundwater using vertical barrier walls (i.e. frozen soil barriers, slurry wall barriers, sheet piling, jet grouting etc.). Purpose of containment would be to limit exposure to sensitive receptors) (i.e. surface water and groundwater exposure pathways). The bottom of wall typically keyed into a low permeability layer.	◆ Could effectively contain impacted groundwater > 30 years ◆ Moderate potential short term exposure risk (vapor, odors, and construction worker and community exposures) ◆ Significant quantities of DNAPL could limit effectiveness of jet grouting barriers ◆ Absence of an aquitard at depth limits long term effectiveness	◆ Geotechnical evaluation of containment area would be necessary for design and construction ◆ Additional potential implementability constraints depending on type of barrier used ◆ Site-specific space restrictions could inhibit implementability ◆ Implementability would be difficult with presence of extensive amounts of debris and subsurface structures ◆ Treatability and/or pilot testing would be required depending on selected vertical barrier wall technology	Moderate to High	Eliminated (bedrock inadequate as an aquitard; weathered, ungulate, and not competent)
In-situ Treatment	◆ Air Sparging: Removes VOCs and high-vapor pressure SVOCs from groundwater and saturated soil by forcing air into the saturated zone and inducing air flow through the soil matrix. Typically combined with soil vapor extraction to collect contaminated vapor prior to reaching the ground surface.	◆ Effective at treating VOCs, but less effective for SVOCs ◆ Less effective where DNAPL present ◆ Could be combined with another process option (i.e. soil vapor extraction) to be more effective ◆ Heterogeneous conditions and low permeabilities in the subsurface could limit effectiveness ◆ Controlling spread of contamination could limit technology effectiveness.	◆ Pilot testing is required ◆ Permit is required ◆ Implementability would be difficult with presence of extensive amounts of debris and subsurface structures, or low permeability soil	Low to Moderate	Eliminated (less effective on SVOCs)
	◆ Permeable Reactive Barrier : This technology would remediate groundwater affected by MGP residuals by actively or passively treating GW as it passes through a permeable treatment wall. Walls can be designed with reactive media appropriate for treatment of site-specific constituents present in the groundwater - can be designed as a continuous treatment wall or with a "funnel and gate" design.	◆ Deep contamination and fluctuating hydraulic gradients could limit effectiveness ◆ Potentially ineffective on treating/removing DNAPL ◆ Absence of an aquitard at depth limits long term effectiveness	◆ Treatability and pilot testing would be required ◆ Permit may be required	Moderate to High	Eliminated (bedrock inadequate as an aquitard; weathered, ungulate, and not competent)
	◆ Multi-phase Extraction (MPE): MPE is an enhancement of the traditional SVE system. Both groundwater and soil vapor are simultaneously extracted. Extracted liquids and vapor are collected and treated for disposal, or re-injected to the subsurface. It removes contaminants from above and below the water table. The system lowers the water table around the well, exposing more of the formation.	◆ Heterogeneous conditions and low permeabilities in the subsurface could limit effectiveness ◆ Presence of significant amount of debris could significantly limit effectiveness ◆ Not effective on soils with high organic content or extremely dry ◆ Not effective on contaminants of Henry's Law Constant below 0.01 at 20 deg C (dimensionless) ◆ Could be combined with another process	◆ Require treatment of air and water ◆ Pilot testing is required	Moderate to High	Eliminated (majority of the COCs Henry's Law Constant below 0.01 (dimensionless))
	◆ Monitored Natural Attenuation: Verify that loss of contaminants is naturally occurring and that contaminant degradation and natural processes will reduce contaminant concentrations to acceptable levels. Demonstrate through a groundwater sampling network, contaminant trend analysis, mass balance calculations and modeling.	◆ Potential effectiveness is 0%-99% treatment for various contaminants ◆ Potential for contaminants to migrate before they are degraded ◆ Potentially longer time frame required to achieve remediation objectives compared to active remediation depending on site ◆ Free product, if exist, may be required to be removed	◆ Easy implementation	Low	Retained
	◆ Phytoremediation: Phytoremediation is a process that uses naturally-occurring or genetically engineered vegetation to remove, transfer, stabilize, and destroy contaminants in soil and sediment. Contaminants may be either organic or inorganic. Poplar tree is a typical plant species used since it adapt well to wet environments and its root structure can promote water withdrawal or hydraulic control in shallow groundwater. Phytoremediation techniques also include engineered	◆ Treatment zone is determined by plants used; usually limited to shallow soils ◆ High concentrations of hazardous materials can be toxic to plants ◆ Dependant on climatic or seasonal conditions, which may interfere or inhibit plant growth, slow remediation efforts, or increase the length of the treatment period ◆ Effective for removal of metals and PAHs ◆ Potentially long time frame required to achieve remedial objectives	◆ Potential for community not to accept option ◆ Treatability and pilot testing would be required ◆ Limited by the availability of space	Low to Moderate	Eliminated (availability of space is limited)
	◆ Enhanced In-situ Biodegradation: Uses microorganisms to treat contamination by enhancing natural biodegradation mechanisms through the addition of microbes, nutrients, electron donors, and/or electron acceptors. Amendments can be applied using injection wells or infiltration galleries.	◆ Effective at degradation of VOCs, less effective for PAHs ◆ Heterogeneous conditions and low permeabilities in the subsurface can limit effectiveness ◆ Groundwater circulation system may be installed so that contaminants do not escape from zones of active biodegradation ◆ Potential for vapors to migrate in basements, utility corridors, or other prevential flow paths ◆ Potential for migration of DNAPL and/or contaminants into deeper hydrologic units	◆ Treatability and pilot testing would be required ◆ Require a permit	Moderate to High	Eliminated (less effective for PAHs)

