2014 AMENDMENT TO CITY OF MENOMONIE URBAN STORMWATER PLAN

Prepared For:

City of Menomonie
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Menomonie, WI 54751

Prepared By:

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September 2014

Executive Summary

The following document is intended to provide recommendations for ways to prevent, treat and mitigate the impacts to surface waters from agricultural lands, construction sites and urbanization in the City of Menomonie.

Prevent:

The most effective method of preventing degradation of surface waters is to reduce the volume of surface water runoff and transport of sediment and nutrients emanating from any given piece of land and directly or indirectly discharged to surface waters.

RECOMMENDATION #1:	Consider requiring all lessors of City-owned agricultural lands prepare, submit and adhere to, conservation and nutrient management plans.
RECOMMENDATION #2:	Consider an ordinance to require the preparation, submittal and adherence to conservation and nutrient management plans for all privately-owned agricultural lands within the City.
RECOMMENDATION #3:	Consider potential increases in fines for violations of the erosion control ordinance.
RECOMMENDATION #4:	Consider promoting Low Impact Development by reviewing parking regulations and incentives.
RECOMMENDATION #5:	Consider strengthening the infiltration requirements in the stormwater ordinance in accordance with recent WisDNR regulation updates.
RECOMMENDATION #6:	Consider adding phosphorus removal requirements to the stormwater ordinance in accordance with TMDL regulations.

Treat:

After prevention, the next most effective method of preventing degradation of surface waters is to capture stormwater runoff and reduce the peak rate, volume and/or sediment loads prior to discharge to surface waters.

RECOMMENDATION #7: Consider acquiring the land and commencing design and permitting for Concept Site #7 (17th Street) for construction in 2015.

RECOMMENDATION #8: Consider commencing design and permitting for Concept Sites #2 (21st Avenue), #3 (Wakanda Park), and #5 (2nd Street West) which are located on City-owned lands for construction within the next 5 years.

RECOMMENDATION #9: Consider approaching the owners of Concept Sites #1 (29th Avenue) and #6 (9th Street) to determine if land acquisition would be feasible. If so, commence design and permitting for construction within the next 10 years.

RECOMMENDATION #10: Consider approaching Mayo Clinic Health Systems to determine if any partnering might be available for Concept Site #8 (4th Avenue).

RECOMMENDATION #11: Consider eliminating Concept Site #4 (Junction Trail) from further consideration due to lack of cost-effectiveness and lack of separation to Well #4.

Mitigate:

The final method of preventing degradation to surface waters is to try to mitigate the impacts of sediment and nutrients after they have already reached the surface water.

RECOMMENDATION #12: Consider additional stream bank restoration efforts on Jarrett Creek, Wilson Creek, Galloway Creek and Gilbert Creek.

RECOMMENDATION #13: Consider dredging of backwater areas such as Wolske Bay, Cannery Lagoon, Wilson Creek, Butch's Bay and the mouth of Jarrett Creek.

RECOMMENDATION #14: Consider partnering with Wisconsin DNR to retain a certified limnologist to study Lake Menomin and determine if chemical sequester, chemical algal control and/or biological control would be technically feasible, regulatorily permissible and cost-effective.

2014 Amendment to City of Menomonie
Urban Stormwater Plan
CHAPTER 1 – Introduction

Purpose

The purpose of this report is to discuss how the City of Menomonie can prevent, treat and mitigate the impacts to surface waters from agricultural lands, construction sites and urbanization.

Introduction

The City of Menomonie is located near the downstream end of the Red Cedar River. The Red Cedar River is the main waterway in the Red Cedar River Basin which is a watershed of 1,893 square miles[1] and includes portions of Dunn, St. Croix, Chippewa, Polk, Barron, Rusk, Burnett, Washburn and Sawyer counties.

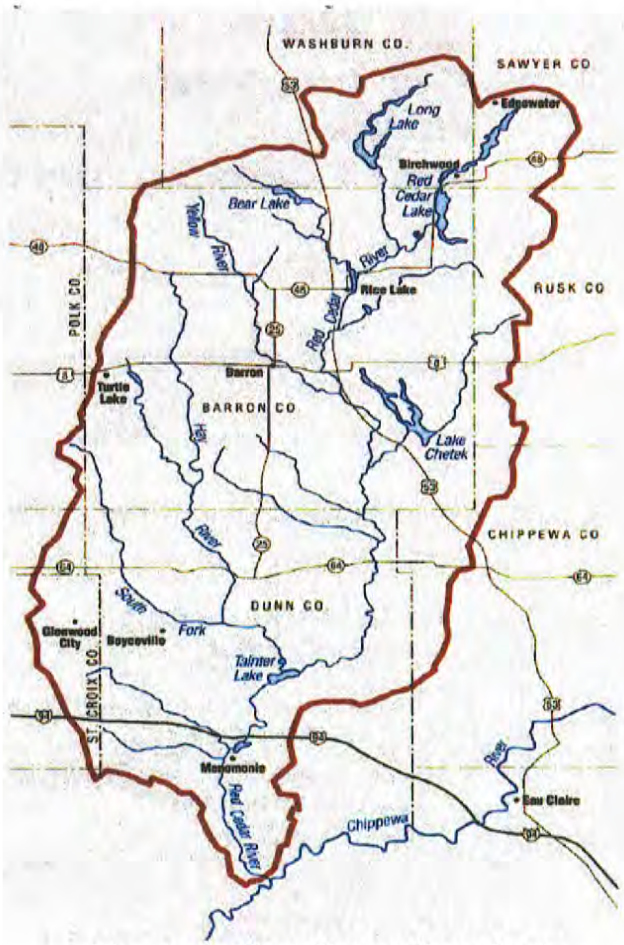

Figure 1: Red Cedar River Basin
(courtesy Wisconsin DNR)

[1] UW-Extension, http://naturalresources.uwex.edu/redcedar/

The City of Menomonie has developed around Lake Menomin which is a 1,405 acre[2] hydroelectric impoundment of the Red Cedar River.

In addition to the Red Cedar River and Lake Menomin, there are four major waterways in the City of Menomonie: Wilson Creek, Gilbert Creek, Galloway Creek and Jarrett Creek. Wilson Creek and Jarrett Creek discharge to Lake Menomin. There are also numerous unnamed minor surface waters and wetlands.

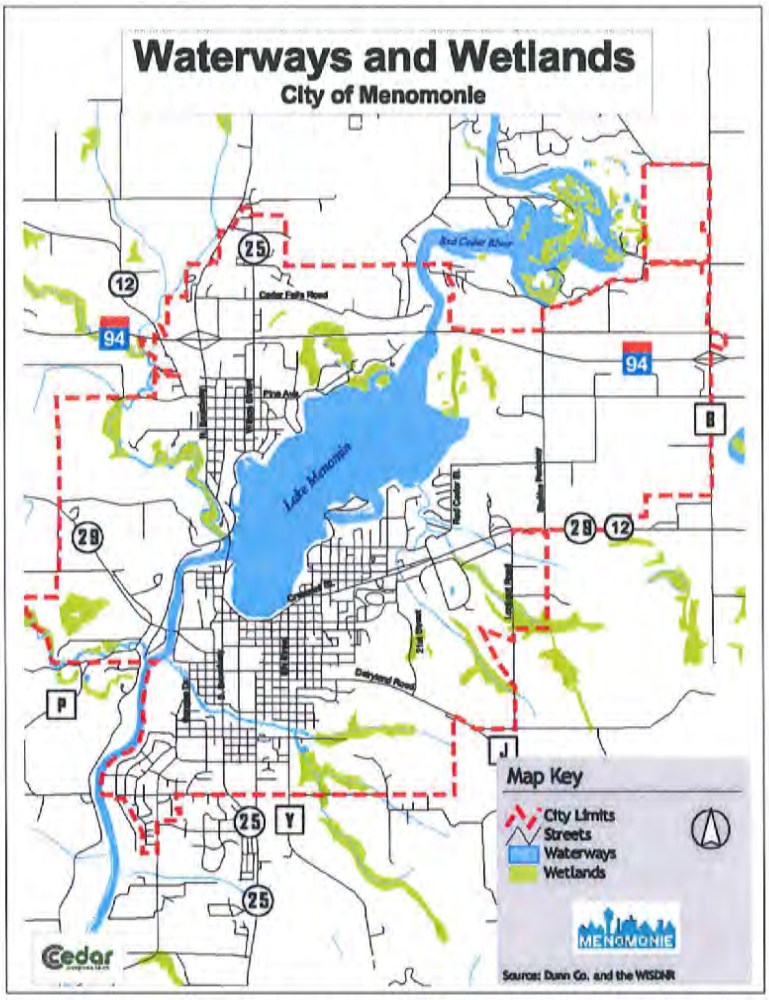

Figure 2: City of Menomonie Waterways & Wetlands

[2] WisDNR, Tainter Lake and Menomin Lake TMDL

Source Waters

There are three major source waters for each of these surface waters:

1. Local surface water runoff.
2. Upstream surface water runoff.
3. Ground-water discharge (also known as "base flow").

Impact of Land Use on Source Waters

As land is developed, the quality of the surface water discharge deteriorates.

Pristine undeveloped watersheds infiltrate most of the annual rainfall total, with only the larger storm events creating surface water runoff. Infiltrated water is taken up by native vegetation or slowly leaves the watershed as ground-water recharge or discharge. The quality of the groundwater discharge and surface water discharge is very good.

Agricultural lands reduce infiltration and increase surface water discharge due to elimination of ground cover vegetation. The quality of the surface water discharge is reduced due to sediment and nutrients.

Construction sites reduce infiltration and increase surface water discharge due to elimination of vegetation and compaction of soils by construction equipment. The quality of the surface water discharge is greatly reduced due to sediment.

Urban development greatly reduces infiltration and greatly increases surface water discharge due to the introduction of impervious surfaces (i.e. roofs, parking lots, roads, etc). The quality of surface water discharge is greatly reduced due to sediment from gravel parking lots and winter road maintenance and nutrients from lawn maintenance.

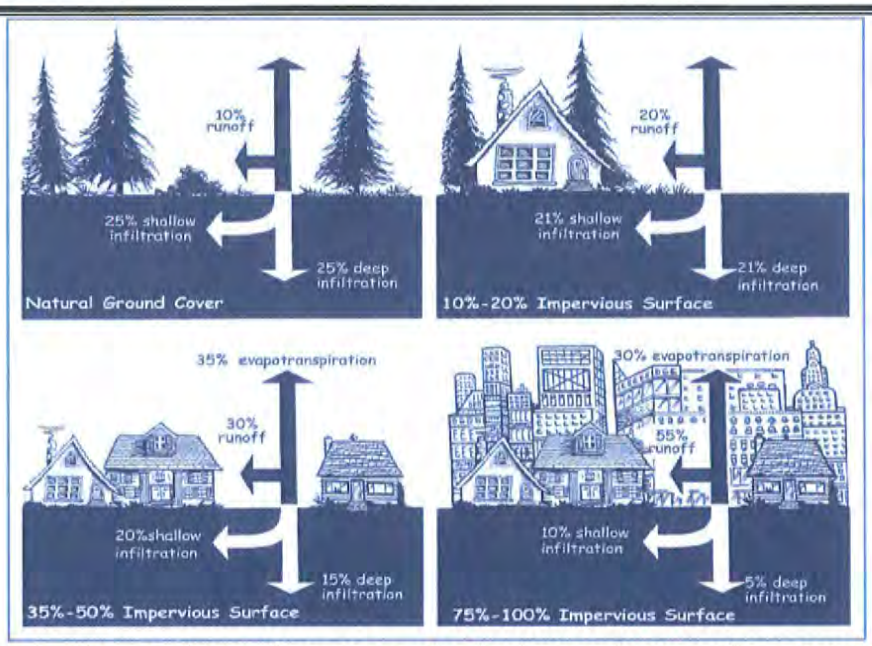

Figure 3: Comparison of source water by impervious surface percentage (courtesy of UW-Extension)

Historical Growth Patterns.

The developed areas of the City of Menomonie have increased since 1920. A large portion of the City's growth is attributed to the increased use of rail transportation for industry and completion of Interstate 94 in the 1960's. Developed areas within the City of Menomonie in 1920 and 2010 are shown in Figures 4 and 5, respectively.

For much of this growth period, the preferred method of managing stormwater was to collect it and convey it to the nearest waterway as quickly as possible. As a result, stormwater runoff from much of the existing development within the City drains, more or less, directly to surface waters.

Figure 4: City of Menomonie 1920 Developed Areas

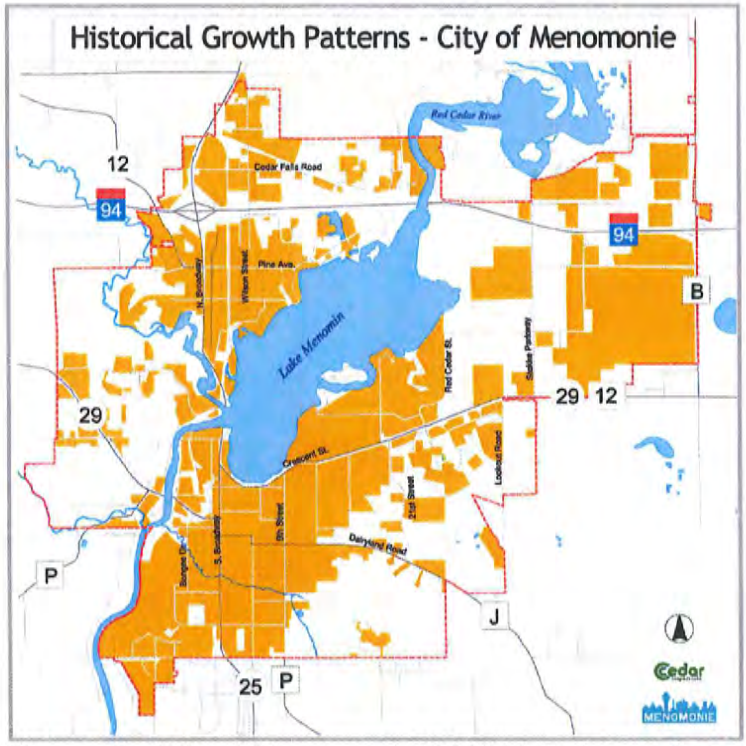

Figure 5: City of Menomonie 2010 Developed Areas

General

The most effective method of preventing degradation of surface waters is to reduce the volume of surface water runoff and transport of sediment and nutrients emanating from any given piece of land and directly, or indirectly, discharged to surface waters.

Agricultural Lands

The National Resource Conservation Service (NRCS) and Wisconsin Department of Natural Resources (WisDNR) have recommended many methods of reducing the volume of surface water runoff and preventing transport of sediment from agricultural lands. These methods include:

1. Contour planting.
2. Grassed waterways.
3. Perimeter filter strips.
4. Modified tillage practices.
5. Crop rotation and cover crops.

These methods, and others, can be incorporated into a conservation plan.

In addition, nutrient management plans can ensure that fertilizers such as manure are spread at an appropriate rate at appropriate times during the year.

RECOMMENDATION #1: Consider requiring all lessors of City-owned agricultural lands prepare, submit and adhere to, conservation and nutrient management plans.

RECOMMENDATION #2: Consider an ordinance to require the preparation, submittal and adherence to conservation and nutrient management plans for all privately-owned agricultural lands within the City.

Construction Sites

The Wisconsin Department of Natural Resources has recommended many methods of reducing the volume of surface water runoff and preventing transport of sediment from construction sites. These methods include:

1. Phased construction – Area of disturbance at any point in time is limited to the area that can be stabilized in a reasonable amount of time to reduce potential for sediment pickup.
2. Erosion mat – Covers slopes and channels to reduce potential for sediment pickup.
3. Ditch checks – Placed in concentrated flow areas to slow surface water runoff to encourage sediment deposition.
4. Sediment basins – placed in concentrated flow areas to detain stormwater to encourage sediment deposition and reduce surface water discharge.
5. Silt fence – placed around perimeter of construction site to filter sediment laden surface water runoff.
6. Aggregate tracking pads – placed at entrances and exits from the construction site to remove sediment from truck/vehicle tires.

The City of Menomonie requires construction site erosion control under Title 9, Chapter 10 of the City Code. The erosion control ordinance is enforced by the Building Inspection Department.

RECOMMENDATION #3: Consider potential increases in fines for violations of the erosion control ordinance.

Urban Development

The Wisconsin Department of Natural Resources has recommended many methods of reducing the volume of surface water runoff and preventing transport of sediment and nutrients from urban development. These methods include:

1. Low Impact Development
    a. Reduce impervious area through planned unit developments where a portion of the site is more densely developed while the remainder of the site is left undeveloped
    b. Reduce impervious area through the use of pervious pavement systems
2. On-site filtration
    a. Include grass filter strips or swales or proprietary treatment boxes that filter mainly sediment from surface water runoff. These generally do not reduce surface water volume.
3. On-site bioinfiltration
    a. Small basins with engineered soils to promote infiltration and vegetation uptake. These generally reduce sediment and nutrients by reducing surface water volume upon which they were being transported.
4. On-site detention
    a. Consists of dead storage, live storage and a staged outlet. The dead storage promotes settlement of sediment and nutrients. The live storage and staged outlet throttle the rate that surface water runoff leaves the basin. Detention basins do not reduce the volume of surface water runoff rather they spread the volume over a longer timeframe.
5. On-site retention
    a. Infiltration basins consist of dead storage and an emergency overflow. The dead storage volume is sized to contain the entire runoff from all but the largest storm events. The runoff soaks into the ground, evaporates into the air and/or is taken up by plants.

The City of Menomonie requires stormwater management under Title 9, Chapter 11 of the City Code. The stormwater management ordinance is enforced by the Building Inspection Department. The following is a <u>partial</u> list of sites that have complied with the ordinance.

- 3M plant expansions
- Red Cedar Townhomes site
- Cannery Estates subdivision
- Whisper Ridge subdivision
- Fair Oaks Townhomes site
- Shorehaven Condominiums subdivision
- Walgreens site

- Fastenal site
- Pizza Hut site
- White Pine subdivision
- Red Cedar Medical Center expansions
- Bill's Distributing site
- UW-Stout Red Cedar Hall site
- Dunn County Historical Society site
- Big Dot of Happiness site
- Bouncin' Babies & Kool Kids site
- Phillips Plastics plant expansions
- United Development Group mall site
- Bodyworks site
- RCU north site
- Harmony Center site
- Badger Housing site
- Community Health site
- UW-Stout Lots 11, 17 and 22 sites
- Dancing Oaks subdivision
- Stepping Stones site
- Kenworth site
- Mayo Clinic Dialysis Center site
- Johnson Motors site
- Monkey Business site
- Woodland Ridge Townhomes site
- Neighbors of Dunn County site
- Bremer north site
- CVS site
- Cedar Corporation

In an effort to reduce nutrient transport the City supported the legislation that enacted the ban on phosphorus fertilizers and the City initiated a lawn and leaf pickup program.

RECOMMENDATION #4: Consider promoting Low Impact Development by reviewing parking regulations and incentives.

RECOMMENDATION #5: Consider strengthening the infiltration requirements in the stormwater ordinance in accordance with recent WisDNR regulation updates.

RECOMMENDATION #6: Consider adding phosphorus removal requirements to the stormwater ordinance in accordance with TMDL regulations.

General

After prevention, the next most effective method of preventing degradation of surface waters is to capture stormwater runoff and reduce the peak rate, volume and/or sediment loads prior to discharge to surface waters.

Best Management Practices

The Environmental Protection Agency (EPA) and Wisconsin Department of Natural Resources (WisDNR) has recommended many Best Management Practices (BMPs) to treat stormwater runoff. These methods include:

1. Grassed swales – These are used in place of storm sewers to convey stormwater while promoting infiltration and settlement of sediment. Grassed swales are significantly less expensive than storm sewer but can be land intensive. The City of Menomonie has utilized them extensively, most recently on 59th Street NE and on Freitag Drive.

2. Wet detention basins – These are used to collect and detain storm water runoff. Staged outlet devices maximize detention time which reduces peak runoff rates downstream and increases settlement of sediment. Wet detention basins are land intensive and are ineffective at controlling volume. A permanent pool of water is maintained in a wet detention basin. A shallow water shelf is provided for habitat and safety. The City of Menomonie has utilized wet detention basins on Riverside Drive and Cedar Falls Road.

3. Constructed wetlands – These are similar to wet detention basins, but instead of a permanent pool of water, a shallow pool filled with submergent and emergent aquatic vegetation is used. The City of Menomonie has utilized constructed wetlands on Heller Road.

4. Infiltration basins – These are used to collect and retain stormwater runoff. Generally speaking, infiltration is the only outlet from an infiltration basin. As such, infiltration basins are extremely effective at controlling storm water peak runoff rates and volumes. Infiltration basins are extremely land intensive. The City of Menomonie has utilized infiltration basins on 59th Street NE, Freitag Drive and at the Walmart Distribution Center.

5. Bioinfiltration basins – These are small infiltration basins used to collect and retain stormwater runoff from small watersheds. These generally have a shallow retention area with a storm sewer overflow. These require maintenance to remove and replace dead or unsightly vegetation. The City has utilized a bioinfiltration basin at Elmwood Park.

6. Catch basins and proprietary treatment boxes – These are concrete vaults that collect and retain sediment. These provide no peak runoff rate or volume reduction and require regular maintenance. Recent WisDNR regulations have limited the credited effectiveness of catch basins and proprietary treatment boxes. The City has utilized a catch basin at the Public Works Department site as part of the street sweeper washout pad and at 3rd Street East and Galloway Creek.

7. Street Sweeping and Lawn/Waste Pickup – These "good housekeeping" practices are intended to reduce the amount of sediment and nutrients that run off street areas. The City of Menomonie regularly sweeps streets and conducts two Lawn/Waste pickups per year (spring and fall).

Concept Regional Storm Water Pond Sites for Existing Developed Areas

Eight potential regional pond sites for existing developed areas have been identified and are shown in Figure 6. These sites were selected based upon the size of the upstream watershed and the expected availability of the land for acquisition. A description of each site is provided.

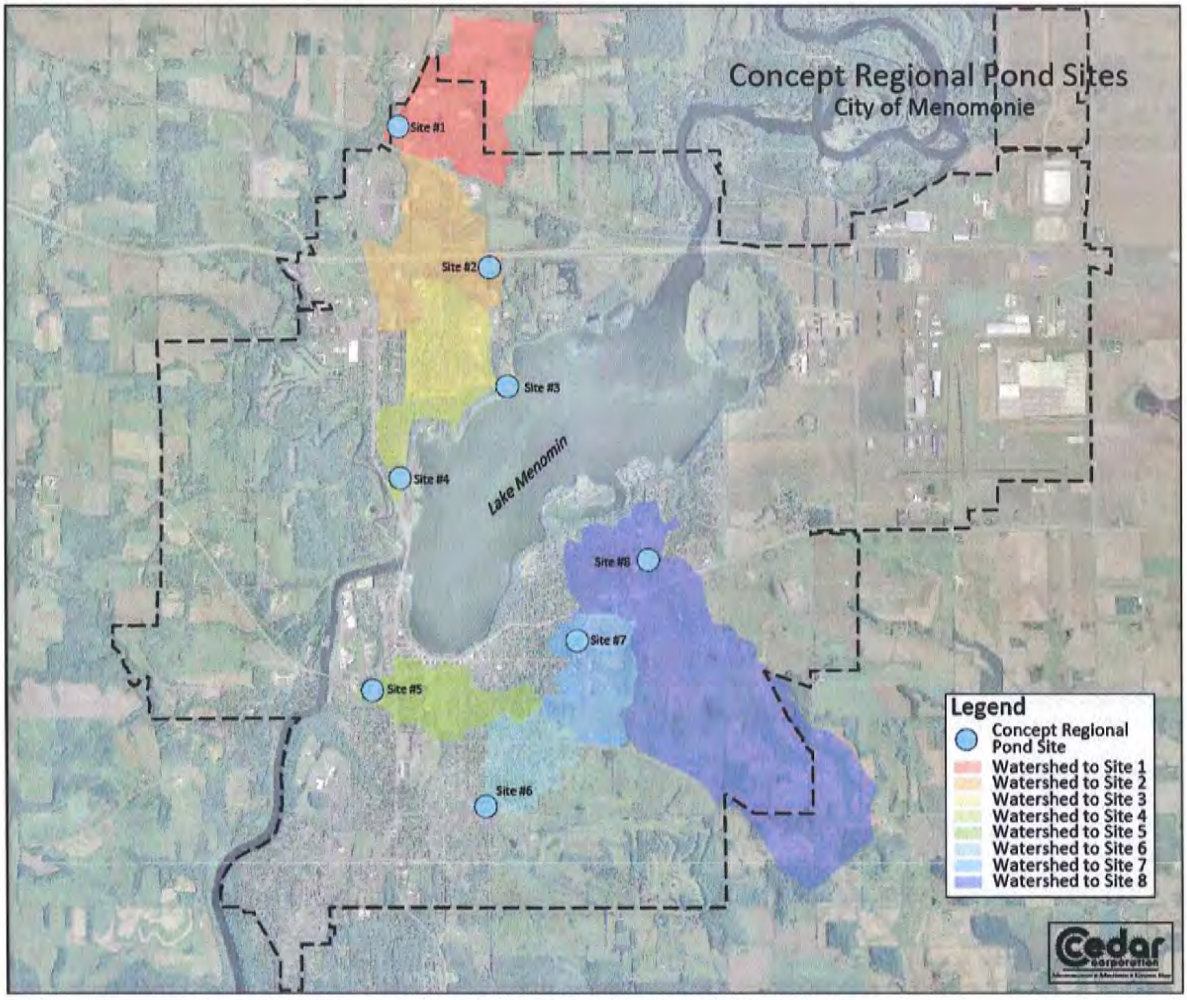

Figure 6: Potential Regional Pond sites

- Site #1: 29th Avenue Northwest
  - Location: Near 29th Avenue Northwest, Union Pacific Railroad and STH 25.
  - Watershed: Approximately 240 acres
  - Downstream Waterway: Wilson Creek/Lake Menomin
  - Ownership: Private
  - Note: Anticipated wetland and waterway impacts.

- Site #2: 21st Avenue Northeast
  - Location: Near 21st Avenue Northeast, Wakanda Street and IH94
  - Watershed: Approximately 240 acres
  - Downstream Waterway: Lake Menomin
  - Ownership: City
  - Note: Anticipated wetland and waterway impacts.

- Site #3: Wakanda Park
  - Location: Near Wakanda Park Beach Road
  - Watershed: Approximately 150 acres
  - Downstream Waterway: Lake Menomin
  - Ownership: City
  - Note: Modify Wakanda Park Beach Rd to accommodate diversion of stormwater to pond.

- Site #4: Junction Trail
  - Location: Near Junction Trail and Tainter Street.
  - Watershed: Approximately 70 acres
  - Downstream Waterway: Lake Menomin
  - Ownership: Private
  - Note: Divert storm sewer away from Wolske Bay.
  - Note: Is in close proximity to Municipal Well #4.

- Site #5: 2nd Street West
  - Location: Near 2nd Street West and STH 29
  - Watershed: Approximately 150 acres
  - Downstream Waterway: Red Cedar River
  - Ownership: City
  - Note: Anticipated wetland and waterway impacts.

- Site #6: 9th Street East
  - Location: Near 9th Street East and 19th Avenue East
  - Watershed: Approximately 130 acres
  - Downstream Waterway: Galloway Creek/Red Cedar River
  - Ownership: Private

- Site #7: 17th Street East
  - Location: Near 17th Street East, 16th Street East and 5th Avenue East
  - Watershed: Approximately 170 acres
  - Downstream Waterway: Jarrett Creek/Lake Menomin
  - Ownership: County

- Site #8: 4th Avenue East
  - Location: Near 4th Avenue East and 24th Street Northeast
  - Watershed: Approximately 870 acres
  - Downstream Waterway: Jarrett Creek/Lake Menomin
  - Ownership: Private
  - Note: Would accommodate future Mayo Health System expansions.

A conceptual layout of each site is provided in **Appendix A**.

Individual feasibility studies will need to be prepared for each concept regional pond site. As part of this study, the exact dimensions of the property, the exact depth and dimensions of adjacent storm sewers, the presence of any hazardous materials and the presence of wetlands or waterways should be determined. Because most of the sites are at the downstream end of relatively large waterways, it is likely that wetlands and waterways will be present. Therefore coordination with, and permits from, WisDNR and the Corps of Engineers will be required.

Concept Regional Storm Water Ponds for Existing Developed Areas Pollutant Removals

The potential regional pond sites have been evaluated using the WinSLAMM v10 water quality model for annual Total Suspended Solids (TSS) and Total Phosphorus (TP) removal. The results are as follows:

Site (#)	Pond Top Area (Acre)	Annual Runoff (Acre-feet)	Annual TSS Removal (lbs.)	Annual TP Removal (lbs.)
1	3.1	67	13,840	31
2	3.2	122	33,840	70
3	1.2	79	12,720	28
4	2.1	42	10,180	23
5	2.5	134	22,110	48
6	1.6	77	14,770	33
7	1.8	51	10,050	24
8	2.5	217	39,800	82
Total	**17.7**	**789**	**157,310**	**339**

Figure 7: Pond Area, Annual TSS Removal and Annual TP Removal, By Site

The WinSLAMM model outputs are provided in **Appendix B**.

Concept Regional Storm Water Ponds for Existing Developed Areas Construction Costs

Concept cost estimates have been prepared for the potential regional pond sites. The estimated costs are as follows:

Site (#)	Construction Cost	Land Acquisition Cost[1]	Total Cost
1	$344,800	$77,500	$422,300
2	$213,400	$0[2]	$213,400
3	$136,900	$0[2]	$136,900
4	$437,700	$52,500	$490,200
5	$243,600	$0[2]	$243,600
6	$124,800	$40,000	$164,800
7	$238,000	$0[3]	$238,000
8	$239,300	$938,100[4]	$1,177,400
Total	**$1,978,500**	**$1,153,100**	**$3,131,600**

Figure 8: Construction, Land Acquisition and Total Cost, By Site

The construction estimates are provided in **Appendix C**. These estimates should be updated as part of the feasibility study for each individual site.

The initial life expectancy for each pond is assumed to be at least ten years at which point a major maintenance project would be required to remove accumulated sediment and pollutants.

[1] Land acquisition cost assumed to be $25,000 per acre, unless otherwise noted.
[2] City owns property.
[3] County owns property. Based upon preliminary discussions between City and County, it is assumed that County will contribute the land and the City will construct the pond.
[4] Land acquisition cost assumed to be 100% of assessed value.

Concept Regional Storm Water Ponds for Existing Developed Areas Cost Effectiveness

The concept regional storm water ponds have been compared on a "Cost per Total Suspended Solids Removed" basis over the assumed initial life expectancy (construction costs have been amortized over the ten year period). The results are as follows:

Site (#)	Cost Per Total Suspended Solids ($/lbs/year)
1	$3.05
2	$0.63
3	$1.08
4	$4.82
5	$1.10
6	$1.12
7	$2.37
8	$2.96
Average	**$2.14**

Figure 9: Cost per TSS ($/lbs/year), By Site

Figure 9 should not be interpreted as the only method of assessing the priority of each site. For example:

- Concept Site #2 (21st Avenue Northwest) is ranked as the most cost-effective site but will require extensive permitting effort due to anticipated impacts to wetlands and waterways. In addition, stormwater from Concept Site #2 does not drain directly to a surface water but instead drains through wetlands which provide additional treatment prior to discharge to Lake Menomin.

- Concept Site #7 (17th Street) is of average cost-effectiveness but it is located in a high priority watershed (Jarrett Creek) and in a high visibility location (adjacent to the Dunn County Fairgrounds). In addition, Concept Site #7 is free from wetlands and waterways that would require extensive permitting. As such, Concept Site #7 would provide public awareness and educational benefits and could be built in 2015.

Concept Regional Storm Water Ponds for Existing Developed Areas Recommendations

RECOMMENDATION #7: ***Consider acquiring the land and commencing design and permitting for Concept Site #7 (17th Street) for construction in 2015.***

RECOMMENDATION #8: ***Consider commencing design and permitting for Concept Sites #2 (21st Avenue), #3 (Wakanda Park), and #5 (2nd Street West) which are located on City-owned lands for construction within the next 5 years.***

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RECOMMENDATION #11: ***Consider eliminating Concept Site #4 (Junction Trail) from further consideration due to lack of cost-effectiveness and lack of separation to Well #4.***

2014 Amendment to City of Menomonie
Urban Stormwater Plan
CHAPTER 4 – Mitigation

General

The final method of preventing degradation to surface waters is to try to mitigate the impacts of sediment and nutrients after they have already reached the surface water.

In many regions of the country, including the upper Midwest, other nutrients, particularly nitrogen, tend to be in abundant supply. Phosphorus is often the nutrient in shortest supply, therefore limiting or controlling plant growth. About 90 percent of the lakes in Wisconsin are limited by phosphorus (Shaw and others, 1993).

Phosphorus is one of the essential nutrients for plant growth. High phosphorus concentrations can cause dense algal populations (blooms) and is a major cause of eutrophication (advanced aging) in lakes. When phosphorus concentrations exceed 0.025 mg/L (parts per million in lake water) these water bodies may experience excess or nuisance growth of algae or other aquatic plants (U.S. Environmental Protection Agency, 1986).

As such, any solution to nutrient management must consider upstream contributions and internal recycling of phosphorus.

Upstream Contributions

According to Wisconsin DNR in 1990, Lake Menomin received 326,000 pounds of phosphorus per year. With the recently enacted TMDL, Wisconsin DNR proposes to reduce the phosphorus load to 149,710 lbs per year. Of this, only 2,200 lbs per year (1.47%) is anticipated to come from the stormwater runoff from the City of Menomonie. According to USGS, Lake Menomin receives an average flow of 853 million gallons per day. Any mitigation methods must consider this continuously incoming phosphorus load and water flow.

Internal Recycling

Internal phosphorus recycling occurs in many lakes, including Lake Menomin. Phosphorus used by algae, aquatic plants, fish, and zooplankton is stored within these organisms. As these organisms die and decompose, this phosphorus is returned to the lake water and sediments. Anoxia (the designation of low dissolved oxygen (0 to 1 ppm) in the lower stratification of lake water or hypolimnion near the lake bottom makes phosphorus more soluble, adding further to the release of phosphorus from the falling particles and the lake sediments. During spring and fall turnover the phosphorus, which was released from the bottom sediments into the hypolimnion during anoxia, is mixed throughout the lake. This phosphorus is added to the incoming phosphorus from

upstream and is available for algal growth. These phenomena are part of the internal-recycling processes of lakes. Disturbance of the bottom sediments, particularly before the spring and fall turnover events, can result in an increase in phosphorus concentrations.

Current Known Sediment Chemistry

The City of Menomonie has recently completed a second round of sediment sampling at six areas (Wolske Bay, S. Wolske Bay, Cannery Lagoon, mouth of Wilson Creek, Butch's Bay and mouth of Jarrett Creek) considered algal problem areas in Lake Menomin. A Technical Memorandum has been prepared and is included as **Appendix D**. In summary, bottom sediment thicknesses vary from 0.5 to 6 feet in these select areas, which contain from 130 to 1600 parts per million (0.013 to 0.16 %) phosphorus, low concentrations of heavy metals and some residual hydrocarbons as would be expected in a lake that is in this geographic location.

Mitigation Methods

Several methods of mitigation have been discussed:

- Stream Bank Restoration – Erosion of stream banks is exacerbated by urbanization and the consequential increase in stormwater runoff peak discharge rates. By restoring the stream banks using hard (riprap) and soft (live stakes), streambanks can be protected from additional erosion whereby protecting adjacent structures (such as homes, utility pipes, etc). The City of Menomonie has aggressively targeted stream bank restoration along Jarrett Creek.

- Dredging – This method would utilize mechanical or hydraulic dredging to remove phosphorus-laden sediment from the lake bed. The sediment must be hauled to an upland disposal site. Disturbance of sediment can release previously trapped phorphorus back into the water column therefore care must be taken to avoid suspension of sediments during dredging operations. Care must also be taken to identify appropriate and sufficient disposal sites due to other potential contaminants (such as heavy metals) within the sediment. These procedures are completed during the WisDNR and Corps of Engineers permitting process. Typically siltation sediment barriers are installed in the lake water to separate the lake from the dredging area. Although initially effective, the long term result will be the re-sedimentation of these "backwater" areas where siltation and precipitation effects occur due to the low energy conditions in the lake water. Dredging is more typically used to improve navigation or remove hazardous

materials (such as the Fox River Cleanup Project which intends to remove PCBs from the Lower Fox River near Green Bay).

- Chemical Sequester – This method would utilize aluminum, iron or calcium salts or other chemicals to inactivate and precipitate phosphorus out of the water column. Care must be taken to match the dosing to the in-lake conditions and upstream contributions. Care must be taken to select dosing sites to provide proper mixing. Ongoing operations will likely be required in order to address the influx water volume and corresponding concentrations of phosphorus. Chemical sequester is more typically used on non-flowing water bodies, such as Half Moon Lake in Eau Claire. One application on a flowing water body was at Lake Wapogasset near Amery in the late 1990's. Lake water quality showed improvement initially but in a relatively short amount of time was once again challenged with algal blooms in late summer. In that case, the constant feeding of phosphorus waters from upstream provided the necessary nutrient levels to overcome the initial beneficial effects of the chemical dosing.

- Chemical Algal Control – This method would utilize copper sulfate, copper chelate or sodium carbonate perooxyhydrate (SCP) to prevent algal blooms. Care must be taken to match the dosing to the in-lake conditions and upstream contributions. Care must be taken to select dosing sites to provide proper mixing. Copper products are toxic at high concentrations to existing aquatic flora and fauna, thus dosing of these chemicals must be completed at concentrations protective of all existing species and may not be an appropriate control measure. Care must be taken to avoid unsafe drops in oxygen concentrations that can harm or kill fish and other aquatic life. Chemical algal control is more typically used on small ponds.

- Biological Control – This method would utilize harvesting of certain fish, stocking of certain fish and other aquatic life and planting of certain aquatic plants to reduce sediment resuspension and increase biological uptake of nutrients. Care must be taken to avoid the introduction of invasive species.

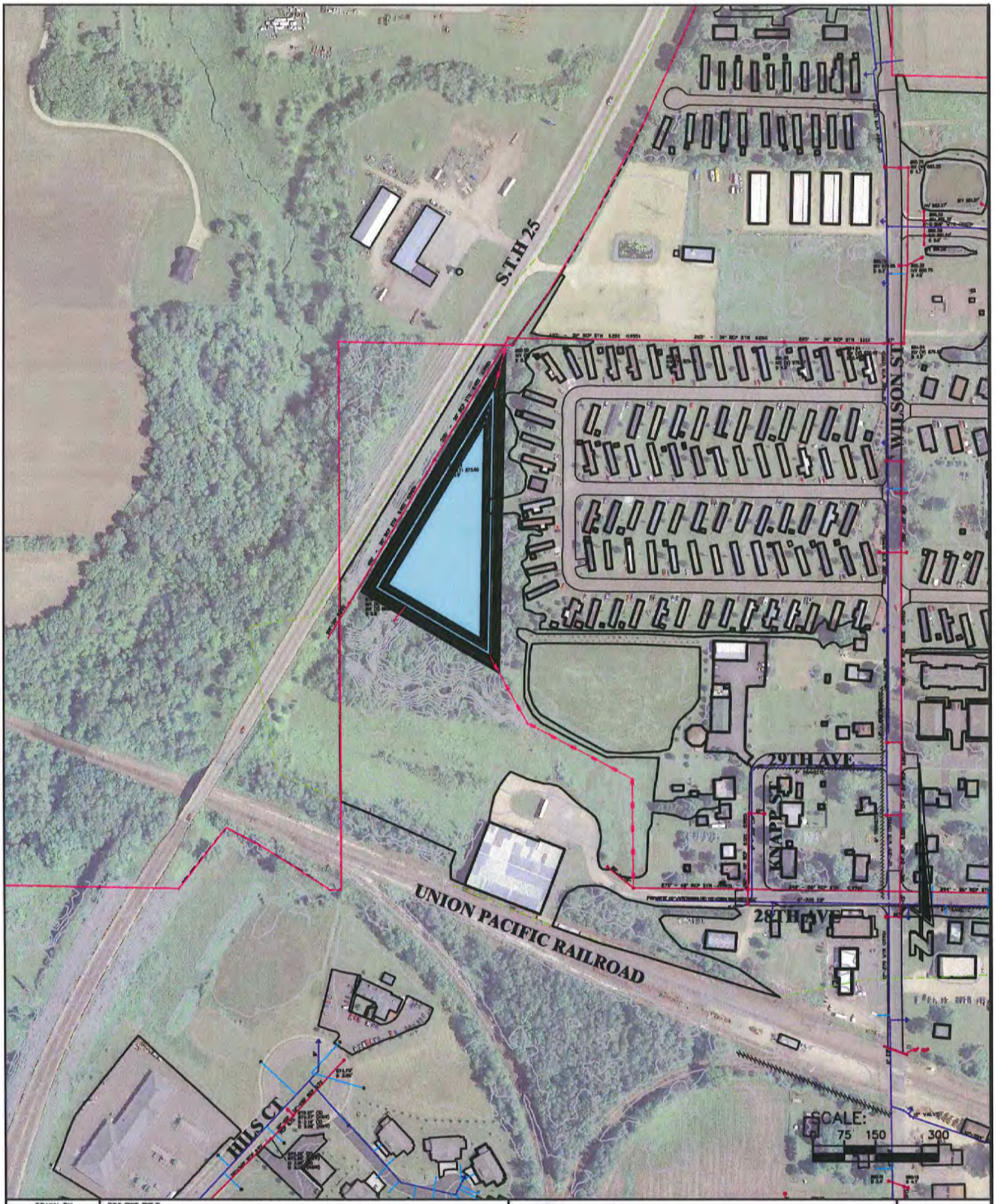
Mitigation Recommendations

RECOMMENDATION #12: ***Consider additional stream bank restoration efforts on Jarrett Creek, Wilson Creek, Galloway Creek and Gilbert Creek.***

RECOMMENDATION #13: ***Consider dredging of backwater areas such as Wolske Bay, Cannery Lagoon, Wilson Creek, Butch's Bay and the mouth of Jarrett Creek.***

RECOMMENDATION #14: ***Consider partnering with Wisconsin DNR to retain a certified limnologist to study Lake Menomin and determine if chemical sequester, chemical algal control and/or biological control would be technically feasible, regulatorily permissible and cost-effective.***

APPENDIX A: CONCEPT REGIONAL POND SITE LAYOUTS



DRAWN BY: MAK	PROJECT TITLE: CITY OF MENOMONIE STORM WATER MANAGEMENT PLAN MENOMONIE, WI CONCEPT POND MAP	Cedar corporation — engineers • architects • planners • environmental specialists • land surveyors • landscape architects • interior designers	JOB NO. M00550718
DATE: FEB 2014			FIGURE 1
REFERENCE FILE: —			
DRAWING FILE: Contours and Watersheds			

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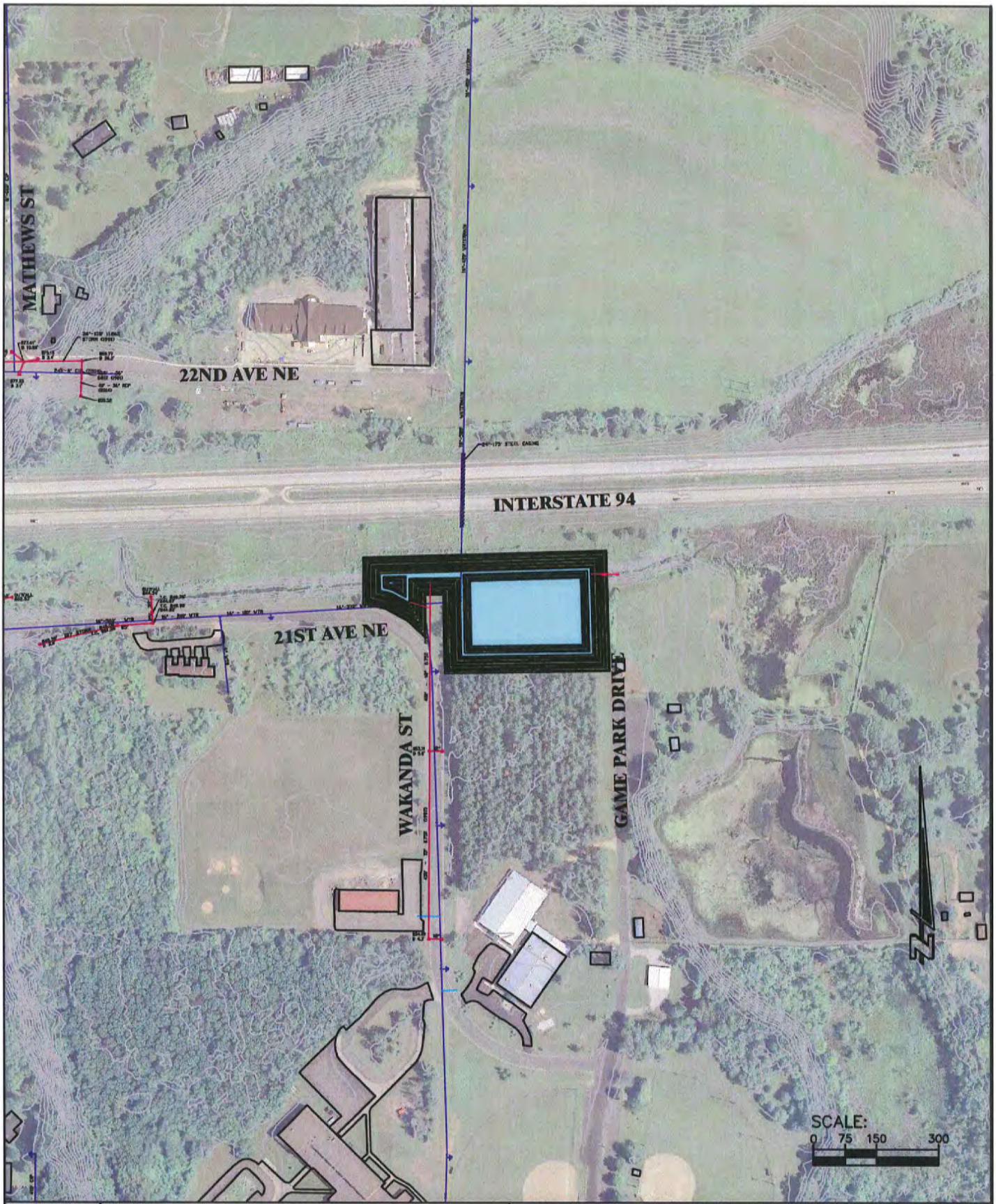
www.cedarcorp.com
604 Wilson Ave. Menomonie, WI 54751 715-235-9081 FAX 715-235-2727
2320 Walton Commons West Suite 142 Madison, WI 53718 608-354-0037 FAX 608-249-5824
1486 Bellevue Street Suite 502 Green Bay, WI 54311 920-455-7001 FAX 920-491-9020