Table 3 - Description of Potential Process Options
Wisconsin Public Service - Former Stevens Point Manufactured Gas Plant Site
1111 Crosby Avenue, Stevens Point, Wisconsin
USEPA WIN000509983 / BRRTS # 02-50-000079 / FID # 750081200

General Response Action and Remedial Technology	Description of Process Option	Effectiveness	Implementability	Relative Cost	Status for Remedial Alternative Assembly
Collection/Extraction/ Removal	◆ Interceptor Trenches: Trenches, drains, and piping are used to capture groundwater flow from the contamination zone to discharge location.	◆ Groundwater treatment system required; operation and maintenance required ◆ Less effective in-situ remedial solution without combined with other process option ◆ DNAPL is difficult to extract from the subsurface ◆ Heterogeneous conditions and low permeabilities in the subsurface can limit effectiveness	◆ Implementability would be difficult with presence of extensive amounts of debris and subsurface structures ◆ Pilot testing and/or modeling required	Low to Moderate	Retained
	◆ Extraction Wells: Wells are installed to collect groundwater through pumping to capture groundwater flow from the contamination zone.	◆ Groundwater treatment system required; operation and maintenance required ◆ Less effective in-situ remedial solution without combined with other process option ◆ DNAPL is difficult to extract from the subsurface ◆ Heterogeneous conditions and low permeabilities in the subsurface can limit effectiveness	◆ Implementability would be difficult with presence of extensive amounts of debris and subsurface structures ◆ Pilot testing and/or modeling required	Low to Moderate	Retained
Ex-situ Treatment	◆ Activated Carbon: Contaminated groundwater is extracted and is pumped through one or more vessels containing activated carbon to which dissolved organic contaminants adsorb. Periodically the carbon requires to be replaced.	◆ Effective for removing contaminants at low concentrations (less than 10 mg/L) at nearly any flow rate ◆ Potential for fouling of the carbon from water with high suspended solids, iron and oil & grease ◆ Spent carbon need to be regenerated or disposed	◆ Equipment readily available	Low to Moderate	Retained
	◆ Air Stripping: Contaminated groundwater is extracted and is put into contact with air. Volatile organics are partitioned from extracted groundwater by increasing surface area of the contaminated water exposed to air. The contaminant mass of volatile contaminants are transferred from liquid-phase to gas-phase.	◆ Potential for inorganic or biological fouling of the equipment, require frequent cleaning ◆ Effective only for contaminated water with VOC and SVOC concentrations with dimensionless Henry's constant greater than 0.01 ◆ Potential for high energy cost ◆ Potential for off-gases requiring treatment	◆ Air permit required ◆ Equipment readily available	Low to Moderate	Retained
	◆ Chemical/UV Oxidation: Destruction process that oxidizes organic constituents in wastewater by the addition of strong oxidizers and irradiation with UV light.	◆ Effective on petroleum hydrocarbons ◆ Potential for high turbidity to interfere with the transmission of UV light ◆ Potential for fouling of the equipment with high concentrations of heavy metals (greater than 10 mg/L) or insoluble oil/grease ◆ Potential for off-gases requiring treatment ◆ Potential for high energy cost ◆ Require on-going cleaning and maintenance of equipment	◆ Pilot testing may be required	Low to Moderate	Retained
	◆ Separation: Detach contaminants from the extracted groundwater through physical and chemical means such as distillation, filtration/ultrafiltration/microfiltration, membrane separation and phase separation	◆ Potential for oil & grease to decrease flow rate and interfere with the separation process ◆ Potential for high energy cost ◆ Disposal of spent media	◆ Easy implementation ◆ Equipment readily available	Low to Moderate	Retained
	◆ Bioreactors: Contaminated groundwater is extracted and is put into contact with microorganisms in attached or suspended growth biological reactors (e.g., activated sludge, fluidized beds, batch reactors).	◆ Effective at treating SVOCs, hydrocarbons, and biodegrable organic material ◆ Potential for groundwater not to contain adequate microbial population density to be effective ◆ Very high contaminant concentrations may be toxic to microorganisms, may require special design approaches ◆ Air pollution controls may be required if there is volatilization from activate sludge processes ◆ Low ambient temperatures significantly decrease biodegradation rates; longer time or increase cost for heating ◆ Potential for nuisance microorganisms to colonize bioreactors, reduce effectiveness ◆ Residuals from sludge processes require treatment or disposal	◆ Treatability and pilot testing required ◆ Potential for community not to accept option ◆ Equipment may not be readily available	High	Eliminated (less expensive options are available)
Discharge/Disposal - On-site	◆ Reinjection: Reinject treated groundwater meeting discharge limits to groundwater.	◆ Combined with another process option to treat generated wastewater effectively	◆ Permit required ◆ Potential for negative public perception	Low to Moderate	Eliminated (surface water and POTW are readily available)
	◆ Discharge to Surface Water: Discharge treated groundwater meeting discharge limits to on-site surface water body.	◆ Combined with another process option to treat generated wastewater effectively ◆ Limited by on-site surface water body discharge requirements	◆ Permit required ◆ Pilot testing or modeling may be required	Low	Retained
Discharge/Disposal - Off-site	◆ Publicly Owned Treatment Works: Discharge treated groundwater meeting discharge limits to municipal sewer for treatment at local public wastewater treatment facility.	◆ Combined with another process option to treat generated wastewater effectively ◆ Limited by the POTW acceptable discharge rate and contaminant concentration	◆ Permit required	High	Retained