DRAWN BY: MAK	PROJECT TITLE: CITY OF MENOMONIE STORM WATER MANAGEMENT PLAN MENOMONIE, WI CONCEPT POND MAP	Cedar corporation — engineers • architects • planners • environmental specialists • land surveyors • landscape architects • interior designers	CHECKED BY: MAK
DATE: FEB 2014			JOB NO.: M00550718
REFERENCE FILE: —			FIGURE: 2
DRAWING FILE: Contours and Watersheds		800-472-7372 www.cedarcorp.com 604 Wilson Ave. Menomonie, WI 54751 715-235-9051 FAX 715-235-2727 2320 Walton Commons West Suite 142 Madison, WI 53718 608-354-0037 FAX 608-249-5624 1468 Bellevue Street Suite 302 Green Bay, WI 54311 920-455-7001 FAX 920-491-9020	

DRAWN BY: MAK	PROJECT TITLE: CITY OF MENOMONIE STORM WATER MANAGEMENT PLAN MENOMONIE, WI CONCEPT POND MAP	Cedar corporation — engineers • architects • planners • environmental specialists • land surveyors • landscape architects • interior designers	CHECKED BY: MAK
DATE: FEB 2014			JOB NO.: M00550718
REFERENCE FILE: —			FIGURE: 3
DRAWING FILE: Contours and Watersheds			

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604 Wilson Ave. Menomonie, WI 54751 715-235-9081 FAX 715-236-2727
2830 Walton Commons West Suite 142 Madison, WI 53718 608-354-0037 FAX 608-249-0624
1488 Bellevue Street Suite 202 Green Bay, WI 54311 920-455-7001 FAX 920-491-9020

DRAWN BY: MAK	PROJECT TITLE: CITY OF MENOMONIE STORM WATER MANAGEMENT PLAN MENOMONIE, WI CONCEPT POND MAP		CHECKED BY: MAK
DATE: FEB 2014			JOB NO.: M00550718
REFERENCE FILE: —			FIGURE: 4
DRAWING FILE: Contours and Watersheds			

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land surveyors • landscape architects • interior designers
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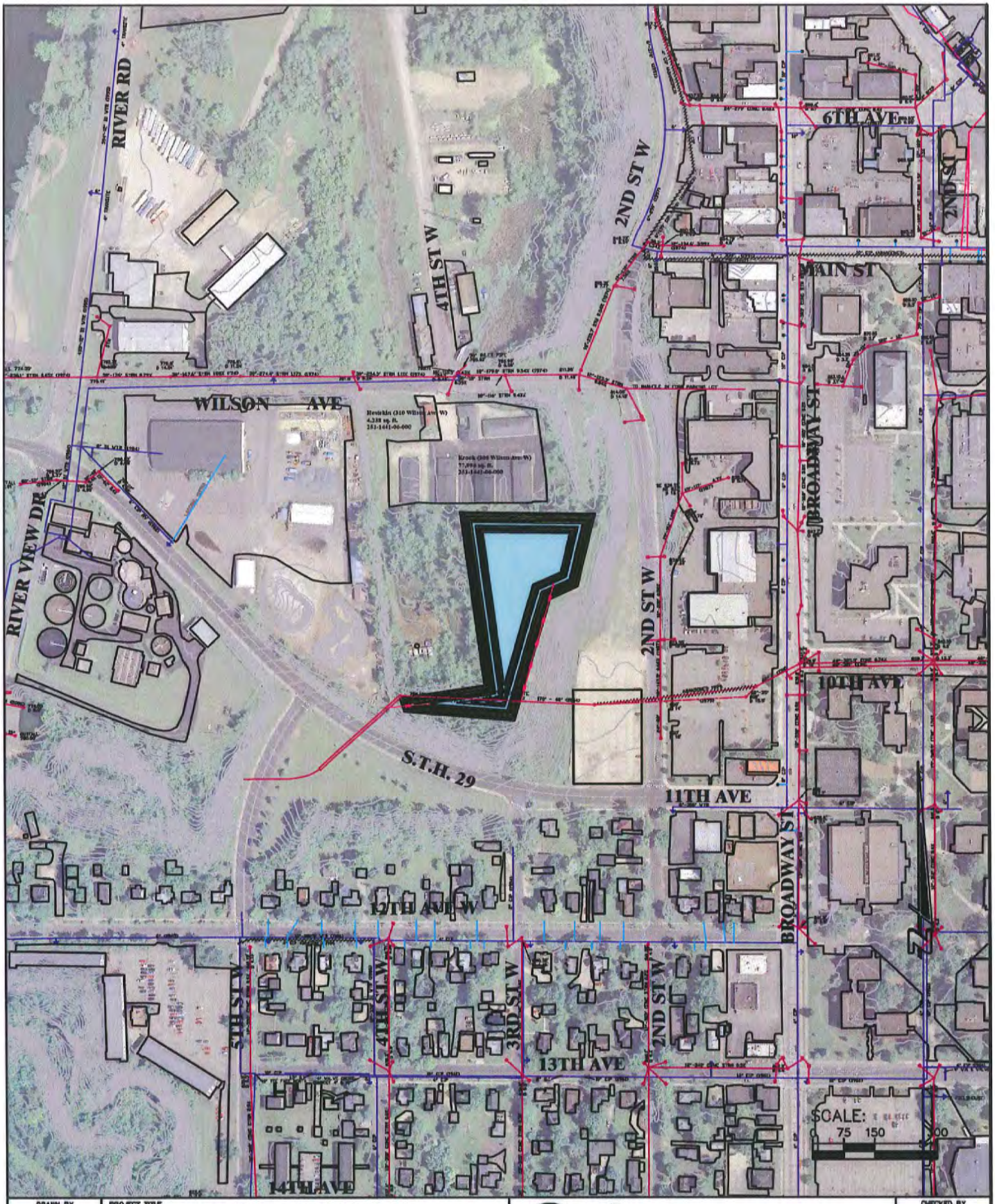
2820 Walton Commons West Suite 142 Madison, WI 53718 608-354-0037 FAX 608-249-0624
1468 Bellevue Street Suite 302 Green Bay, WI 54311 920-455-7001 FAX 920-491-9020



DRAWN BY: MAK	PROJECT TITLE: CITY OF MENOMONIE STORM WATER MANAGEMENT PLAN MENOMONIE, WI CONCEPT POND MAP	Cedar corporation engineers · architects · planners · environmental specialists land surveyors · landscape architects · interior designers	CHECKED BY: MAK
DATE: FEB 2014			JOB NO.: M00550718
REFERENCE FILE: –			FIGURE: 5
DRAWING FILE: Contours and Watersheds			

800-472-7372
www.cedarcorp.com
804 Wilson Ave.
Menomonie, WI 54751
715-235-9081
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2820 Walton Commons West
Suite 142
Madison, WI 53718
608-354-0037
FAX 608-249-5624
1488 Bellevue Street
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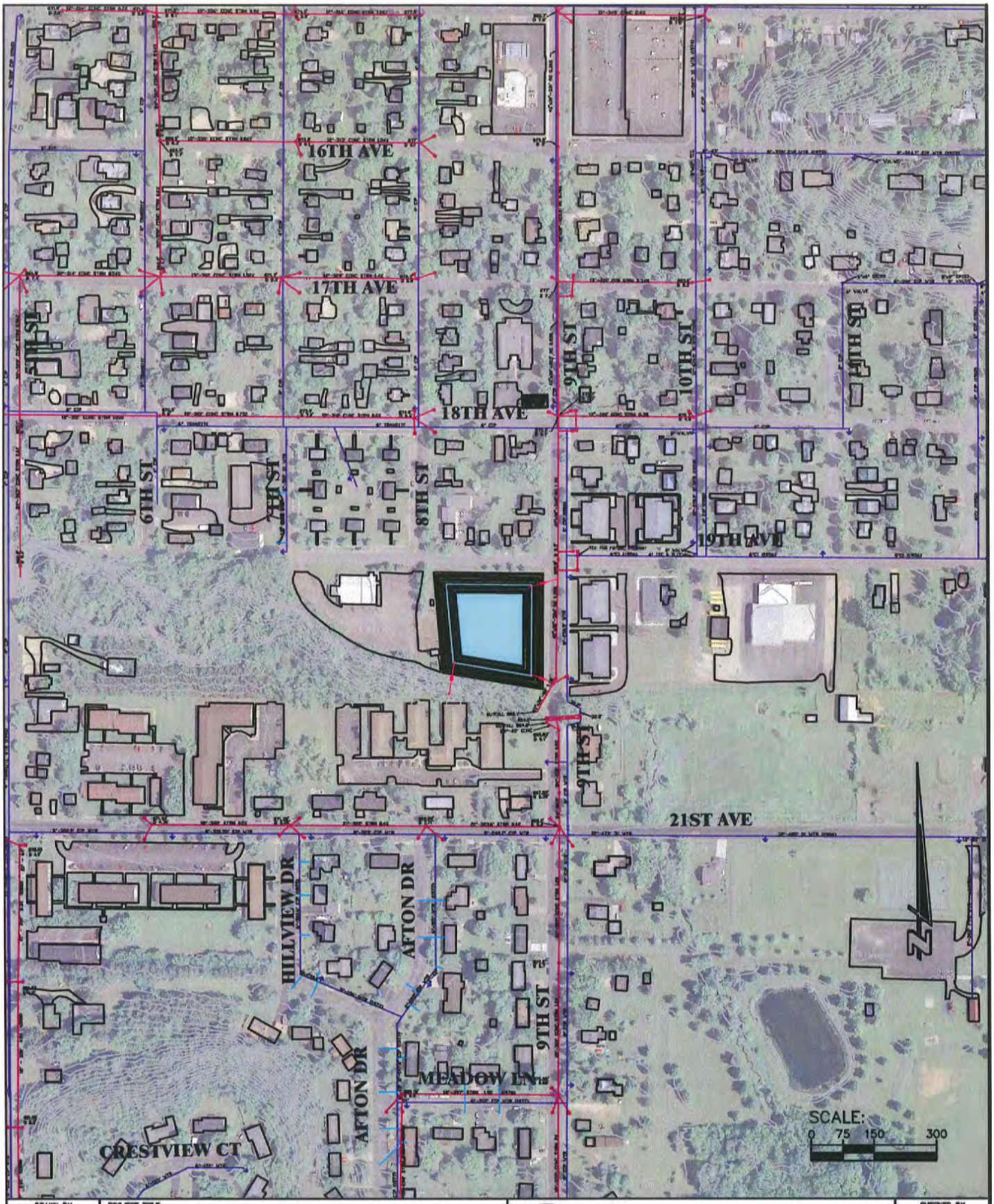
920-455-7001
FAX 920-491-9020



DRAWN BY: MAK	PROJECT TITLE: CITY OF MENOMONIE STORM WATER MANAGEMENT PLAN MENOMONIE, WI CONCEPT POND MAP		CHECKED BY: MAK
DATE: FEB 2014			JOB NO.: M00550718
REFERENCE FILE: —			FIGURE: 6
DRAWING FILE: Contours and Watersheds			

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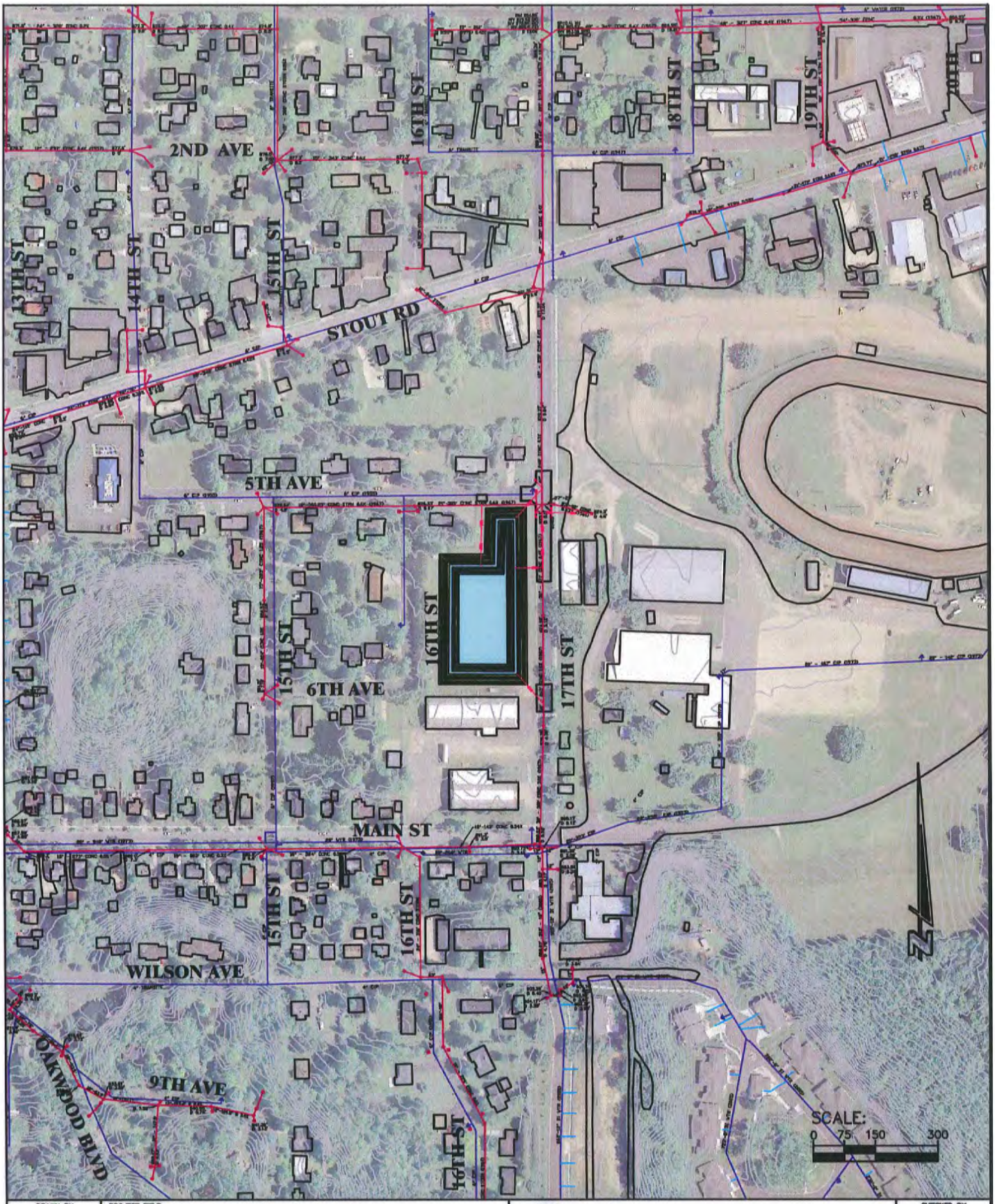
2320 Walton Commons West Suite 142 Madison, WI 53718 608-354-0037 FAX 608-249-5824
1488 Bellevue Street Suite 502 Green Bay, WI 54311 920-455-7001 FAX 920-491-9020



DRAWN BY: MAK	PROJECT TITLE: CITY OF MENOMONIE STORM WATER MANAGEMENT PLAN MENOMONIE, WI CONCEPT POND MAP		CHECKED BY: MAK
DATE: FEB 2014			JOB NO.: M00550718
REFERENCE FILE: –			FIGURE: 7
DRAWING FILE: Contours and Watersheds			

Cedar corporation
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land surveyors • landscape architects • interior designers
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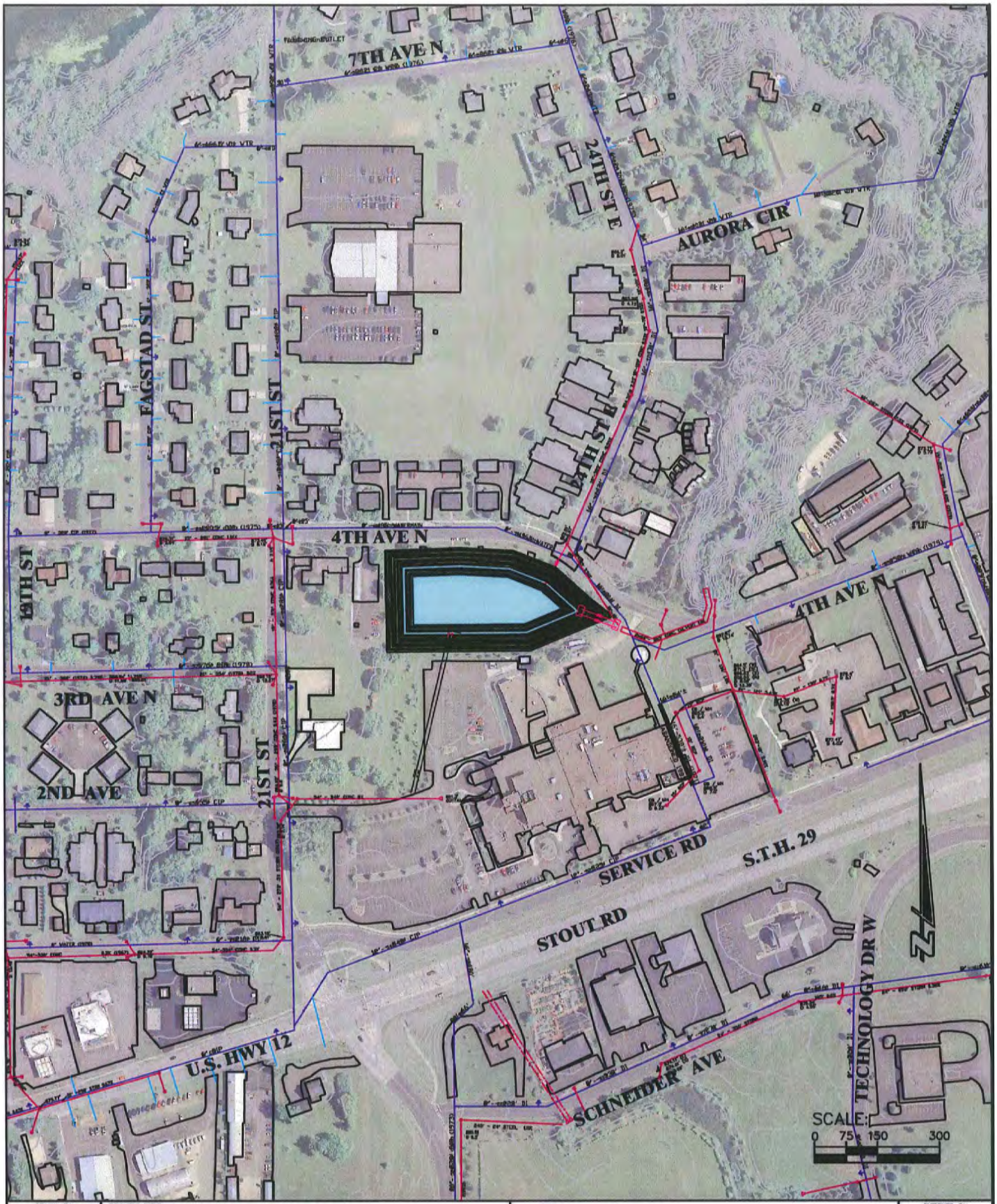
2830 Walton Commons West Suite 142 Madison, WI 53718 608-354-0037 FAX 608-249-5824
1468 Bellevue Street Suite 502 Green Bay, WI 54311 920-455-7001 FAX 920-491-9020



DRAWN BY: MAK	PROJECT TITLE: CITY OF MENOMONIE	Cedar corporation — engineers • architects • planners • environmental specialists • land surveyors • landscape architects • interior designers	CHECKED BY: MAK
DATE: FEB 2014	STORM WATER MANAGEMENT PLAN MENOMONIE, WI		JOB NO.: M00550718
REFERENCE FILE: –	CONCEPT POND MAP		FIGURE: 8
DRAWING FILE: Contours and Watersheds		800-472-7372 www.cedarcorp.com	604 Wilson Ave. Menomonie, WI 54751 715-235-9081 FAX 715-235-2727 · 2620 Walton Commons West Suite 142 Madison, WI 53718 608-354-0037 FAX 608-249-5624 · 1499 Bellevue Street Suite 502 Green Bay, WI 54311 920-455-7001 FAX 920-491-9020

APPENDIX B: CONCEPT REGIONAL POND POLLUTANT REMOVALS

File Name:

C:\WINSLAMM MODELING\20140120_site1.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	1.458E+07		0.11	103.4	94062	
Outfall Total with Controls	1.450E+07	0.55 %	0.11	27.47	24860	73.57 %

Current File Output: Annualized Total After Outfall Controls: 2.901E+06 | Years in Model Run: 5.00 | 4975

Pollutant	Concentration - No Controls	Concentration - With Controls	Concentration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	103.4	27.47	mg/L	94062	24860	lbs	73.57 %
Total Phosphorus	0.3341	0.1626	mg/L	304.1	147.1	lbs	51.61 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 281.470

Total Control Practice Costs

Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff

(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.11	Fair
With Controls	0.11	Fair

File Name:

C:\WINSLAMM MODELING\20140120_site2.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	2.663E+07		0.24	157.3	261529	
Outfall Total with Controls	2.648E+07	0.56 %	0.24	55.84	92323	64.70 %

Current File Output: Annualized Total After Outfall Controls: 5.300E+06 | Years in Model Run: 5.00 | 18475

Pollutant	Concentration - No Controls	Concentration - With Controls	Concentration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	157.3	55.84	mg/L	261529	92323	lbs	64.70 %
Total Phosphorus	0.4008	0.1900	mg/L	666.3	314.1	lbs	52.86 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 242.300

Total Control Practice Costs

Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff

(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.24	Poor
With Controls	0.24	Poor

File Name:

C:\WINSLAMM MODELING\20140120_site3.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	1.729E+07		0.25	104.6	112903	
Outfall Total with Controls	1.719E+07	0.58 %	0.25	45.94	49292	56.34 %

Current File Output: Annualized Total After Outfall Controls: 3.440E+06 Years in Model Run: 5.00 9864

Pollutant	Concentration - No Controls	Concentration - With Controls	Concentration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	104.6	45.94	mg/L	112903	49292	lbs	56.34 %
Total Phosphorus	0.3120	0.1789	mg/L	336.7	191.9	lbs	43.00 %

Print Output Summary to Text File

Print Output Summary to .csv File

Total Area Modeled (ac): 149.180

Total Control Practice Costs

Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff

(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.25	Poor
With Controls	0.25	Poor

File Name:

C:\WINSLAMM MODELING\20140120_site4.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	9.295E+06		0.27	120.9	70156	
Outfall Total with Controls	9.241E+06	0.58 %	0.27	33.41	19274	72.53 %

Current File Output: Annualized Total After Outfall Controls: 1.849E+06 Years in Model Run: 5.00 3857

Pollutant	Concentration - No Controls	Concentration - With Controls	Concentration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	120.9	33.41	mg/L	70156	19274	lbs	72.53 %
Total Phosphorus	0.3644	0.1639	mg/L	211.4	94.54	lbs	55.29 %

Print Output Summary to Text File

Print Output Summary to .csv File

Total Area Modeled (ac): 73.370

Total Control Practice Costs

Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff

(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.27	Poor
With Controls	0.27	Poor

File Name:

C:\WINSLAMM MODELING\20140120_site5.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	2.933E+07		0.42	98.35	180088	
Outfall Total with Controls	2.916E+07	0.58 %	0.42	38.19	69520	61.40 %

Current File Output: Annualized Total After Outfall Controls: 5.835E+06 — Years in Model Run: 5.00 — 13912

Pollutant	Concentration - No Controls	Concentration - With Controls	Concentration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	98.35	38.19	mg/L	180088	69520	lbs	61.40 %
Total Phosphorus	0.2724	0.1420	mg/L	498.7	258.5	lbs	48.17 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 149.760

Total Control Practice Costs

Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff

(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.42	Poor
With Controls	0.42	Poor

File Name:

C:\WINSLAMM MODELING\20140120_site6.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	1.682E+07		0.28	114.3	120067	
Outfall Total with Controls	1.672E+07	0.59 %	0.28	44.25	46194	61.53 %

Current File Output: Annualized Total After Outfall Controls: 3.346E+06 — Years in Model Run: 5.00 — 9244

Pollutant	Concentration - No Controls	Concentration - With Controls	Concentration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	114.3	44.25	mg/L	120067	46194	lbs	61.53 %
Total Phosphorus	0.3389	0.1805	mg/L	355.8	188.4	lbs	47.06 %

Print Output Summary to Text File | Print Output Summary to .csv File

Total Area Modeled (ac): 130.280

Total Control Practice Costs

Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff

(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.28	Poor
With Controls	0.28	Poor

File Name:

C:\WINSLAMM MODELING\20140120_site7.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	1.120E+07		0.14	108.4	75787	
Outfall Total with Controls	1.114E+07	0.54 %	0.14	36.76	25551	66.29 %

Current File Output: Annualized Total After Outfall Controls: 2.228E+06 Years in Model Run: 5.00 5113

Pollutant	Concentration - No Controls	Concentration - With Controls	Concentration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	108.4	36.76	mg/L	75787	25551	lbs	66.29 %
Total Phosphorus	0.3565	0.1836	mg/L	249.2	127.7	lbs	48.77 %

Print Output Summary to Text File

Print Output Summary to .csv File

Total Area Modeled (ac): 167.900

Total Control Practice Costs

Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff

(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.14	Poor
With Controls	0.14	Poor

File Name:

C:\WINSLAMM MODELING\20140120_site8.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	4.745E+07		0.12	124.9	370110	
Outfall Total with Controls	4.719E+07	0.55 %	0.12	58.09	171105	53.77 %

Current File Output: Annualized Total After Outfall Controls: 9.442E+06 Years in Model Run: 5.00 34240

Pollutant	Concentration - No Controls	Concentration - With Controls	Concentration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Solids	124.9	58.09	mg/L	370110	171105	lbs	53.77 %
Total Phosphorus	0.3540	0.2172	mg/L	1049	639.7	lbs	39.00 %

Print Output Summary to Text File

Print Output Summary to .csv File

Total Area Modeled (ac): 869.000

Total Control Practice Costs

Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff

(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.12	Fair
With Controls	0.12	Fair

APPENDIX C: CONCEPT REGIONAL POND ESTIMATED COSTS

PRELIMINARY OPINION OF PROBABLE COST
STORM WATER MANAGEMENT PLAN - SITE #1
CITY OF MENOMONIE

CEDAR CORPORATION
JOB #: 0055-718
DATE: 1/27/2014
ESTIMATE PREPARED BY: RDJ

STORM SEWER

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
Inlet Protection	EA	0	$50.00	$0.00
Connect to Exist STM	EA	2	$500.00	$1,000.00
Storm Sewer, RCP, 30"	LF	125	$55.00	$6,875.00
Storm Sewer, RCP, 48"	LF	780	$125.00	$97,500.00
Storm Manhole, Type II	VF	10	$400.00	$4,000.00
Storm Manhole, Type III	VF	5	$550.00	$2,750.00
Storm Manhole, Type IV	VF	5	$600.00	$3,000.00
Storm Manhole, Type V	VF	5	$800.00	$4,000.00
Apron Endwall, RCP, 30"	EA	1	$1,250.00	$1,250.00
Apron Endwall, RCP, 48"	EA	2	$1,750.00	$3,500.00
Storm Restoration	SY	1600	$4.00	$6,400.00
Outlet Structure Trash Rack	EA	1	$1,000.00	$1,000.00
SUBTOTAL				$131,275.00
CONTINGENCY (10%)				$13,127.50
ENGINEERING (15%)				$19,691.25
TOTAL STORM SEWER				**$164,093.75**

POND CONSTRUCTION

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
Remove Concrete	SY	0	$3.00	$0.00
Remove Asphalt	SY	0	$1.50	$0.00
Clear & Grub	ACRE	3.4	$2,500.00	$8,500.00
Strip Topsoil	ACRE	3.5	$2,500.00	$8,750.00
Common Excavation	CY	38330	$2.50	$95,825.00
Restoration, Seed	ACRE	3.5	$5,000.00	$17,500.00
Intermediate Erosion Mat	SY	8160	$1.50	$12,240.00
Rip Rap, Medium	CY	35	$50.00	$1,750.00
SUBTOTAL				$144,565.00
CONTINGENCY (10%)				$14,456.50
ENGINEERING (15%)				$21,684.75
TOTAL POND CONSTRUCTION				**$180,706.25**

TOTAL OPINION OF PROBABLE PROJECT COST **$344,800.00**

PRELIMINARY OPINION OF PROBABLE COST
STORM WATER MANAGEMENT PLAN - SITE #2
CITY OF MENOMONIE

CEDAR CORPORATION
JOB #: 0055-718
DATE: 1/27/2014
ESTIMATE PREPARED BY: RDJ

STORM SEWER

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
Inlet Protection	EA	0	$50.00	$0.00
Connect to Exist STM	EA	1	$500.00	$500.00
Storm Sewer, RCP, 18"	LF	120	$35.00	$4,200.00
Storm Manhole, Type I	VF	10	$250.00	$2,500.00
Apron Endwall, RCP, 18"	EA	2	$650.00	$1,300.00
Outlet Structure Trash Rack	EA	1	$1,000.00	$1,000.00
SUBTOTAL				$9,500.00
CONTINGENCY (10%)				$950.00
ENGINEERING (15%)				$1,425.00
TOTAL STORM SEWER				**$11,875.00**

POND CONSTRUCTION

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
Remove Concrete	SY	0	$3.00	$0.00
Remove Asphalt	SY	0	$1.50	$0.00
Clear & Grub	ACRE	2.5	$2,500.00	$6,250.00
Strip Topsoil	ACRE	3.2	$2,500.00	$8,000.00
Common Excavation	CY	46246	$2.50	$115,615.00
Restoration, Seed	ACRE	3.2	$5,000.00	$16,000.00
Intermediate Erosion Mat	SY	9380	$1.50	$14,070.00
Rip Rap, Medium	CY	25	$50.00	$1,250.00
SUBTOTAL				$161,185.00
CONTINGENCY (10%)				$16,118.50
ENGINEERING (15%)				$24,177.75
TOTAL POND CONSTRUCTION				**$201,481.25**

TOTAL OPINION OF PROBABLE PROJECT COST	**$213,356.25**

PRELIMINARY OPINION OF PROBABLE COST
STORM WATER MANAGEMENT PLAN - SITE #3
CITY OF MENOMONIE

CEDAR CORPORATION
JOB #: 0055-718
DATE: 1/27/2014
ESTIMATE PREPARED BY: RDJ

STORM SEWER

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
Inlet Protection	EA	0	$50.00	$0.00
Connect to Exist STM	EA	1	$500.00	$500.00
Storm Sewer, RCP, 48"	LF	205	$125.00	$25,625.00
Storm Manhole, Type III	VF	14	$550.00	$7,700.00
Apron Endwall, RCP, 48"	EA	2	$1,750.00	$3,500.00
Outlet Structure Trash Rack	EA	1	$1,000.00	$1,000.00
SUBTOTAL				$38,325.00
CONTINGENCY (10%)				$3,832.50
ENGINEERING (15%)				$5,748.75
TOTAL STORM SEWER				**$47,906.25**

POND CONSTRUCTION

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
Remove Concrete	SY	0	$3.00	$0.00
Remove Asphalt	SY	0	$1.50	$0.00
Clear & Grub Tree	EA	11	$500.00	$5,500.00
Strip Topsoil	ACRE	1.2	$2,500.00	$3,000.00
Common Excavation	CY	10000	$2.50	$25,000.00
Restoration, Seed	ACRE	1.2	$5,000.00	$6,000.00
Intermediate Erosion Mat	SY	2920	$1.50	$4,380.00
Rip Rap, Medium	CY	20	$50.00	$1,000.00
SUBTOTAL				$44,880.00
CONTINGENCY (10%)				$4,488.00
ENGINEERING (15%)				$6,732.00
TOTAL POND CONSTRUCTION				**$56,100.00**

STREET

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
HMA, Surface 2"	SY	1065	$20.00	$21,300.00
Crushed Aggregate Base	CY	250	$20.00	$5,000.00
SUBTOTAL				$26,300.00
CONTINGENCY (10%)				$2,630.00
ENGINEERING (15%)				$3,945.00
TOTAL STORM SEWER				**$32,875.00**

TOTAL OPINION OF PROBABLE PROJECT COST **$136,881.25**

PRELIMINARY OPINION OF PROBABLE COST
STORM WATER MANAGEMENT PLAN - SITE #4
CITY OF MENOMONIE

CEDAR CORPORATION
JOB #: 0055-718
DATE: 1/27/2014
ESTIMATE PREPARED BY: RDJ

STORM SEWER

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
Inlet Protection	EA	0	$50.00	$0.00
Restoration, Storm	SY	6000	$4.00	$24,000.00
Connect to Exist STM	EA	3	$500.00	$1,500.00
Storm Sewer, RCP, 24"	LF	3200	$45.00	$144,000.00
Storm Manhole, Type I	VF	10	$250.00	$2,500.00
Storm Manhole, Type II	VF	30	$400.00	$12,000.00
Apron Endwall, RCP, 24"	EA	2	$1,000.00	$2,000.00
Outlet Structure Trash Rack	EA	1	$1,000.00	$1,000.00
SUBTOTAL				$187,000.00
CONTINGENCY (10%)				$18,700.00
ENGINEERING (15%)				$28,050.00
TOTAL STORM SEWER				**$233,750.00**

POND CONSTRUCTION

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
Clear & Grub	ACRE	1.6	$2,500.00	$4,000.00
Strip Topsoil	ACRE	3	$2,500.00	$7,500.00
Common Excavation	CY	25110	$2.50	$62,775.00
Restoration, Pond	ACRE	2.1	$5,000.00	$10,500.00
Intermediate Erosion Mat	SY	6610	$1.50	$9,915.00
Rip Rap, Medium	CY	25	$50.00	$1,250.00
SUBTOTAL				$95,940.00
CONTINGENCY (10%)				$9,594.00
ENGINEERING (15%)				$14,391.00
TOTAL POND CONSTRUCTION				**$119,925.00**

STREET

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
Remove Concrete	SY	0	$3.00	$0.00
Remove Asphalt	SY	3600	$1.50	$5,400.00
Remove Curb & Gutter	LF	40	$2.00	$80.00
4" Asphaltic Pavement	SY	3600	$14.00	$50,400.00
Crushed Aggregate Base	CY	535	$20.00	$10,700.00
Curb & Gutter, 30"	LF	40	$15.00	$600.00
SUBTOTAL				$67,180.00
CONTINGENCY (10%)				$6,718.00
ENGINEERING (15%)				$10,077.00
TOTAL STORM SEWER				**$83,975.00**

TOTAL OPINION OF PROBABLE PROJECT COST	**$437,650.00**

PRELIMINARY OPINION OF PROBABLE COST
STORM WATER MANAGEMENT PLAN - SITE #5
CITY OF MENOMONIE

CEDAR CORPORATION
JOB #: 0055-718
DATE: 1/27/2014
ESTIMATE PREPARED BY: RDJ

STORM SEWER

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
Storm Vault	EA	1	$25,000.00	$25,000.00
Restoration, Storm	SY	1000	$4.00	$4,000.00
Connect to Exist STM	EA	2	$500.00	$1,000.00
Storm Sewer, RCP, 48"	LF	390	$125.00	$48,750.00
Storm Manhole, Type III	VF	5	$550.00	$2,750.00
Storm Manhole, Type VI	VF	5	$1,100.00	$5,500.00
Apron Endwall, RCP, 48"	EA	0	$1,750.00	$0.00
Outlet Structure Trash Rack	EA	1	$1,000.00	$1,000.00
SUBTOTAL				$88,000.00
CONTINGENCY (10%)				$8,800.00
ENGINEERING (15%)				$13,200.00
TOTAL STORM SEWER				**$110,000.00**

POND CONSTRUCTION

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
Clear & Grub	ACRE	1.7	$2,500.00	$4,250.00
Strip Topsoil	ACRE	2.5	$2,500.00	$6,250.00
Common Excavation	CY	28770	$2.50	$71,925.00
Restoration, Pond	ACRE	2.5	$5,000.00	$12,500.00
Intermediate Erosion Mat	SY	7950	$1.50	$11,925.00
Rip Rap, Medium	CY	0	$50.00	$0.00
SUBTOTAL				$106,850.00
CONTINGENCY (10%)				$10,685.00
ENGINEERING (15%)				$16,027.50
TOTAL POND CONSTRUCTION				**$133,562.50**

STREET

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
Remove Concrete	SY	0	$3.00	$0.00
Remove Asphalt	SY	0	$1.50	$0.00
Remove Curb & Gutter	LF	0	$2.00	$0.00
4" Asphaltic Pavement	SY	0	$14.00	$0.00
Crushed Aggregate Base	CY	0	$20.00	$0.00
SUBTOTAL				$0.00
CONTINGENCY (10%)				$0.00
ENGINEERING (15%)				$0.00
TOTAL STORM SEWER				**$0.00**

TOTAL OPINION OF PROBABLE PROJECT COST	**$243,562.50**

PRELIMINARY OPINION OF PROBABLE COST
STORM WATER MANAGEMENT PLAN - SITE #6
CITY OF MENOMONIE

CEDAR CORPORATION
JOB #: 0055-718
DATE: 1/27/2014
ESTIMATE PREPARED BY: RDJ

STORM SEWER

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
Inlet Protection	EA	1	$50.00	$50.00
Restoration, Storm	SY	400	$4.00	$1,600.00
Connect to Exist STM	EA	2	$500.00	$1,000.00
Storm Sewer, RCP, 12"	LF	87	$30.00	$2,610.00
Storm Sewer, RCP, 42"	LF	154	$85.00	$13,090.00
Storm Manhole, Type I	VF	5	$250.00	$1,250.00
Storm Manhole, Type III	VF	10	$550.00	$5,500.00
Apron Endwall, RCP, 12"	EA	1	$550.00	$550.00
Apron Endwall, RCP, 42"	EA	2	$1,500.00	$3,000.00
Outlet Structure Trash Rack	EA	1	$1,000.00	$1,000.00
SUBTOTAL				$29,650.00
CONTINGENCY (10%)				$2,965.00
ENGINEERING (15%)				$4,447.50
TOTAL STORM SEWER				**$37,062.50**

POND CONSTRUCTION

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
Clear & Grub	ACRE	0.1	$2,500.00	$250.00
Strip Topsoil	ACRE	1.5	$2,500.00	$3,750.00
Common Excavation	CY	18520	$2.50	$46,300.00
Restoration, Pond	ACRE	1.5	$5,000.00	$7,500.00
Intermediate Erosion Mat	SY	4460	$1.50	$6,690.00
Rip Rap, Medium	CY	0	$50.00	$0.00
SUBTOTAL				$64,490.00
CONTINGENCY (10%)				$6,449.00
ENGINEERING (15%)				$9,673.50
TOTAL POND CONSTRUCTION				**$80,612.50**

STREET

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
Remove Concrete	SY	0	$3.00	$0.00
Remove Asphalt	SY	280	$1.50	$420.00
Remove Curb & Gutter	LF	80	$2.00	$160.00
4" Asphaltic Pavement	SY	280	$14.00	$3,920.00
Crushed Aggregate Base	CY	60	$20.00	$1,200.00
Curb & Gutter, 30"	LF	80	$15.00	$1,200.00
SUBTOTAL				$5,700.00
CONTINGENCY (10%)				$570.00
ENGINEERING (15%)				$855.00
TOTAL STORM SEWER				**$7,125.00**

TOTAL OPINION OF PROBABLE PROJECT COST	**$124,800.00**

PRELIMINARY OPINION OF PROBABLE COST
STORM WATER MANAGEMENT PLAN - SITE #7
CITY OF MENOMONIE

CEDAR CORPORATION
JOB #: 0055-718
DATE: 1/27/2014
ESTIMATE PREPARED BY: RDJ

STORM SEWER

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
Inlet Protection	EA	6	$50.00	$300.00
Restoration, Storm	SY	1200	$4.00	$4,800.00
Connect to Exist STM	EA	3	$500.00	$1,500.00
Storm Sewer, RCP, 12"	LF	75	$30.00	$2,250.00
Storm Sewer, RCP, 24"	LF	145	$45.00	$6,525.00
Storm Sewer, RCP, 30"	LF	410	$55.00	$22,550.00
Storm Sewer, RCP, 42"	LF	95	$85.00	$8,075.00
Storm Manhole, Type II	VF	42	$400.00	$16,800.00
Storm Manhole, Type III	VF	25	$550.00	$13,750.00
Storm Inlet, Type III	VF	10	$220.00	$2,200.00
Apron Endwall, RCP, 24"	EA	1	$1,000.00	$1,000.00
Apron Endwall, RCP, 30"	EA	2	$1,250.00	$2,500.00
Outlet Structure Trash Rack	EA	1	$1,000.00	$1,000.00
SUBTOTAL				$83,250.00
CONTINGENCY (10%)				$8,325.00
ENGINEERING (15%)				$12,487.50
TOTAL STORM SEWER				**$104,062.50**

POND CONSTRUCTION

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
Clear & Grub Tree	EA	2	$500.00	$1,000.00
Strip Topsoil	ACRE	1.9	$2,500.00	$4,750.00
Common Excavation	CY	20000	$2.50	$50,000.00
Restoration, Pond	ACRE	1.8	$5,000.00	$9,000.00
Intermediate Erosion Mat	SY	5760	$1.50	$8,640.00
Rip Rap, Medium	CY	35	$50.00	$1,750.00
SUBTOTAL				$75,140.00
CONTINGENCY (10%)				$7,514.00
ENGINEERING (15%)				$11,271.00
TOTAL POND CONSTRUCTION				**$93,925.00**

STREET

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
Remove Concrete	SY	0	$3.00	$0.00
Remove Asphalt	SY	1500	$1.50	$2,250.00
Remove Curb & Gutter	LF	120	$2.00	$240.00
4" Asphaltic Pavement	SY	1500	$14.00	$21,000.00
Crushed Aggregate Base	CY	335	$20.00	$6,700.00
Curb & Gutter, 30"	LF	120	$15.00	$1,800.00
SUBTOTAL				$31,990.00
CONTINGENCY (10%)				$3,199.00
ENGINEERING (15%)				$4,798.50
TOTAL STORM SEWER				**$39,987.50**

TOTAL OPINION OF PROBABLE PROJECT COST	**$237,975.00**

PRELIMINARY OPINION OF PROBABLE COST
STORM WATER MANAGEMENT PLAN - SITE #8
CITY OF MENOMONIE

CEDAR CORPORATION
JOB #: 0055-718
DATE: 1/27/2014
ESTIMATE PREPARED BY: RDJ

STORM SEWER

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
Inlet Protection	EA	1	$50.00	$50.00
Restoration, Storm	SY	500	$4.00	$2,000.00
Connect to Exist STM	EA	3	$500.00	$1,500.00
Storm Sewer, RCP, 18"	LF	105	$35.00	$3,675.00
Storm Sewer, RCP, 24"	LF	0	$45.00	$0.00
Storm Sewer, RCP, 48"	LF	16	$125.00	$2,000.00
Storm Sewer, RCP, 60"	LF	180	$200.00	$36,000.00
Storm Manhole, Type I	VF	0	$250.00	$0.00
Storm Inlet, Type III	VF	0	$220.00	$0.00
Apron Endwall, RCP, 18"	EA	1	$650.00	$650.00
Apron Endwall, RCP, 48"	EA	2	$1,750.00	$3,500.00
Outlet Structure Trash Rack	EA	0	$1,000.00	$0.00
Storm Vault	LS	1	$25,000.00	$25,000.00
SUBTOTAL				$74,375.00
CONTINGENCY (10%)				$7,437.50
ENGINEERING (15%)				$11,156.25
TOTAL STORM SEWER				**$92,968.75**

POND CONSTRUCTION

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
Clear & Grub	ACRE	1.1	$2,500.00	$2,750.00
Strip Topsoil	ACRE	2.5	$2,500.00	$6,250.00
Common Excavation	CY	30000	$2.50	$75,000.00
Restoration, Pond	ACRE	2.5	$5,000.00	$12,500.00
Intermediate Erosion Mat	SY	8070	$1.50	$12,105.00
Rip Rap, Medium	CY	50	$50.00	$2,500.00
SUBTOTAL				$111,105.00
CONTINGENCY (10%)				$11,110.50
ENGINEERING (15%)				$16,665.75
TOTAL POND CONSTRUCTION				**$138,881.25**

STREET

ITEM	UNIT	QUANTITY	UNIT PRICE	COST
Remove Concrete	SY	0	$3.00	$0.00
Remove Asphalt	SY	280	$1.50	$420.00
Remove Curb & Gutter	LF	20	$2.00	$40.00
4" Asphaltic Pavement	SY	280	$14.00	$3,920.00
Crushed Aggregate Base	CY	65	$20.00	$1,300.00
Curb & Gutter, 30"	LF	20	$15.00	$300.00
SUBTOTAL				$5,980.00
CONTINGENCY (10%)				$598.00
ENGINEERING (15%)				$897.00
TOTAL STORM SEWER				**$7,475.00**

TOTAL OPINION OF PROBABLE PROJECT COST **$239,325.00**

APPENDIX D: SEDIMENT SAMPLING MEMORANDUM

Cedar corporation

engineers | architects | planners | environmental specialists
land surveyors | landscape architects | interior designers

MEMO

604 Wilson Avenue
Menomonie, WI 54751
715-235-9081
800-472-7372
FAX 715-235-2727

DATE: March 31, 2014
TO: City of Menomonie
FROM: Cedar Corporation
REGARDING: 2014 Lake Menomin Sediment Sampling
PROJECT #: 55-0729

Sediment sampling at five select locations on Lake Menomin was prepared and implemented. The five areas are labeled as: South Wolske Bay, Cannery Lagoon, Wilson Creek, Butch's Bay, and Jarrett Creek on attached Figure 1. In each area, multiple sampling points were occupied ranging from one to six per location as noted on Figure 1.