Table 3 - Description of Potential Process Options
Wisconsin Public Service - Former Stevens Point Manufactured Gas Plant Site
1111 Crosby Avenue, Stevens Point, Wisconsin
USEPA WIN000509983 / BRRTS # 02-50-000079 / FID # 750081200

General Response Action and Remedial Technology	Description of Process Option	Effectiveness	Implementability	Relative Cost	Status for Remedial Alternative Assembly
Sediment					
No Action - None	◆ No action taken to reduce or monitor site risks.	◆ No added risk during short term ◆ Not proven or reliable	◆ Easy implementation ◆ Potential for negative public perception	Low	Retained
Institutional Controls - Access and Use Restrictions	◆ Dredging/Anchoring Restrictions: Through community ordinance, require a permit for dredging of sediment and prohibit use of boat anchors within the institutional control zone.	◆ Minimal potential short term exposure risk ◆ Administratively effective and reliable; relies on local government action to establish, enforce and restrict	◆ Require approval by third-party property owners, if any ◆ Administratively implementable assuming property owner approval	Low	Eliminated (would not fully address ecological risks)
	◆ Signs: Signs that are installed to prevent access and/or warn of the presence of site-related contaminants in sediment.	◆ Could be configured to address entire impacted area ◆ Minimal potential short term exposure risk (vapor, odors, and construction worker and community exposures) ◆ Effective and reliable in reducing direct exposure risk; ineffective for addressing COC leaching to surface water or isolating contaminants from ecological receptors	◆ Requires approval by third-party property owners, if any ◆ Easy implementation ◆ Administratively implementable assuming property owner approval	Low	Eliminated (would not address ecological risks)
Institutional Controls - Environmental Monitoring	◆ Sediment Monitoring: Perform sediment analyses to monitor contaminant concentrations over time and to assess future environmental effects and compliance with remedial action objectives.	◆ Minimal potential short term exposure ◆ Could be combined with other process option to be more effective	◆ Easy implementation	Low	Retained
Containment - Barriers	◆ Granular cap: Granular material placed on top of sediment to isolate direct contact with the contaminant and reduce exposure risks.	◆ Effective on controlling risk to human health and isolating contaminants from ecological receptors ◆ Effective on controlling sediment from suspending in water column ◆ Potential for scouring or a catastrophic event that could damage the cap ◆ Disruption to the benthic community ◆ Minimal potential short term exposure risk (vapor, odors, and construction worker and community exposures)	◆ May be difficult to place in shallow water, steep slope and unstable sediment ◆ River flow velocities and/or scouring potential may make it difficult to implement ◆ May be implemented around infrastructure (e.g., piers, pilings, buried utilities) ◆ Require adequate water depth to accommodate cap with anticipated uses (e.g., navigation, flood control)	Low to Moderate	Retained
	◆ Reactive cap to enhance chemical isolation with engineered materials (cement, activated carbon, coke)	◆ Encourage fate processes such as sequestration or degradation of contaminants beneath cap ◆ Discourage recontamination of cap ◆ Encourage degradation to eliminate negative consequences of subsequent cap loss	◆ Activated carbon or coke are low-density materials that may not settle rapidly enough to be placed accurately and uniformly, especially in moving surface waters such as rivers or estuaries.	Low to Moderate	Retained