Sampling Techniques

After setting up on a sampling point, an ice augur was used to drill through the ice.

Water Depth and Soft Sediment Thickness
Using a measuring rod, a Total Water Depth measurement was taken from the top of the ice to the top of the sediment. After recording the depth, a thickness measurement was taken by continuously pushing the rod through the sediment until hitting refusal. This measurement is recorded as the Soft Sediment Thickness (see Table 1).

Sediment Sample Collection
A soil auger was used to core the sediment and grab representative samples from each sample location/depth.
All samples were placed in pre labeled collection bags and packaged separately.
A minimum of one sample from each location was submitted to a Wisconsin certified laboratory for various analyses.
The remaining samples have been frozen for future use if necessary.

Table 1. Lake Menomin Sediment Samples

Sample Location and Number	Total Water Depth (feet)	Soft Sediment Thickness (feet)	Description
South Wolske Bay			
SWB-1	3.7	0.7	Black silt with fine sand
SWB-2*	3.6	1.0	Black fine sand with silt
SWB-3	3.9	0.3	Black fine sand with silt

Sample Location and Number	Total Depth (feet)	Sediment Thickness (feet)	Description
Cannery Lagoon			
CL-1*	6.1	1.7	Black silt with fine sand
CL-2	2.0	3.9	Black silt with fine sand
CL-3	2.0	3.1	Black silt with fine sand
Wilson Creek			
WC-1*	2.0	Greater than 6.0	Black silt
Butch's Bay			
BB-1	12.5	3.5	Black organic silt (with decaying plant roots)
BB-2	12.0	4.0	Black organic silt (with decaying plant roots)
BB-3*	8.7	2.5	Black organic silt (with decaying plant roots)
BB-4	5.0	3.0	Black organic silt (with decaying plant roots)
BB-5*	5.0	3.3	Black organic silt (with decaying plant roots)
BB-6	7.3	4.5	Black organic silt (with decaying plant roots)
Jarrett Creek			
JC-1*	0	0.5	Brown medium grain sand
JC-2	7.5	0.5	Brown medium grain sand
JC-3	5.5	1.3	Brown medium grain sand

*samples submitted to the lab for analysis

Analytical Results

The analytical report is attached and the data summarized in Tables 2, 3 and 4. Laboratory methods, Chemical Abstract Service numbers for analytical parameters and analyte name are presented in Table 3. All analyses were completed at Test America Laboratories, Inc, a Wisconsin DNR Certified Laboratory.

Table 2 presents the sieve analysis for each sample. Traditional graphical presentations follow the table.

Table 4 presents the analyses of each select sample. As expected, some metals and polyaromatic hydrocarbons are present as are nitrogen and phosphorous compounds. As part of the permit process, these results would be presented to WDNR for determination regarding disposal concerns. It is noted that the results from all samples do not exceed concentrations that would represent hazardous concentrations of identified compounds in the sediments.

For comparison, the results from previous sediment sampling conducted in North Wolske Bay are included in Table 4.

Discussion

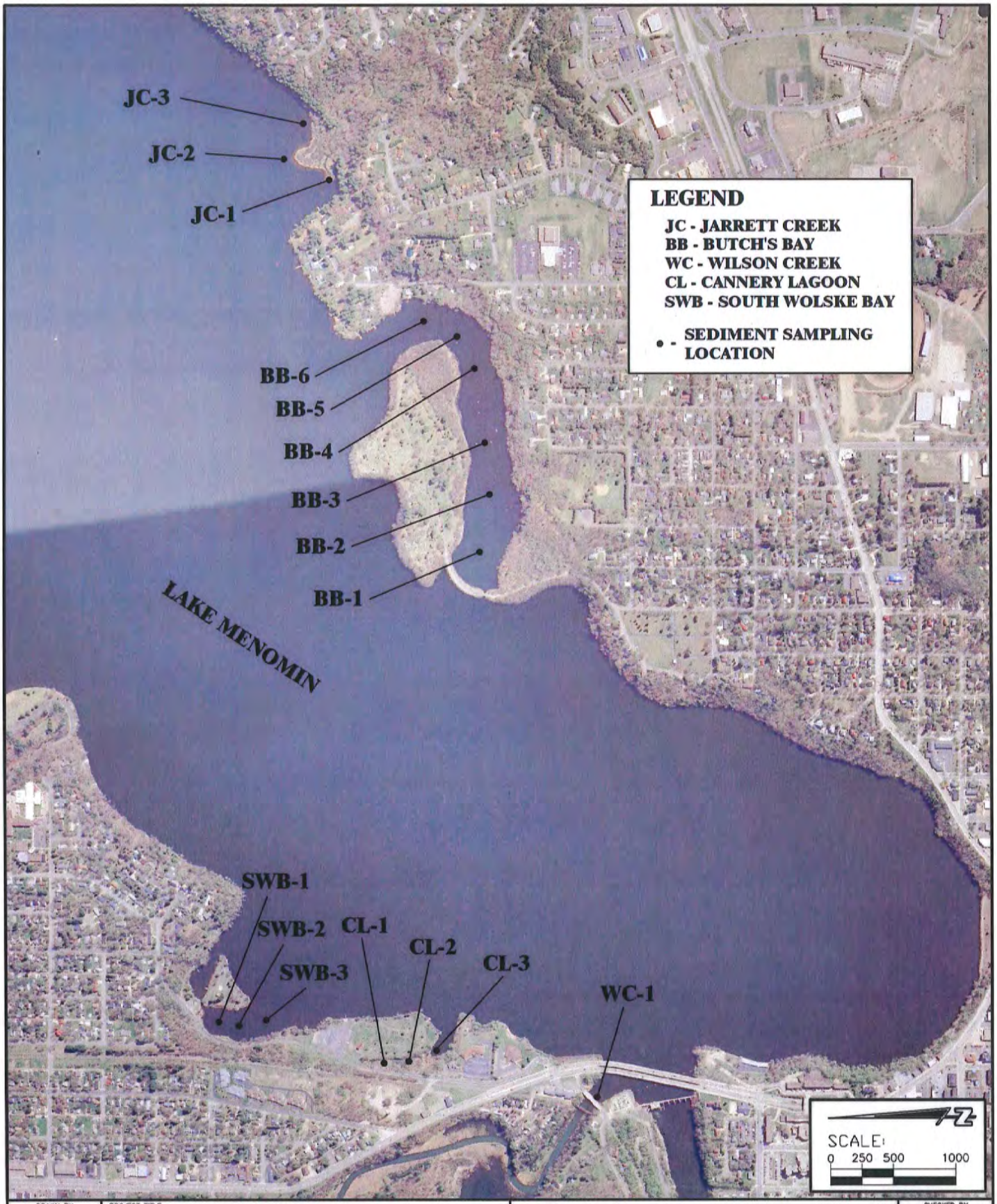
Much of the dredged materials are classified as silt and clay. Dewatering of the dredged sediments will be required to allow these fractions of clay and silt to settle out and will require dewatering using a dewatering membrane chamber or a sediment settling basin(s).

The balance of the results indicates the presence of non-hazardous chemical and physical parameters. It would appear if DNR concurs, that disposal of the dredged sediment on a City Landfill cap(s) could possibly be approved. The thin sediments are rich in nutrients and will aid in rapid restoration of the disposal site minimizing future erosion concerns.

We will forward the analytical results to the WDNR for their comments when the City decides to start a formal application for dredging. The fears of excessive contaminants in the soils are, in this location, thus far unfounded and we believe this will lead to a favorable dredging project. During the dredging process we may be required to sample the dredged materials and the water from the dewatering process as verification of these initial results. The WDNR will define these parameters in the various issued permits.

Next steps:

1) Prepare a cost estimate for the proposed work
2) Once approved by the City Council proceed with design and permitting



DRAWN BY: MAK	PROJECT TITLE: LAKE MENOMIN	Cedar corporation	CHECKED BY: SEM
DATE: MAR 2014	SEDIMENT SAMPLING	604 Wilson Avenue, Menomonie, Wisconsin 54751	JOB NO.: M00550729
REFERENCE FILE: –	MENOMONIE, WI	715-235-9081, 800-472-7372, FAX 715-235-2727, www.cedarcorp.com	FIGURE: 1
DRAWING FILE: 00base_00550729	SAMPLE DETAIL MAP	engineers • architects • planners • environmental specialists, land surveyors • landscape architects • interior designers	

LAKE MENOMIN
SEDIMENT SAMPLES
GRAIN SIZE ANALYSES

Sieve Analyses	SWB-2	CL-1	WC-1	BB-3	BB-5	JC-1
	% Passing					
Sieve Size 3 inch - Percent Finer	100	100	100	35.8	100	100
Sieve Size 2 inch - Percent Finer	100	100	100	22.8	100	100
Sieve Size 1.5 inch - Percent Finer	100	100	100	13.4	100	100
Sieve Size 1 inch - Percent Finer	100	100	100	9.5	100	100
Sieve Size 0.75 inch - Percent Finer	100	100	100	6.8	100	100
Sieve Size 0.375 inch - Percent Finer	100	100	100	3.3	84.4	92.2
Sieve Size #4 - Percent Finer	99.7	99.3	100	1.4	72.9	86.5
Sieve Size #10 - Percent Finer	99.5	98.8	100	100	61.9	79.4
Sieve Size #20 - Percent Finer	99.2	97.2	99.8	100	52	64.7
Sieve Size #40 - Percent Finer	96.4	92.5	99.5	100	45.3	26.9
Sieve Size #60 - Percent Finer	83.5	84.6	98.8	100	41.2	4.1
Sieve Size #80 - Percent Finer	71.2	79.1	98	100	39.2	1.7
Sieve Size #100 - Percent Finer	59.9	75.8	97.4	96.7	37.8	1.4
Sieve Size #200 - Percent Finer	26.1	58.3	96.1	80.3	34.4	1.1
Hydrometer Reading 1 - Percent Finer	15.5	34.8	71	67.2	10.8	0.6
Hydrometer Reading 2 - Percent Finer	12.2	29.4	58.8	48.4	10.8	0.6
Hydrometer Reading 3 - Percent Finer	9.9	21.6	42.8	41.5	10.1	0.6
Hydrometer Reading 4 - Percent Finer	7.6	18.3	34	37.7	10.1	0.6
Hydrometer Reading 5 - Percent Finer	6.5	16	27.1	36	10.1	0.6
Hydrometer Reading 6 - Percent Finer	4.6	12.6	17.7	34.8	1.4	0.4
Hydrometer Reading 7 - Percent Finer	3.5	7.2	12.5	32.2	0.7	0.4
Grain Size Classification						
% composition	**SWB-2**	**CL-1**	**WC-1**	**BB-3**	**BB-5**	**JC-1**
Gravel	0.3	0.7	0	27.5	27.1	13.5
Sand	73.6	41	3.9	19.2	38.5	85.4
Coarse Sand	0.2	0.5	0	10.3	11	7.1
Medium Sand	3.1	6.3	0.5	10.3	16.6	52.5
Fine Sand	70.3	34.2	3.4	10.3	10.9	25.8
Silt	19.6	42.3	69	1.4	24.3	0.5
Clay	6.5	16	27.1	0.7	10.1	0.6

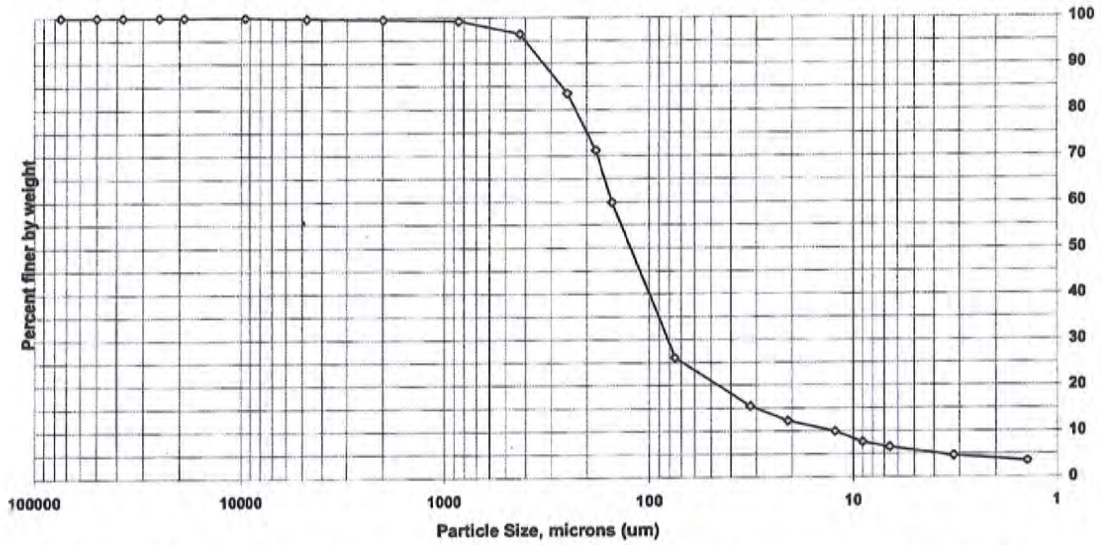
Particle Size of Soils by ASTM D422

Sample ID:	SWB-2	**Percent Solids:**	78.3%	**Date Received:**	3/11/2014
Lab ID:	500-72959-A-2	**Specific Gravity:**	2.650	**Start Date:**	3/13/2014
				End Date:	3/17/2014

Shape (> #10): angular

Non-soil material: wood

Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.7	0.3
#10	2000	99.5	0.2
#20	850	99.2	0.3
#40	425	96.4	2.8
#60	250	83.5	12.9
#80	180	71.2	12.3
#100	150	59.9	11.3
#200	75	26.1	33.8
Hyd1	32	15.5	10.6
Hyd2	20.9	12.2	3.3
Hyd3	12.3	9.9	2.3
Hyd4	9	7.6	2.3
Hyd5	6.6	6.5	1.1
Hyd6	3.2	4.6	1.9
Hyd7	1.4	3.5	1.1

Soil Classification	Percent of sample
Gravel	0.3
Sand	73.6
Coarse Sand	0.2
Medium Sand	3.1
Fine Sand	70.3
Silt	19.6
Clay	6.5

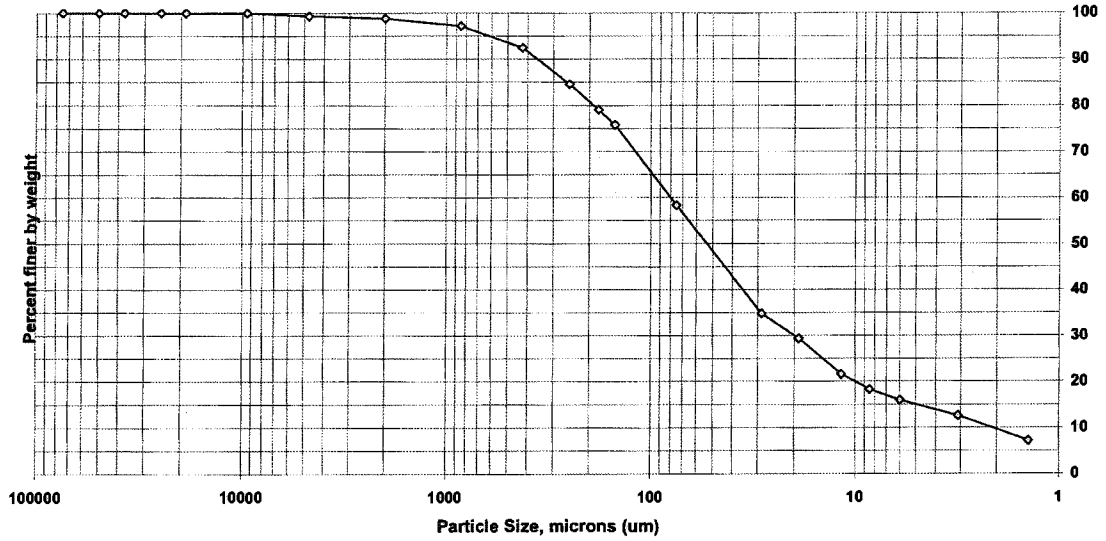
Particle Size of Soils by ASTM D422

Sample ID:	CL-1	**Percent Solids:**	63.5%	**Date Received:**	3/11/2014
Lab ID:	500-72959-A-3	**Specific Gravity:**	2.650	**Start Date:**	3/13/2014
				End Date:	3/17/2014

Shape (> #10): angular

Non-soil material: plant

Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.3	0.7
#10	2000	98.8	0.5
#20	850	97.2	1.6
#40	425	92.5	4.7
#60	250	84.6	7.9
#80	180	79.1	5.5
#100	150	75.8	3.3
#200	75	58.3	17.5
Hyd1	28.7	34.8	23.5
Hyd2	19	29.4	5.4
Hyd3	11.7	21.6	7.8
Hyd4	8.5	18.3	3.3
Hyd5	6	16.0	2.3
Hyd6	3.1	12.6	3.4
Hyd7	1.4	7.2	5.4

Soil Classification	Percent of sample
Gravel	0.7
Sand	41.0
Coarse Sand	0.5
Medium Sand	6.3
Fine Sand	34.2
Silt	42.3
Clay	16.0

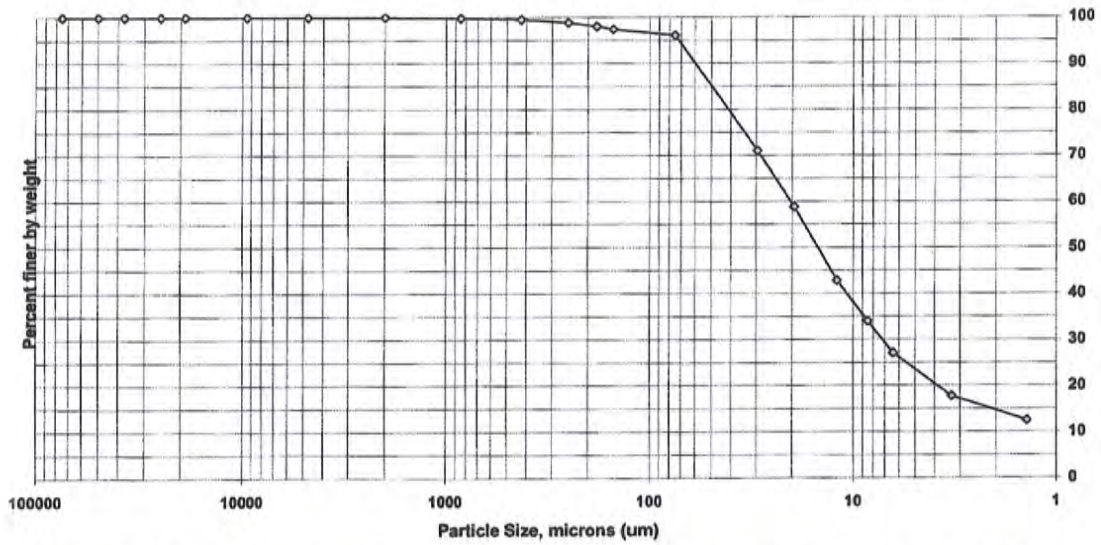
Particle Size of Soils by ASTM D422

Sample ID:	WC-1	**Percent Solids:**	54.3%	**Date Received:**	3/11/2014
Lab ID:	500-72959-A-4	**Specific Gravity:**	2.650	**Start Date:**	3/13/2014
				End Date:	3/17/2014

Shape (> #10): n/a

Non-soil material: n/a

Hardness (> #10): n/a



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	99.8	0.2
#40	425	99.5	0.3
#60	250	98.8	0.7
#80	180	98.0	0.8
#100	150	97.4	0.6
#200	75	96.1	1.3
Hyd1	29.5	71.0	25.1
Hyd2	19.5	58.8	12.2
Hyd3	12	42.8	16.0
Hyd4	8.5	34.0	8.8
Hyd5	6.4	27.1	6.9
Hyd6	3.3	17.7	9.4
Hyd7	1.4	12.5	5.2

Soil Classification	Percent of sample
Gravel	0.0
Sand	3.9
Coarse Sand	0.0
Medium Sand	0.5
Fine Sand	3.4
Silt	69.0
Clay	27.1

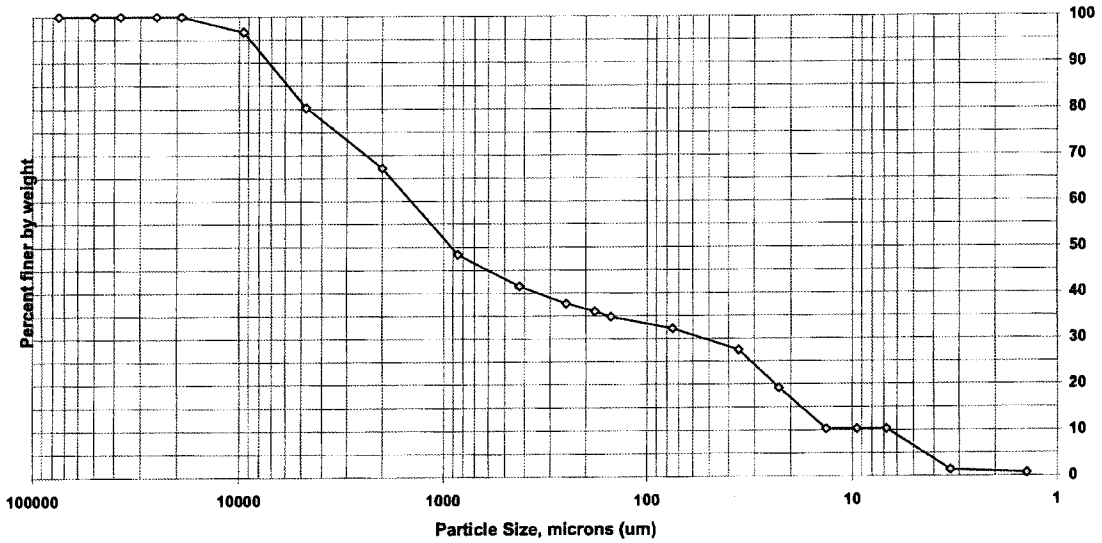
Particle Size of Soils by ASTM D422

Sample ID:	BB-3	**Percent Solids:**	10.2%	**Date Received:**	3/11/2014
Lab ID:	500-72959-A-5	**Specific Gravity:**	2.650	**Start Date:**	3/14/2014
				End Date:	3/20/2014

Shape (> #10): n/a

Non-soil material: plant,wood

Hardness (> #10): n/a



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	96.7	3.3
#4	4750	80.3	16.4
#10	2000	67.2	13.1
#20	850	48.4	18.8
#40	425	41.5	6.9
#60	250	37.7	3.8
#80	180	36.0	1.7
#100	150	34.8	1.2
#200	75	32.2	2.6
Hyd1	35.8	27.5	4.7
Hyd2	22.8	19.2	8.3
Hyd3	13.4	10.3	8.9
Hyd4	9.5	10.3	0.0
Hyd5	6.8	10.3	0.0
Hyd6	3.3	1.4	8.9
Hyd7	1.4	0.7	0.7

Soil Classification	Percent of sample
Gravel	19.7
Sand	48.1
Coarse Sand	13.1
Medium Sand	25.7
Fine Sand	9.3
Silt	21.9
Clay	10.3

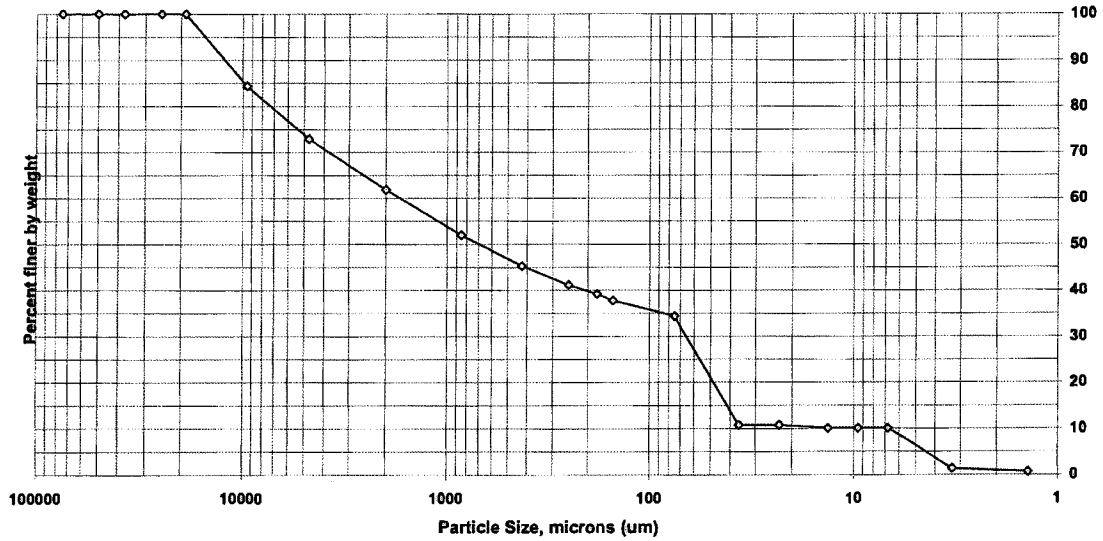
Particle Size of Soils by ASTM D422

Sample ID:	BB-5	**Percent Solids:**	9.0%	**Date Received:**	3/11/2014
Lab ID:	500-72959-A-6	**Specific Gravity:**	2.650	**Start Date:**	3/14/2014
				End Date:	3/20/2014

Shape (> #10): n/a

Non-soil material: plant,wood

Hardness (> #10): n/a



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	84.4	15.6
#4	4750	72.9	11.5
#10	2000	61.9	11.0
#20	850	52.0	9.9
#40	425	45.3	6.7
#60	250	41.2	4.1
#80	180	39.2	2.0
#100	150	37.8	1.4
#200	75	34.4	3.4
Hyd1	36.4	10.8	23.6
Hyd2	23	10.8	0.0
Hyd3	13.4	10.1	0.7
Hyd4	9.5	10.1	0.0
Hyd5	6.8	10.1	0.0
Hyd6	3.3	1.4	8.8
Hyd7	1.4	0.7	0.7

Soil Classification	Percent of sample
Gravel	27.1
Sand	38.5
Coarse Sand	11.0
Medium Sand	16.6
Fine Sand	10.9
Silt	24.3
Clay	10.1

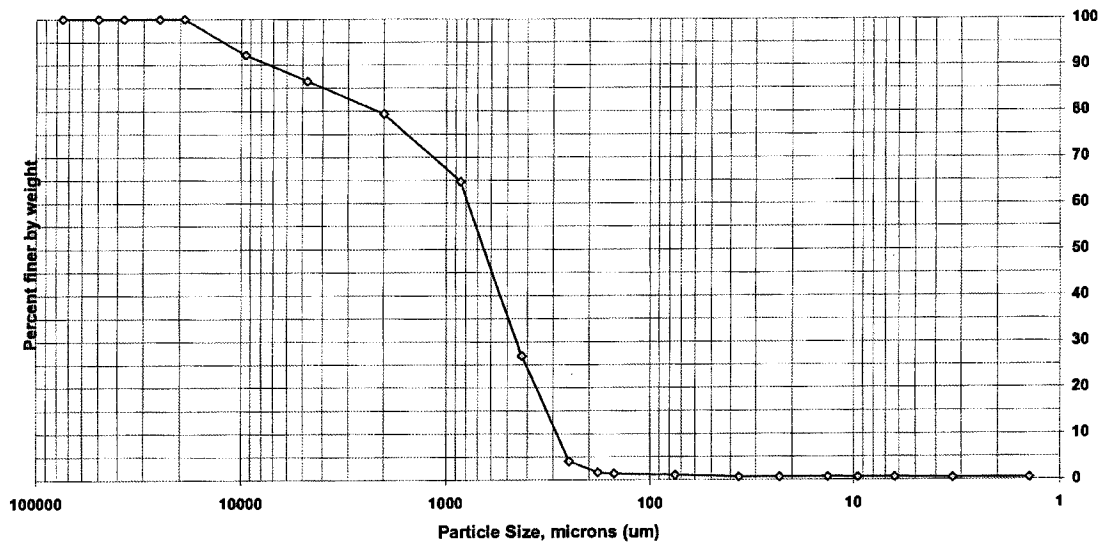
Particle Size of Soils by ASTM D422

Sample ID:	JC-1	**Percent Solids:**	82.8%	**Date Received:**	3/11/2014
Lab ID:	500-72959-A-1	**Specific Gravity:**	2.650	**Start Date:**	3/13/2014
				End Date:	3/17/2014

Shape (> #10): subrounded

Non-soil material: n/a

Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	92.2	7.8
#4	4750	86.5	5.7
#10	2000	79.4	7.1
#20	850	64.7	14.7
#40	425	26.9	37.8
#60	250	4.1	22.8
#80	180	1.7	2.4
#100	150	1.4	0.3
#200	75	1.1	0.3
Hyd1	36.4	0.6	0.4
Hyd2	23	0.6	0.0
Hyd3	13.3	0.6	0.0
Hyd4	9.5	0.6	0.1
Hyd5	6.3	0.6	0.0
Hyd6	3.3	0.4	0.1
Hyd7	1.4	0.4	0.0

Soil Classification	Percent of sample
Gravel	13.5
Sand	85.4
Coarse Sand	7.1
Medium Sand	52.5
Fine Sand	25.8
Silt	0.5
Clay	0.6

LAKE MENOMIN
SEDIMENT ANALYTICAL PROCEDURES

Analyte	Specific Method	CAS Number	Units	Limit	Reports To
Ammonia	SM4500NH3_G	7664-41-7	mg/Kg	3.4	MDL
Organic Matter at 440 Deg(C)	D2974_87	N/A	%	0.1	MDL
Sieve & Hydrometer	D422	N/A	% Passing	N/A	MRL
Mercury	7471A	7439-97-6	mg/Kg	0.0074	MDL
Arsenic	6010B	7440-38-2	mg/Kg	0.21	MDL
Cadmium	6010B	7440-43-9	mg/Kg	0.027	MDL
Chromium	6010B	7440-47-3	mg/Kg	0.12	MDL
Copper	6010B	7440-50-8	mg/Kg	0.21	MDL
Lead	6010B	7439-92-1	mg/Kg	0.16	MDL
Nickel	6010B	7440-02-0	mg/Kg	0.21	MDL
Potassium	6010B	9/7/7440	mg/Kg	3.2	MDL
Zinc	6010B	7440-66-6	mg/Kg	0.43	MDL
Nitrogen, Nitrate Nitrite	353.2	N/A	mg/Kg	0.52	MDL
Nitrogen, Kjeldahl	SM4500_TKN_H	N/A	mg/Kg	33	MDL
Total Organic Carbon	Lloyd_Kahn_Mod	7440-44-0	mg/Kg	1000	MDL
Percent Moisture	Moisture	N/A	%	0.1	MDL
Percent Solids	Moisture	N/A	%	0.1	MDL
pH	9045C	N/A	SU	0.2	MDL
Phosphorus as P	4500_P_E	7723-14-0	mg/Kg	6.9	MDL
1-Methylnaphthalene	8270D	90-12-0	ug/Kg	9.4	MDL
2-Methylnaphthalene	8270D	91-57-6	ug/Kg	7.1	MDL
Acenaphthene	8270D	83-32-9	ug/Kg	6.9	MDL
Acenaphthylene	8270D	208-96-8	ug/Kg	5.1	MDL
Anthracene	8270D	120-12-7	ug/Kg	6.4	MDL
Benzo[a]anthracene	8270D	56-55-3	ug/Kg	5.2	MDL
Benzo[a]pyrene	8270D	50-32-8	ug/Kg	7.4	MDL
Benzo[b]fluoranthene	8270D	205-99-2	ug/Kg	8.3	MDL
Benzo[g,h,i]perylene	8270D	191-24-2	ug/Kg	12	MDL
Benzo[k]fluoranthene	8270D	207-08-9	ug/Kg	11	MDL
Chrysene	8270D	218-01-9	ug/Kg	10	MDL
Dibenz(a,h)anthracene	8270D	53-70-3	ug/Kg	7.4	MDL
Fluoranthene	8270D	206-44-0	ug/Kg	7.1	MDL
Fluorene	8270D	86-73-7	ug/Kg	5.4	MDL
Indeno[1,2,3-cd]pyrene	8270D	193-39-5	ug/Kg	9.9	MDL
Naphthalene	8270D	91-20-3	ug/Kg	5.9	MDL
Phenanthrene	8270D	85-01-8	ug/Kg	5.3	MDL
Pyrene	8270D	129-00-0	ug/Kg	7.6	MDL
Specific Conductance	9050A	N/A	umhos/cm	0.95	MDL
Total Solids	2540G	N/A	%	0.1	MDL
Total Volatile Solids	2540G	N/A	%	0.1	MDL

LAKE MENOMIN
2014 SEDIMENT SAMPLING
CHEMICAL ANALYSES

Analyte	Sample Identification										Units
	North Wolske Bay Samples 2013				Lake Menomin Samples 2014						
	WB-01 0-2	WB-01 2-4	WB-02 0-2	WB-02 2-4	SWB-2	CL-1	WC-1	BB-3	BB-5	JC-1	
Ammonia	500	36	110	130	43	150	530	1500	1400	7.6	mg/Kg
Organic Matter at 440 Deg(C)					1.2	4.3	4.9	69	72	0.28	%
Mercury	0.078	<0.0084	0.017	0.018	<0.0087	0.036	0.042	0.11	0.1	<0.0074	mg/Kg
Arsenic	1.8	0.68	0.57	0.49	2.9	6	4.3	2.9	<1.9	0.3	mg/Kg
Cadmium	0.34	0.081	0.097	0.1	<0.034	<0.037	0.066	<0.21	<0.24	<0.027	mg/Kg
Chromium	**18**	5.9	8.6	8.6	11	18	28	13	8.4	7.3	mg/Kg
Copper	**24**	2.6	**6.9**	**6.7**	4.7	15	21	27	16	5.2	mg/Kg
Lead	**15**	2.1	4.3	3.8	4.1	19	20	15	14	1.9	mg/Kg
Nickel	7.8	2.7	3.8	3.7	3.6	13	20	12	6.5	5.7	mg/Kg
Potassium					260	1300	1800	590	480	160	mg/Kg
Zinc	35	7.6	11	11	13	1000	63	72	49	15	mg/Kg
Nitrogen, Nitrate Nitrite					<0.60	<0.74	<0.80	<4.0	<4.7	0.73	mg/Kg
Nitrogen, Kjeldahl	**940**	**90**	**530**	**290**	**260**	**740**	**1,100**	**6,100**	**10,000**	**53**	mg/Kg
Total Organic Carbon	**10,000**	**2,100**	**4,500**	**4,900**	**4,500**	**22,000**	**29,000**	**400,000**	**390,000**	**<1000**	mg/Kg
Percent Moisture	63	18	32	23	27	40	44	89	91	14	%
Percent Solids	37	82	68	77	73	60	56	11	9.5	86	%
pH					7.35	7.03	8.05	7.12	6.73	7.89	SU
Phosphorus as P	**900**	**130**	**340**	**280**	**300**	**1600**	**1300**	**1300**	**1000**	**200**	mg/Kg
1-Methylnaphthalene	<44	<20	<23	<21	<11	29	<14	<73	<82	<9.4	ug/Kg
2-Methylnaphthalene	<120	<52	<61	<54	<8.1	33	<11	<55	<62	<7.1	ug/Kg
Acenaphthene	<27	<12	<14	<12	<7.9	<9.6	<11	<54	<60	<6.9	ug/Kg
Acenaphthylene	<20	<9.2	<11	<9.6	<5.8	<7.0	<7.8	<39	<44	<5.1	ug/Kg
Anthracene	<21	<9.5	<11	12	<7.4	<8.9	<9.9	<50	<56	<6.4	ug/Kg
Benzo[a]anthracene	<19	<8.4	<9.8	<8.7	**12**	**25**	**16**	<40	<45	<5.2	ug/Kg
Benzo[a]pyrene	<16	<7.3	<8.5	<7.6	**16**	**33**	**29**	**90**	**100**	**10**	ug/Kg
Benzo[b]fluoranthene	<17	<7.8	<9.1	<8.1	**19**	**45**	**37**	**96**	**130**	**16**	ug/Kg
Benzo[g,h,i]perylene	<30	<14	<16	<14	19	53	38	150	190	14	ug/Kg
Benzo[k]fluoranthene	<21	<9.6	<11	<9.9	13	**23**	**27**	<88	**100**	<11	ug/Kg
Chrysene	<20	<9.1	<11	<9.4	<12	38	24	<82	<92	<10	ug/Kg
Dibenz(a,h)anthracene	<25	<11	<13	<12	**11**	**21**	**23**	**120**	**200**	**8.3**	ug/Kg
Fluoranthene	<36	<16	<19	<17	21	32	42	<56	<62	10	ug/Kg
Fluorene	<20	<9.1	<11	<9.5	<6.2	<7.5	<8.3	<42	<47	<5.4	ug/Kg
Indeno[1,2,3-cd]pyrene	<30	<14	<16	<14	**18**	**37**	**33**	**140**	**210**	**11**	ug/Kg
Naphthalene	<17	<7.8	<9.0	<8.0	<6.8	19	<9.1	<46	<52	<5.9	ug/Kg
Phenanthrene	<37	<17	<20	18	<6.2	46	16	<42	<47	<5.3	ug/Kg
Pyrene	<32	<15	<17	<15	18	39	35	<59	<67	7.9	ug/Kg
Specific Conductance					670	1200	2100	470	900	320	umhos/cm
Total Solids					73	60	56	11	9.5	86	%
Total Volatile Solids					1.9	5.1	5.6	70	69	620	%

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MEMO

DATE: **May 29, 2013**
TO: **Dave Schofield**
FROM: **Scott McCurdy**
REGARDING: **Wolske Bay Sediment Sampling**
PROJECT #: **M0055-715**

Lake Menomin Sediment Sampling, May 9, 2013

Conditions: Overcast with rain

Sampling Platform: Mayor's pontoon with Mayor operating

Samplers: Ryan Stafne, Scott McCurdy

Positioning:

1. Pontoon was positioned about halfway between and tied to the floating dock on the south shore of the Bay and to the private dock on the north shore.

2. A four inch PVC pipe was manually driven into the sediment to allow "sampler" return to the same location as sampler can only take one 12 inch long sample.

3. Samples were collected in acetate sleeves of 12 inches in length and 1-1/2 inches in diameter using an AMS manual sediment sampler with integral hammer weight in the sample string.

4. Collected samples were numbered and composited for depths 0 to 2 feet and 2 to 4 feet at each of the sample locations.

5. Samples labeled:
   WB-01 0-2 composite of 0-1 and 1-2 foot intervals
   WB-01 2-4 composite of 2-3 and 3-4 foot intervals
   WB-02 0-2 composite of 0-1 and 1-2 foot intervals
   WB-02 2-4 composite of 2-3 and 3-4 foot intervals

In Field Observations:

1. Sample techniques using PVC pipe to guide sampler worked well. Adjustment to PVC pipe length could be made to better accommodate encountered water depths.

2. Samples can be difficult to remove from sampler device. Acetate sleeves wedge in sampler if "over" driven or not fully free of silt and sand before inserting next sample sleeve.

Sample WB-01:

0-1 foot	Bottom sediments, thin muck
1-2 feet	Bottom sediments, some sand – gray angular
2-4 feet	Hole caving incomplete recovery – gray sand

Sample WB-2

0-1 foot	Bottom sediments, thin black, very fine grained
1-2 feet	Bottom sediments as above, thin layer of sand in base of sample
2-4 feet	Gray sand/silt as in Sample WB-01

Comments:

1. Samplers encountered hard compacted sand at 18 to 20 inches below the surface of lake bottom.
2. Mayor commented that his exploration of the bay indicated much thicker sediments were present around the edges of the bay.

Results:

Analytical reports are attached and are summarized in the attached Table 1 and graphs and indicate:

1. General Chemistry: As expected the near surface bottom sediment (0 to 2 feet) is higher in moisture and total organic carbon content and lower in solids than underlying sediments.
2. Metals: Except in the near surface sample in WB-01, metals are relatively uniform in concentration, all below Expected Concentration. In the WB-01 0-2 sample higher concentrations of metal are noted but not significantly above the Expected Concentrations for chromium, copper, lead, nickel and zinc.
3. PAH's: non observed in any samples except slightly above MDL in WB-02 2-4

SEDIMENT ANALYSES
WOLSKE BAY, LAKE MENOMIN

Analyte	Expected Detection	Units	SAMPLE RESULTS WB-01 0-2	Q	WB-01 2-4	Q	WB-02 0-2	Q	WB-02 2-4	Q
GENERAL CHEMISTRY										
Percent Moisture		%	63		18		32		23	
Percent Solids		%	37		82		68		77	
TOC Dup		mg/Kg	10000		2100		4500		4900	
METALS										
Arsenic	5	mg/Kg	1.8	J	0.68	J	0.57	J	0.49	J
Cadmium	0.6	mg/Kg	0.34	J	0.081	J	0.097	J	0.1	J
Chromium	10	mg/Kg	**18**	B	5.9	B	8.6	B	8.6	B
Copper	5	mg/Kg	**24**		2.6		**6.9**		**6.7**	
Iron		mg/Kg	7700		2000		3100		3000	
Lead	10	mg/Kg	**15**		2.1		4.3		3.8	
Manganese		mg/Kg	190		32		45		50	
Mercury	100	ug/Kg	78		<8.4		17	J	18	J
Nickel	5	mg/Kg	**7.8**		2.7		3.8		3.7	
Zinc	10	mg/Kg	**35**		7.6		**11**		**11**	
NUTRIENTS										
Ammonia		mg/Kg	500	B	36	B	110	B	130	B
Nitrogen, Kjeldahl		mg/Kg	940	B	90	B	530	B	290	B
Phosphorus as P		mg/Kg	900		130		340		280	
POLYNUCLEAR AROMATIC HYDROCARBONS										
1-Methylnaphthalene		ug/Kg	<44		<20		<23		<21	
2-Methylnaphthalene		ug/Kg	<120		<52		<61		<54	
Acenaphthene		ug/Kg	<27		<12		<14		<12	
Acenaphthylene		ug/Kg	<20		<9.2		<11		<9.6	
Anthracene		ug/Kg	<21		<9.5		<11		12	J
Benzo[a]anthracene		ug/Kg	<19		<8.4		<9.8		<8.7	
Benzo[a]pyrene		ug/Kg	<16		<7.3		<8.5		<7.6	
Benzo[b]fluoranthene		ug/Kg	<17		<7.8		<9.1		<8.1	
Benzo[g,h,i]perylene		ug/Kg	<30		<14		<16		<14	
Benzo[k]fluoranthene		ug/Kg	<21		<9.6		<11		<9.9	
Chrysene		ug/Kg	<20		<9.1		<11		<9.4	
Dibenz(a,h)anthracene		ug/Kg	<25		<11		<13		<12	
Fluoranthene		ug/Kg	<36		<16		<19		<17	
Fluorene		ug/Kg	<20		<9.1		<11		<9.5	
Indeno[1,2,3-cd]pyrene		ug/Kg	<30		<14		<16		<14	
Naphthalene		ug/Kg	<17		<7.8		<9.0		<8.0	
Phenanthrene		ug/Kg	<37		<17		<20		18	J
Pyrene		ug/Kg	<32		<15		<17		<15	

'Q' = Data Qualifiers		
	B	Compound was found in the blank and in the sample
	J	Result is less than reporting limit but greater than or equal to the Method Detection Level and the concentration is an approximate value.