In-situ Treatment - Biological	◆ Monitored Natural Recovery: Verify that loss of contaminants is naturally occurring and that contaminant degradation and natural processes will reduce contaminant concentrations to acceptable levels. Demonstrate through a sediment sampling network, contaminant trend analysis, mass balance calculations and modeling.	◆ Relies on natural deposition of clean sediment to control impacts to environmental receptors ◆ Effectiveness and timeframe of natural recovery is unknown ◆ Does not adversely impact current benthic community	◆ Easy implementation	Low to Moderate	Retained
Ex-situ Treatment - Biological	◆ Landfarming: Contaminated soil, sediment, or sludge is excavated, applied into lined beds, and periodically turned over or tilled to aerate the waste to promote volatilization of VOCs from media and to enhance biodegradation.	◆ Effective at treating more volatile hydrocarbons ◆ Marginally effective at treating PAHs ◆ Moderate potential for short term exposure risk (vapor, odors, and construction worker and community exposures) ◆ Require engineering, erosion and access controls for managing fugitive emissions, sediment, and public access ◆ Require a runoff collection facility, and possibly require treatment	◆ Limited to availability of space ◆ Topography, erosion, climate, and soil type and permeability at the site dependant on implementability ◆ Require permitting ◆ Pilot testing would be required	Moderate to High	Eliminated (availability of space is limited)
Collection/Extraction/ Removal	◆ Dredging: River sediments are removed from the river bottom by means of mechanical and/or hydraulic dredging equipment. Dredged sediments are then treated and/or disposed on- or off-site facility.	◆ Effective at controlling risk to human health and isolating contaminants from ecological receptors ◆ Effective at controlling sediment from suspending in water column ◆ Require engineering, erosion and access controls during construction for managing fugitive emissions, sediment, and public access ◆ Moderate potential short term exposure risk (vapor, odors, and construction worker and community exposures) ◆ Short term disruption to the benthic community ◆ Contaminated sediments may resuspend and be transported downstream	◆ Limited to availability of space for staging and handling of dredge material ◆ Implementability would be difficult with presence of extensive amounts of debris or presence of bedrock or weather bedrock ◆ Typical methods include mechnical or hydraulic ◆ May be implemented via convention excavation method (in the "dry") in shallow waters or if water can be readily diverted, or mechanical or hydraulic methods ◆ Require permitting ◆ River flow velocities may make it difficult to control turbidity ◆ Difficult to remove all contaminated sediment/some residuals may remain	Moderate to High	Retained
Discharge/Disposal - On-site	◆ Water from dewatered sediment treated in on-site water treatment system and discharged to surface water	◆ Combined with another process option to treat generated wastewater effectively ◆ Limited by on-site surface water body discharge requirements	◆ Permit required ◆ Pilot testing or modeling may be required	Low to Moderate	Retained

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Wisconsin Public Service - Former Stevens Point Manufactured Gas Plant Site
1111 Crosby Avenue, Stevens Point, Wisconsin
USEPA WIN000509983 / BRRTS # 02-50-000079 / FID # 750081200

General Response Action and Remedial Technology	Description of Process Option	Effectiveness	Implementability	Relative Cost	Status for Remedial Alternative Assembly
Discharge/Disposal - Off-site	◆ Landfilling: Treated or untreated sediments are disposed of at an off-site state licensed landfill.	◆ Combined with dredging; limited by the volume of contaminated sediment removed ◆ Effective at reducing direct exposure risk and leaching of COCs from sediment to surface water ◆ Moderate potential short term exposure risk (vapor, odors, and construction worker and community exposures)	◆ Transportation of the soil through populate areas may affect community acceptance due to noise, potential accidents, and use of carbon-based fuels. ◆ Limited by disposal facility availability	Moderate to High	Retained

Notes:
DNAPL: Dense Nonaqueous Phase Liquid; DNAPL not present in groundwater at Site.
Response Action for:
Soil
Air
Sediment

Table 4 - Assembly of Remedial Alternatives
Wisconsin Public Service - Former Stevens Point Manufactured Gas Plant Site
1111 Crosby Avenue, Stevens Point, Wisconsin
USEPA WIN000509983 / BRRTS # 02-50-000079 / FID # 750081200

	Remedial Alternative					
	Alt. No. 1	**Alt. No. 2**	**Alt. No. 3a**	**Alt. No. 3b**	**Alt. No. 4a**	**Alt. No. 4b**
	No Action	**Institutional Controls for Soil and Groundwater, Natural Attenuation for Groundwater, and No Action for Pfiffner Pioneer Park Pond Sediment and Wisconsin River Sediment**	**Institutional Controls for Soil and Groundwater, Natural Attenuation for Groundwater, and Sand Cap for Pfiffner Pioneer Park Pond Sediment, and No Action for Wisconsin River**	**Institutional Controls for Soil and Groundwater, Natural Attenuation for Groundwater, and Sand Cap with Activated Carbon for Pfiffner Pioneer Park Pond Sediment, and No Action for Wisconsin River**	**Excavation of a Portion of Former Slough, Institutional Controls for Soil and Groundwater, Groundwater Extraction and Ex-situ Treatment, Dredging and Sand Cover of Pfiffner Pioneer Pond Sediment, and Sand Cover in the Wisconsin River**	**Excavation of a Portion of Former Slough, Institutional Controls for Soil and Groundwater, Groundwater Extraction and Ex-situ Treatment, Dredging and Sand Cover of Pfiffner Pioneer Pond Sediment, and Sand Cover with 6-inch Armor in the Wisconsin River**
Soil Process Options						
1 - No Action	**$0**					
2 - Institutional Controls		**$28,800**	**$28,800**	**$28,800**	**$28,800**	**$28,800**
3 - Excavation and Landfill Disposal					**$2,931,000**	**$2,931,000**
Groundwater Process Options						
1 - No Action	**$0**					
2 - Institutional Controls		**$35,000**	**$35,000**	**$35,000**	**$35,000**	**$35,000**
3 - Monitoring Natural Attenuation		**$0**	**$0**	**$0**		
4 - Extraction and Ex-Situ Treatment of Groundwater					**$566,200**	**$566,200**
Pfiffner Pioneer Park Pond Process Options						
1 - No Action	**$0**	**$0**				
2a - Capping - 6-inch Sand Layer			**$182,300**			
2b - Capping - 6-inch Sand Layer with Activated Carbon				**$197,500**		
3 - Dredging and Landfill Disposal and 6-inch Sand Cover					**$661,400**	**$661,400**
Wisconsin River Process Options						
1 - No Action	**$0**	**$0**	**$0**	**$0**		
2a - Sand Cover					**$438,000**	
2b - Sand Cover with 6-inch Armor						**$476,900**
TOTAL CAPITAL COST TO IMPLEMENT	**$0**	**$63,800**	**$246,100**	**$261,300**	**$4,660,400**	**$4,699,300**
TOTAL ANNUAL O&M COSTS	$0	$57,000	$64,000	$64,000	$215,000	$215,000
5 YEAR REVIEW**	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000
TOTAL PRESENT WORTH COST OVER 30 YEARS AT 5% RATE OF RETURN (ROR)	**$42,000**	**$918,000**	**$952,000**	**$952,000**	**$3,348,300**	**$3,348,300**
TOTAL CAPITAL COST W/ PRESENT WORTH ANNUAL COSTS OVER 30 YEARS AT 5% ROR	**$42,000**	**$982,000**	**$1,198,000**	**$1,213,000**	**$8,009,000**	**$8,048,000**

NOTES:

* Removed during screening.

** 5 Year Review assumed to be conducted for up to 30 years (6 reviews) at 5% rate of return