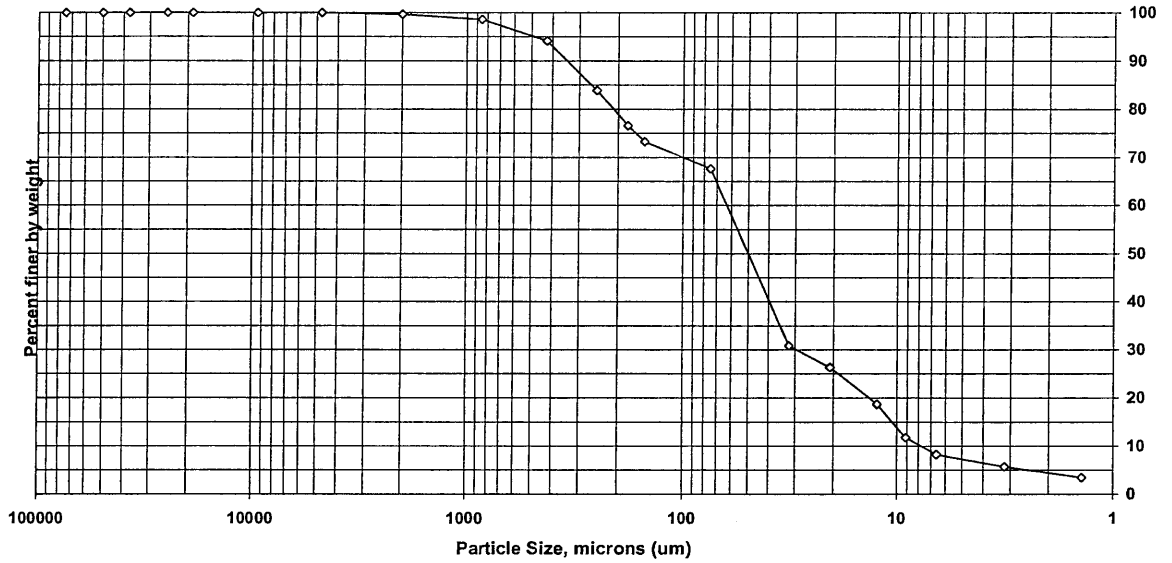
Particle Size of Soils by ASTM D422

Sample ID:	WB-1 0-2	**Percent Solids:**	40.7%	**Date Received:**	5/11/2013
Lab ID:	500-56913-B-1	**Specific Gravity:**	2.650	**Start Date:**	5/14/2013
				End Date:	5/16/2013

Shape (> #10): subangular

Non-soil material: plant

Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.7	0.3
#20	850	98.6	1.1
#40	425	94.2	4.4
#60	250	83.9	10.3
#80	180	76.6	7.3
#100	150	73.3	3.3
#200	75	67.6	5.7
Hyd1	32	30.9	36.7
Hyd2	20.7	26.4	4.5
Hyd3	12.4	18.7	7.7
Hyd4	9.1	11.8	6.9
Hyd5	6.6	8.3	3.5
Hyd6	3.2	5.7	2.6
Hyd7	1.4	3.5	2.2

Soil Classification	Percent of sample
Gravel	0.0
Sand	32.4
Coarse Sand	0.3
Medium Sand	5.5
Fine Sand	26.6
Silt	59.3
Clay	8.3

TestAmerica Burlington

Sediment Grain Size - D422

Client	
Client Sample ID	WB-1 0-2
Lab Sample ID	500-56913-B-1

Date Received	5/11/2013
Start Date	05/14/2013 16:56
End Date	05/16/2013 22:39

Dry Weight Determination

Tin Weight	0.99 g
Wet Sample + Tin	27.43 g
Dry Sample + Tin	11.74 g
% Moisture	59.34 %

Non-soil material:	plant
Shape (> #10):	subangular
Hardness (> #10):	hard

Date/Time in oven	05/14/2013 16:58
Date/Time out of oven	05/15/2013 17:25

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)		178.13	178.13
Sample Weight (Oven Dried)			72.4

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			0.23
Sample <#10			72.2
% Passing #10			40.5

Hydrometer Data

Serial Number	531857
Calib. Date (mm/dd/yyyy)	03/12/2013
Low Temp (C)	17.0
Reading at Low Temp	1.0045
High Temp (C)	23.0
Reading at High Temp	1.0035
Hydrometer Cal Slope	-0.000166667
Hydrometer Cal Intercept	1.007333333
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample	% Finer	Classification	Sub Class
3 inch	75000			0.00 g	100.0	Gravel	
2 inch	50000			0.00 g	100.0	Gravel	
1.5 inch	37500			0.00 g	100.0	Gravel	
1 inch	25000			0.00 g	100.0	Gravel	
3/4 inch	19000			0.00 g	100.0	Gravel	
3/8 inch	9500			0.00 g	100.0	Gravel	
#4	4750			0.00 g	100.0	Gravel	
#10	2000	462.75	462.98	0.23 g	99.7	Sand	Coarse
#20	850	381.44	382.23	0.79 g	98.6	Sand	Medium
#40	425	352.74	355.89	3.15 g	94.2	Sand	Medium
#60	250	340.75	348.19	7.44 g	83.9	Sand	Fine
#80	180	329.97	335.29	5.32 g	76.6	Sand	Fine
#100	150	326.95	329.32	2.37 g	73.3	Sand	Fine
#200	75	306.10	310.20	4.10 g	67.6	Sand	Fine
				0.00 g	67.6		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	72.4

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Microns)	% Finer	Classification	Sub Class
2	2	1.0175	22.5	32	30.9	Silt	
5	5	1.0155	22.5	20.7	26.4	Silt	
15	15	1.0120	22.5	12.4	18.7	Silt	
30	30	1.0090	22.0	9.1	11.6	Silt	
60	59	1.0075	21.5	6.6	8.32	Silt	
250	256	1.0065	20.5	3.2	5.73	Clay	
1440	1440	1.0055	20.5	1.4	3.51	Clay	

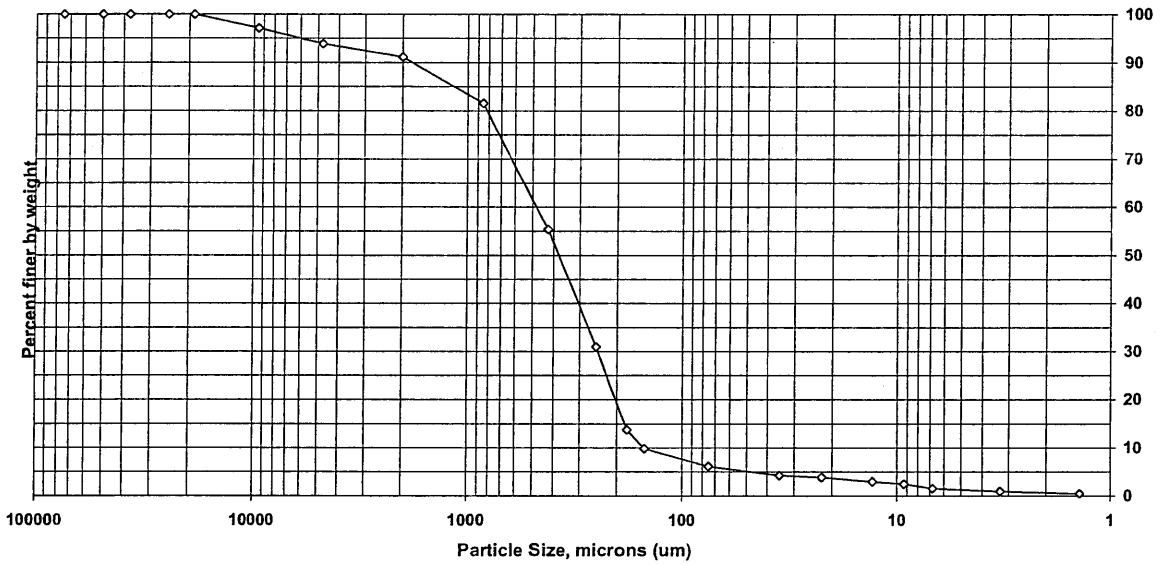
Particle Size of Soils by ASTM D422

Sample ID:	WB-1 2-4	**Percent Solids:**	77.0%	**Date Received:**	5/11/2013
Lab ID:	500-56913-B-2	**Specific Gravity:**	2.650	**Start Date:**	5/14/2013
				End Date:	5/16/2013

Shape (> #10): rounded

Non-soil material: plant

Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	97.1	2.9
#4	4750	93.9	3.2
#10	2000	91.2	2.7
#20	850	81.6	9.6
#40	425	55.4	26.2
#60	250	31.0	24.4
#80	180	13.8	17.2
#100	150	9.9	3.9
#200	75	6.2	3.7
Hyd1	35.1	4.3	1.9
Hyd2	22.3	3.9	0.4
Hyd3	13	3.0	0.9
Hyd4	9.3	2.5	0.5
Hyd5	6.8	1.5	0.9
Hyd6	3.3	1.0	0.5
Hyd7	1.4	0.5	0.5

Soil Classification	Percent of sample
Gravel	6.1
Sand	87.7
Coarse Sand	2.7
Medium Sand	35.8
Fine Sand	49.2
Silt	4.6
Clay	1.5

TestAmerica Burlington

Sediment Grain Size - D422

Client	
Client Sample ID	WB-1 2-4
Lab Sample ID	500-56913-B-2

Date Received	5/11/2013
Start Date	05/14/2013 16:59
End Date	05/16/2013 22:52

Dry Weight Determination

Tin Weight	0.99 g
Wet Sample + Tin	46.71 g
Dry Sample + Tin	36.18 g
% Moisture	23.03 %

Non-soil material:	plant
Shape (> #10):	rounded
Hardness (> #10):	hard

Date/Time in oven	05/14/2013 17:01
Date/Time out of oven	05/15/2013 17:25

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)		237.89	237.89
Sample Weight (Oven Dried)			183

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			16.3
Sample <#10			167
% Passing #10			70.2

Hydrometer Data

Serial Number	531857
Calib. Date (mm/dd/yyyy)	03/12/2013
Low Temp (C)	17.0
Reading at Low Temp	1.0045
High Temp (C)	23.0
Reading at High Temp	1.0035
Hydrometer Cal Slope	-0.000166667
Hydrometer Cal Intercept	1.007333333
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample	% Finer	Classification	Sub Class
3 inch	75000			0.00 g	100.0	Gravel	
2 inch	50000			0.00 g	100.0	Gravel	
1.5 inch	37500			0.00 g	100.0	Gravel	
1 inch	25000			0.00 g	100.0	Gravel	
3/4 inch	19000			0.00 g	100.0	Gravel	
3/8 inch	9500	447.34	452.67	5.33 g	97.1	Gravel	
#4	4750	488.09	494.00	5.91 g	93.9	Gravel	
#10	2000	462.76	467.77	5.01 g	91.2	Sand	Coarse
#20	850	381.44	399.03	17.59 g	81.6	Sand	Medium
#40	425	352.74	400.75	48.01 g	55.4	Sand	Medium
#60	250	340.75	385.45	44.70 g	31.0	Sand	Fine
#80	180	329.97	361.44	31.47 g	13.8	Sand	Fine
#100	150	326.95	334.15	7.20 g	9.9	Sand	Fine
#200	75	306.10	312.83	6.73 g	6.2	Sand	Fine
				0.00 g	6.2		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	183

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0085	22.5	35.1	4.32	Silt	
5	5	1.0080	22.5	22.3	3.89	Silt	
15	15	1.0070	22.5	13	3	Silt	
30	30	1.0065	22.0	9.3	2.49	Silt	
60	58	1.0055	21.5	6.8	1.54	Silt	
250	256	1.0050	21.0	3.3	1.02	Clay	
1440	1440	1.0045	20.5	1.4	0.512	Clay	

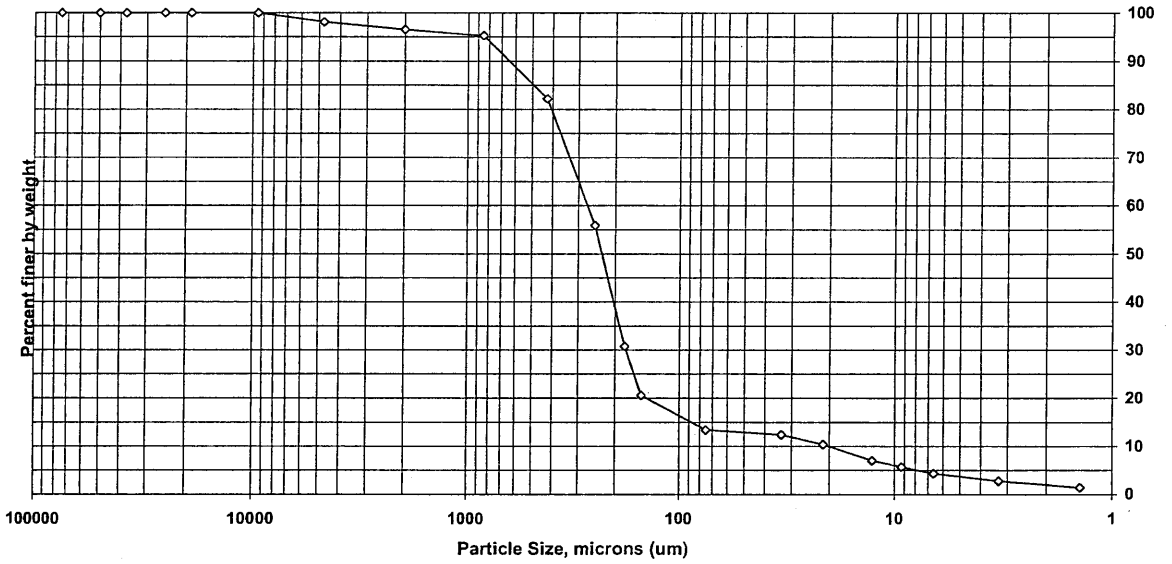
Particle Size of Soils by ASTM D422

Sample ID:	WB-2 0-2	**Percent Solids:**	67.5%	**Date Received:**	5/11/2013
Lab ID:	500-56913-B-3	**Specific Gravity:**	2.650	**Start Date:**	5/14/2013
				End Date:	5/16/2013

Shape (> #10): rounded

Non-soil material: plant

Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	98.1	1.9
#10	2000	96.6	1.5
#20	850	95.3	1.3
#40	425	82.2	13.1
#60	250	55.9	26.3
#80	180	30.8	25.1
#100	150	20.6	10.2
#200	75	13.4	7.2
Hyd1	33.4	12.4	1.0
Hyd2	21.4	10.4	2.0
Hyd3	12.7	7.1	3.3
Hyd4	9.3	5.8	1.3
Hyd5	6.6	4.4	1.4
Hyd6	3.3	2.8	1.5
Hyd7	1.4	1.4	1.4

Soil Classification	Percent of sample
Gravel	1.9
Sand	84.7
Coarse Sand	1.5
Medium Sand	14.4
Fine Sand	68.8
Silt	9.1
Clay	4.4

TestAmerica Burlington

Sediment Grain Size - D422

Client	
Client Sample ID	WB-2 0-2
Lab Sample ID	500-56913-B-3

Date Received	5/11/2013
Start Date	05/14/2013 17:01
End Date	05/16/2013 23:05

Dry Weight Determination

Tin Weight	1.00 g
Wet Sample + Tin	37.10 g
Dry Sample + Tin	25.36 g
% Moisture	32.52 %

Non-soil material:	plant
Shape (> #10):	rounded
Hardness (> #10):	hard

Date/Time in oven	05/14/2013 17:03
Date/Time out of oven	05/15/2013 17:25

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)		181.86	181.86
Sample Weight (Oven Dried)			123

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			4.19
Sample <#10			119
% Passing #10			65.4

Hydrometer Data

Serial Number	531857
Calib. Date (mm/dd/yyyy)	03/12/2013
Low Temp (C)	17.0
Reading at Low Temp	1.0045
High Temp (C)	23.0
Reading at High Temp	1.0035
Hydrometer Cal Slope	-0.000166667
Hydrometer Cal Intercept	1.007333333
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample	% Finer	Classification	Sub Class
3 inch	75000			0.00 g	100.0	Gravel	
2 inch	50000			0.00 g	100.0	Gravel	
1.5 inch	37500			0.00 g	100.0	Gravel	
1 inch	25000			0.00 g	100.0	Gravel	
3/4 inch	19000			0.00 g	100.0	Gravel	
3/8 inch	9500			0.00 g	100.0	Gravel	
#4	4750	488.09	490.40	2.31 g	98.1	Gravel	
#10	2000	462.76	464.64	1.88 g	96.6	Sand	Coarse
#20	850	381.44	383.08	1.64 g	95.3	Sand	Medium
#40	425	352.74	368.84	16.10 g	82.2	Sand	Medium
#60	250	340.75	373.09	32.34 g	55.9	Sand	Fine
#80	180	329.97	360.84	30.87 g	30.8	Sand	Fine
#100	150	326.95	339.48	12.53 g	20.6	Sand	Fine
#200	75	306.10	314.90	8.80 g	13.4	Sand	Fine
				0.00 g	13.4		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	123

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0130	23.0	33.4	12.4	Silt	
5	5	1.0115	23.0	21.4	10.4	Silt	
15	15	1.0090	22.5	12.7	7.08	Silt	
30	29	1.0080	22.5	9.3	5.77	Silt	
60	58	1.0070	22.0	6.6	4.35	Silt	
250	250	1.0060	21.0	3.3	2.83	Clay	
1440	1434	1.0050	20.5	1.4	1.41	Clay	

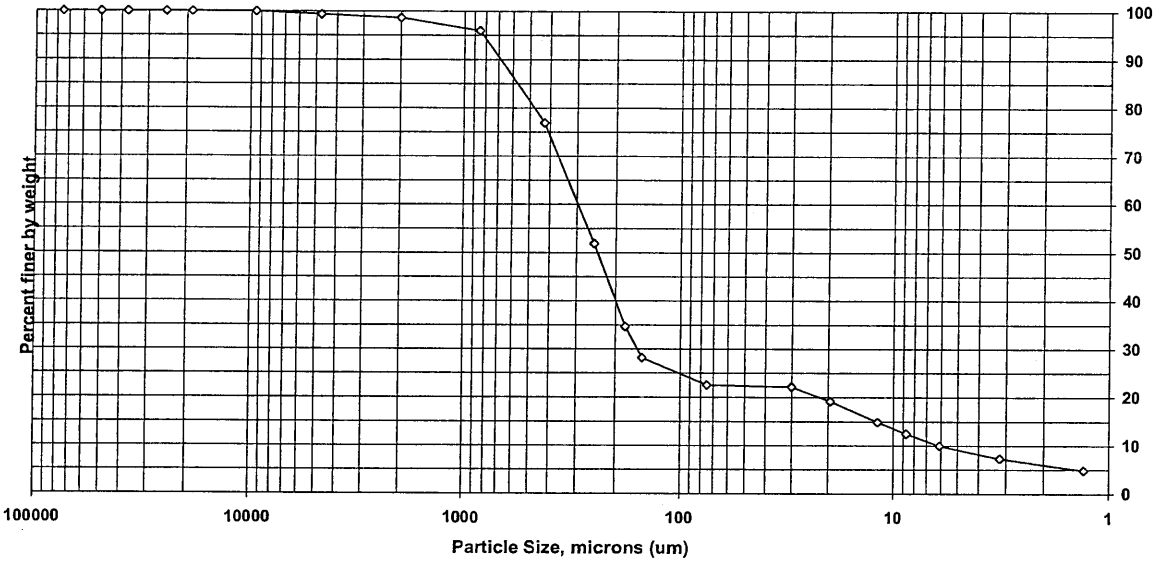
Particle Size of Soils by ASTM D422

Sample ID:	WB-2 2-4	**Percent Solids:**	71.2%	**Date Received:**	5/11/2013
Lab ID:	500-56913-B-4	**Specific Gravity:**	2.650	**Start Date:**	5/14/2013
				End Date:	5/16/2013

Shape (> #10): rounded

Non-soil material: plant

Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.4	0.6
#10	2000	98.7	0.7
#20	850	96.0	2.7
#40	425	76.9	19.1
#60	250	51.9	25.0
#80	180	34.7	17.2
#100	150	28.2	6.5
#200	75	22.6	5.6
Hyd1	30.1	22.2	0.4
Hyd2	19.6	19.2	3.0
Hyd3	11.9	14.9	4.3
Hyd4	8.7	12.5	2.4
Hyd5	6.1	10.0	2.5
Hyd6	3.2	7.4	2.6
Hyd7	1.3	4.9	2.5

Soil Classification	Percent of sample
Gravel	0.6
Sand	76.8
Coarse Sand	0.7
Medium Sand	21.8
Fine Sand	54.3
Silt	12.6
Clay	10.0

TestAmerica Burlington

Sediment Grain Size - D422

Client	
Client Sample ID	WB-2 2-4
Lab Sample ID	500-56913-B-4

Date Received	5/11/2013
Start Date	05/14/2013 17:04
End Date	05/16/2013 23:21

Dry Weight Determination

Tin Weight	0.99 g
Wet Sample + Tin	38.91 g
Dry Sample + Tin	27.98 g
% Moisture	28.82 %

Non-soil material:	plant
Shape (> #10):	rounded
Hardness (> #10):	hard

Date/Time in oven	05/14/2013 17:05
Date/Time out of oven	05/15/2013 17:26

Sample Weights	Tare (g)	Pan+Samp (g)	Samp (g)
Sample Weight (Wet)		188.51	188.51
Sample Weight (Oven Dried)			134

Sample Split (oven dried)	Tare (g)	Pan+Samp (g)	Samp (g)
Sample >=#10			1.74
Sample <#10			132
% Passing #10			70

Hydrometer Data

Serial Number	531857
Calib. Date (mm/dd/yyyy)	03/12/2013
Low Temp (C)	17.0
Reading at Low Temp	1.0045
High Temp (C)	23.0
Reading at High Temp	1.0035
Hydrometer Cal Slope	-0.000166667
Hydrometer Cal Intercept	1.007333333
Default Soil Gravity	2.6500

Gravel/Sand Fraction (Sieves)

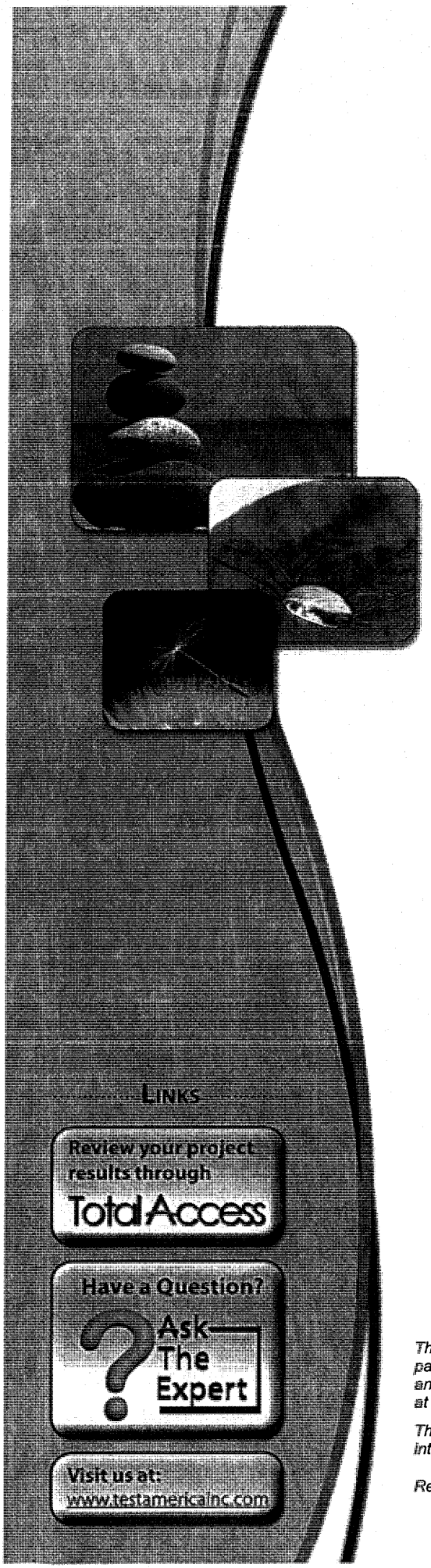
Sample Fraction	Size (um)	Pan Tare (g)	Pan+Sample (g)	Sample	% Finer	Classification	Sub Class
3 inch	75000			0.00 g	100.0	Gravel	
2 inch	50000			0.00 g	100.0	Gravel	
1.5 inch	37500			0.00 g	100.0	Gravel	
1 inch	25000			0.00 g	100.0	Gravel	
3/4 inch	19000			0.00 g	100.0	Gravel	
3/8 inch	9500			0.00 g	100.0	Gravel	
#4	4750	488.09	488.92	0.83 g	99.4	Gravel	
#10	2000	462.76	463.67	0.91 g	98.7	Sand	Coarse
#20	850	381.44	385.06	3.62 g	96.0	Sand	Medium
#40	425	352.74	378.34	25.60 g	76.9	Sand	Medium
#60	250	340.75	374.20	33.45 g	51.9	Sand	Fine
#80	180	329.97	353.05	23.08 g	34.7	Sand	Fine
#100	150	326.95	335.70	8.75 g	28.2	Sand	Fine
#200	75	306.10	313.58	7.48 g	22.6	Sand	Fine
				0.00 g	22.6		

Adjusted Hydrometer Sample Mass

Hydrometer Sample Mass (g)	134

Silt/Clay Fraction (Hydrometer Test)

Hydrometer Test Time (min)	Actual	Spec. Gravity	Temp C	Particle Size (Micron)	% Finer	Classification	Sub Class
2	2	1.0220	23.0	30.1	22.2	Silt	
5	5	1.0195	23.0	19.6	19.2	Silt	
15	15	1.0160	22.5	11.9	14.9	Silt	
30	29	1.0140	22.5	8.7	12.5	Silt	
60	63	1.0120	22.0	6.1	9.99	Silt	
250	250	1.0100	21.0	3.2	7.39	Clay	
1440	1434	1.0080	20.5	1.3	4.89	Clay	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

TestAmerica Job ID: 500-56913-1
Client Project/Site: City of Menomonie - Wolske Bay

For:
Cedar Corporation
604 Wilson Avenue
Menomonie, Wisconsin 54751

Attn: Scott McCurdy

Sandie Fredrick

Authorized for release by:
5/28/2013 11:46:27 AM

Sandie Fredrick, Project Manager I
sandie.fredrick@testamericainc.com

Table of Contents

Case Narrative

Client: Cedar Corporation
Project/Site: City of Menomonie - Wolske Bay

TestAmerica Job ID: 500-56913-1

Job ID: 500-56913-1

Laboratory: TestAmerica Chicago

Narrative

Job Narrative
500-56913-1

Comments
No additional comments.

Receipt
The samples were received on 5/11/2013 9:45 AM; the samples arrived in good condition, properly preserved and, where required, on ice.
The temperature of the cooler at receipt was 0.8° C.

GC/MS Semi VOA
No analytical or quality issues were noted.

Metals
No analytical or quality issues were noted.

General Chemistry
No analytical or quality issues were noted.

Geotechnical
No analytical or quality issues were noted.

Organic Prep
No analytical or quality issues were noted.

Detection Summary

Client: Cedar Corporation
Project/Site: City of Menomonie - Wolske Bay

TestAmerica Job ID: 500-56913-1

Client Sample ID: WB-1 0-2

Lab Sample ID: 500-56913-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	1.8	J	2.4	0.52	mg/Kg	1	☼	6010B	Total/NA
Cadmium	0.34	J	0.48	0.12	mg/Kg	1	☼	6010B	Total/NA
Chromium	18	B	2.4	0.40	mg/Kg	1	☼	6010B	Total/NA
Copper	24		2.4	0.65	mg/Kg	1	☼	6010B	Total/NA
Iron	7700		48	21	mg/Kg	1	☼	6010B	Total/NA
Lead	15		1.2	0.41	mg/Kg	1	☼	6010B	Total/NA
Manganese	190		2.4	0.34	mg/Kg	1	☼	6010B	Total/NA
Nickel	7.8		2.4	0.52	mg/Kg	1	☼	6010B	Total/NA
Zinc	35		4.8	1.6	mg/Kg	1	☼	6010B	Total/NA
Mercury	78		43	20	ug/Kg	1	☼	7471A	Total/NA
Nitrogen, Kjeldahl	940	B	82	21	mg/Kg	1	☼	4500 NH3 G	Total/NA
TOC Dup	10000		130	20	mg/Kg	1		Lloyd Kahn	Total/NA
Ammonia	500	B	51	7.9	mg/Kg	1	☼	SM 4500 NH3 G	Total/NA
Phosphorus as P	900		180	47	mg/Kg	2	☼	SM 4500 P E	Total/NA
Gravel	0.0				%	1		D422	Total/NA
Sieve Size 3 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Sand	32.4				%	1		D422	Total/NA
Sieve Size 2 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Coarse Sand	0.3				%	1		D422	Total/NA
Sieve Size 1.5 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Medium Sand	5.5				%	1		D422	Total/NA
Sieve Size 1 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Fine Sand	26.6				%	1		D422	Total/NA
Sieve Size 0.75 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Sieve Size 0.375 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Silt	59.3				%	1		D422	Total/NA
Clay	8.3				%	1		D422	Total/NA
Sieve Size #4 - Percent Finer	100.0				% Passing	1		D422	Total/NA
Sieve Size #10 - Percent Finer	99.7				% Passing	1		D422	Total/NA
Sieve Size #20 - Percent Finer	98.6				% Passing	1		D422	Total/NA
Sieve Size #40 - Percent Finer	94.2				% Passing	1		D422	Total/NA
Sieve Size #60 - Percent Finer	83.9				% Passing	1		D422	Total/NA
Sieve Size #80 - Percent Finer	76.6				% Passing	1		D422	Total/NA
Sieve Size #100 - Percent Finer	73.3				% Passing	1		D422	Total/NA
Sieve Size #200 - Percent Finer	67.6				% Passing	1		D422	Total/NA
Hydrometer Reading 1 - Percent Finer	30.9				% Passing	1		D422	Total/NA
Hydrometer Reading 2 - Percent Finer	26.4				% Passing	1		D422	Total/NA
Hydrometer Reading 3 - Percent Finer	18.7				% Passing	1		D422	Total/NA
Hydrometer Reading 4 - Percent Finer	11.8				% Passing	1		D422	Total/NA
Hydrometer Reading 5 - Percent Finer	8.3				% Passing	1		D422	Total/NA
Hydrometer Reading 6 - Percent Finer	5.7				% Passing	1		D422	Total/NA
Hydrometer Reading 7 - Percent Finer	3.5				% Passing	1		D422	Total/NA

Client Sample ID: WB-1 2-4

Lab Sample ID: 500-56913-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.68	J	1.2	0.25	mg/Kg	1	☼	6010B	Total/NA
Cadmium	0.081	J	0.23	0.057	mg/Kg	1	☼	6010B	Total/NA
Chromium	5.9	B	1.2	0.19	mg/Kg	1	☼	6010B	Total/NA
Copper	2.6		1.2	0.31	mg/Kg	1	☼	6010B	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: WB-1 2-4 (Continued)

Lab Sample ID: 500-56913-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Iron	2000		23	10	mg/Kg	1	☼	6010B	Total/NA
Lead	2.1		0.58	0.20	mg/Kg	1	☼	6010B	Total/NA
Manganese	32		1.2	0.16	mg/Kg	1	☼	6010B	Total/NA
Nickel	2.7		1.2	0.25	mg/Kg	1	☼	6010B	Total/NA
Zinc	7.6		2.3	0.79	mg/Kg	1	☼	6010B	Total/NA
Nitrogen, Kjeldahl	90	B	39	9.7	mg/Kg	1	☼	4500 NH3 G	Total/NA
TOC Dup	2100		130	20	mg/Kg	1		Lloyd Kahn	Total/NA
Ammonia	36	B	20	3.1	mg/Kg	1	☼	SM 4500 NH3 G	Total/NA
Phosphorus as P	130		25	6.6	mg/Kg	1	☼	SM 4500 P E	Total/NA
Gravel	6.1				%	1		D422	Total/NA
Sieve Size 3 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Sand	87.7				%	1		D422	Total/NA
Sieve Size 2 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Coarse Sand	2.7				%	1		D422	Total/NA
Sieve Size 1.5 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Medium Sand	35.8				%	1		D422	Total/NA
Sieve Size 1 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Fine Sand	49.2				%	1		D422	Total/NA
Sieve Size 0.75 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Sieve Size 0.375 inch - Percent Finer	97.1				% Passing	1		D422	Total/NA
Silt	4.6				%	1		D422	Total/NA
Clay	1.5				%	1		D422	Total/NA
Sieve Size #4 - Percent Finer	93.9				% Passing	1		D422	Total/NA
Sieve Size #10 - Percent Finer	91.2				% Passing	1		D422	Total/NA
Sieve Size #20 - Percent Finer	81.6				% Passing	1		D422	Total/NA
Sieve Size #40 - Percent Finer	55.4				% Passing	1		D422	Total/NA
Sieve Size #60 - Percent Finer	31.0				% Passing	1		D422	Total/NA
Sieve Size #80 - Percent Finer	13.8				% Passing	1		D422	Total/NA
Sieve Size #100 - Percent Finer	9.9				% Passing	1		D422	Total/NA
Sieve Size #200 - Percent Finer	6.2				% Passing	1		D422	Total/NA
Hydrometer Reading 1 - Percent Finer	4.3				% Passing	1		D422	Total/NA
Hydrometer Reading 2 - Percent Finer	3.9				% Passing	1		D422	Total/NA
Hydrometer Reading 3 - Percent Finer	3.0				% Passing	1		D422	Total/NA
Hydrometer Reading 4 - Percent Finer	2.5				% Passing	1		D422	Total/NA
Hydrometer Reading 5 - Percent Finer	1.5				% Passing	1		D422	Total/NA
Hydrometer Reading 6 - Percent Finer	1.0				% Passing	1		D422	Total/NA
Hydrometer Reading 7 - Percent Finer	0.5				% Passing	1		D422	Total/NA

Client Sample ID: WB-2 0-2

Lab Sample ID: 500-56913-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.57	J	1.4	0.31	mg/Kg	1	☼	6010B	Total/NA
Cadmium	0.097	J	0.28	0.070	mg/Kg	1	☼	6010B	Total/NA
Chromium	8.6	B	1.4	0.24	mg/Kg	1	☼	6010B	Total/NA
Copper	6.9		1.4	0.38	mg/Kg	1	☼	6010B	Total/NA
Iron	3100		28	12	mg/Kg	1	☼	6010B	Total/NA
Lead	4.3		0.70	0.24	mg/Kg	1	☼	6010B	Total/NA
Manganese	45		1.4	0.20	mg/Kg	1	☼	6010B	Total/NA
Nickel	3.8		1.4	0.31	mg/Kg	1	☼	6010B	Total/NA
Zinc	11		2.8	0.97	mg/Kg	1	☼	6010B	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: WB-2 0-2 (Continued)

Lab Sample ID: 500-56913-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Mercury	17	J	23	11	ug/Kg	1	☼	7471A	Total/NA
Nitrogen, Kjeldahl	530	B	54	14	mg/Kg	1	☼	4500 NH3 G	Total/NA
TOC Dup	4500		130	20	mg/Kg	1		Lloyd Kahn	Total/NA
Ammonia	110	B	18	2.9	mg/Kg	1	☼	SM 4500 NH3 G	Total/NA
Phosphorus as P	340		40	11	mg/Kg	1	☼	SM 4500 P E	Total/NA
Gravel	1.9				%	1		D422	Total/NA
Sieve Size 3 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Sand	84.7				%	1		D422	Total/NA
Sieve Size 2 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Coarse Sand	1.5				%	1		D422	Total/NA
Sieve Size 1.5 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Medium Sand	14.4				%	1		D422	Total/NA
Sieve Size 1 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Fine Sand	68.8				%	1		D422	Total/NA
Sieve Size 0.75 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Sieve Size 0.375 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Silt	9.1				%	1		D422	Total/NA
Clay	4.4				%	1		D422	Total/NA
Sieve Size #4 - Percent Finer	98.1				% Passing	1		D422	Total/NA
Sieve Size #10 - Percent Finer	96.6				% Passing	1		D422	Total/NA
Sieve Size #20 - Percent Finer	95.3				% Passing	1		D422	Total/NA
Sieve Size #40 - Percent Finer	82.2				% Passing	1		D422	Total/NA
Sieve Size #60 - Percent Finer	55.9				% Passing	1		D422	Total/NA
Sieve Size #80 - Percent Finer	30.8				% Passing	1		D422	Total/NA
Sieve Size #100 - Percent Finer	20.6				% Passing	1		D422	Total/NA
Sieve Size #200 - Percent Finer	13.4				% Passing	1		D422	Total/NA
Hydrometer Reading 1 - Percent Finer	12.4				% Passing	1		D422	Total/NA
Hydrometer Reading 2 - Percent Finer	10.4				% Passing	1		D422	Total/NA
Hydrometer Reading 3 - Percent Finer	7.1				% Passing	1		D422	Total/NA
Hydrometer Reading 4 - Percent Finer	5.8				% Passing	1		D422	Total/NA
Hydrometer Reading 5 - Percent Finer	4.4				% Passing	1		D422	Total/NA
Hydrometer Reading 6 - Percent Finer	2.8				% Passing	1		D422	Total/NA
Hydrometer Reading 7 - Percent Finer	1.4				% Passing	1		D422	Total/NA

Client Sample ID: WB-2 2-4

Lab Sample ID: 500-56913-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Anthracene	12	J	41	9.8	ug/Kg	1	☼	8270D	Total/NA
Phenanthrene	18	J	41	17	ug/Kg	1	☼	8270D	Total/NA
Arsenic	0.49	J	1.1	0.24	mg/Kg	1	☼	6010B	Total/NA
Cadmium	0.10	J	0.22	0.055	mg/Kg	1	☼	6010B	Total/NA
Chromium	8.6	B	1.1	0.18	mg/Kg	1	☼	6010B	Total/NA
Copper	6.7		1.1	0.30	mg/Kg	1	☼	6010B	Total/NA
Iron	3000		22	9.6	mg/Kg	1	☼	6010B	Total/NA
Lead	3.8		0.55	0.19	mg/Kg	1	☼	6010B	Total/NA
Manganese	50		1.1	0.16	mg/Kg	1	☼	6010B	Total/NA
Nickel	3.7		1.1	0.24	mg/Kg	1	☼	6010B	Total/NA
Zinc	11		2.2	0.76	mg/Kg	1	☼	6010B	Total/NA
Mercury	18	J	20	9.3	ug/Kg	1	☼	7471A	Total/NA
Nitrogen, Kjeldahl	290	B	40	10	mg/Kg	1	☼	4500 NH3 G	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Cedar Corporation
Project/Site: City of Menomonie - Wolske Bay

TestAmerica Job ID: 500-56913-1

Client Sample ID: WB-2 2-4 (Continued)

Lab Sample ID: 500-56913-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
TOC Dup	4900		130	20	mg/Kg	1		Lloyd Kahn	Total/NA
Ammonia	130	B	22	3.4	mg/Kg	1	☼	SM 4500 NH3 G	Total/NA
Phosphorus as P	280		57	15	mg/Kg	1	☼	SM 4500 P E	Total/NA
Gravel	0.6				%	1		D422	Total/NA
Sieve Size 3 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Sand	76.8				%	1		D422	Total/NA
Sieve Size 2 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Coarse Sand	0.7				%	1		D422	Total/NA
Sieve Size 1.5 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Medium Sand	21.8				%	1		D422	Total/NA
Sieve Size 1 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Fine Sand	54.3				%	1		D422	Total/NA
Sieve Size 0.75 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Sieve Size 0.375 inch - Percent Finer	100.0				% Passing	1		D422	Total/NA
Silt	12.6				%	1		D422	Total/NA
Clay	10				%	1		D422	Total/NA
Sieve Size #4 - Percent Finer	99.4				% Passing	1		D422	Total/NA
Sieve Size #10 - Percent Finer	98.7				% Passing	1		D422	Total/NA
Sieve Size #20 - Percent Finer	96.0				% Passing	1		D422	Total/NA
Sieve Size #40 - Percent Finer	76.9				% Passing	1		D422	Total/NA
Sieve Size #60 - Percent Finer	51.9				% Passing	1		D422	Total/NA
Sieve Size #80 - Percent Finer	34.7				% Passing	1		D422	Total/NA
Sieve Size #100 - Percent Finer	28.2				% Passing	1		D422	Total/NA
Sieve Size #200 - Percent Finer	22.6				% Passing	1		D422	Total/NA
Hydrometer Reading 1 - Percent Finer	22.2				% Passing	1		D422	Total/NA
Hydrometer Reading 2 - Percent Finer	19.2				% Passing	1		D422	Total/NA
Hydrometer Reading 3 - Percent Finer	14.9				% Passing	1		D422	Total/NA
Hydrometer Reading 4 - Percent Finer	12.5				% Passing	1		D422	Total/NA
Hydrometer Reading 5 - Percent Finer	10				% Passing	1		D422	Total/NA
Hydrometer Reading 6 - Percent Finer	7.4				% Passing	1		D422	Total/NA
Hydrometer Reading 7 - Percent Finer	4.9				% Passing	1		D422	Total/NA

This Detection Summary does not include radiochemical test results.

Method Summary

Client: Cedar Corporation
Project/Site: City of Menomonie - Wolske Bay

TestAmerica Job ID: 500-56913-1

Method	Method Description	Protocol	Laboratory
8270D	Semivolatile Organic Compounds (GC/MS)	SW846	TAL CHI
6010B	Metals (ICP)	SW846	TAL CHI
7471A	Mercury (CVAA)	SW846	TAL CHI
4500 NH3 G	4500NH3 G - Nitrogen, Total Kjeldahl'	SM	TAL CHI
Lloyd Kahn	Organic Carbon, Total (TOC)	EPA	TAL CHI
Moisture	Percent Moisture	EPA	TAL CHI
SM 4500 NH3 G	Ammonia	SM	TAL CHI
SM 4500 P E	Phosphorus	SM	TAL CHI
D422	Grain Size	ASTM	TAL BUR

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL BUR = TestAmerica Burlington, 30 Community Drive, Suite 11, South Burlington, VT 05403, TEL (802)660-1990

TAL CHI = TestAmerica Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: Cedar Corporation
Project/Site: City of Menomonie - Wolske Bay

TestAmerica Job ID: 500-56913-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-56913-1	WB-1 0-2	Solid	05/09/13 13:30	05/11/13 09:45
500-56913-2	WB-1 2-4	Solid	05/09/13 14:45	05/11/13 09:45
500-56913-3	WB-2 0-2	Solid	05/09/13 14:15	05/11/13 09:45
500-56913-4	WB-2 2-4	Solid	05/09/13 14:30	05/11/13 09:45

Client: Cedar Corporation
Project/Site: City of Menomonie - Wolske Bay

TestAmerica Job ID: 500-56913-1

Client Sample ID: WB-1 0-2
Date Collected: 05/09/13 13:30
Date Received: 05/11/13 09:45

Lab Sample ID: 500-56913-1
Matrix: Solid
Percent Solids: 37.1

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Methylnaphthalene	<44		88	44	ug/Kg	☼	05/15/13 17:23	05/20/13 17:29	1
2-Methylnaphthalene	<120		450	120	ug/Kg	☼	05/15/13 17:23	05/20/13 17:29	1
Acenaphthene	<27		88	27	ug/Kg	☼	05/15/13 17:23	05/20/13 17:29	1
Acenaphthylene	<20		88	20	ug/Kg	☼	05/15/13 17:23	05/20/13 17:29	1
Anthracene	<21		88	21	ug/Kg	☼	05/15/13 17:23	05/20/13 17:29	1
Benzo[a]anthracene	<19		88	19	ug/Kg	☼	05/15/13 17:23	05/20/13 17:29	1
Benzo[a]pyrene	<16		88	16	ug/Kg	☼	05/15/13 17:23	05/20/13 17:29	1
Benzo[b]fluoranthene	<17		88	17	ug/Kg	☼	05/15/13 17:23	05/20/13 17:29	1
Benzo[g,h,i]perylene	<30		88	30	ug/Kg	☼	05/15/13 17:23	05/20/13 17:29	1
Benzo[k]fluoranthene	<21		88	21	ug/Kg	☼	05/15/13 17:23	05/20/13 17:29	1
Chrysene	<20		88	20	ug/Kg	☼	05/15/13 17:23	05/20/13 17:29	1
Dibenz(a,h)anthracene	<25		88	25	ug/Kg	☼	05/15/13 17:23	05/20/13 17:29	1
Fluoranthene	<36		88	36	ug/Kg	☼	05/15/13 17:23	05/20/13 17:29	1
Fluorene	<20		88	20	ug/Kg	☼	05/15/13 17:23	05/20/13 17:29	1
Indeno[1,2,3-cd]pyrene	<30		88	30	ug/Kg	☼	05/15/13 17:23	05/20/13 17:29	1
Naphthalene	<17		88	17	ug/Kg	☼	05/15/13 17:23	05/20/13 17:29	1
Phenanthrene	<37		88	37	ug/Kg	☼	05/15/13 17:23	05/20/13 17:29	1
Pyrene	<32		88	32	ug/Kg	☼	05/15/13 17:23	05/20/13 17:29	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*41*		*30 - 119*	*05/15/13 17:23*	*05/20/13 17:29*	*1*
Nitrobenzene-d5 (Surr)	*33*		*30 - 115*	*05/15/13 17:23*	*05/20/13 17:29*	*1*
Terphenyl-d14 (Surr)	*54*		*36 - 134*	*05/15/13 17:23*	*05/20/13 17:29*	*1*

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**1.8**	**J**	2.4	0.52	mg/Kg	☼	05/13/13 10:22	05/13/13 18:40	1
Cadmium	**0.34**	**J**	0.48	0.12	mg/Kg	☼	05/13/13 10:22	05/13/13 18:40	1
Chromium	**18**	**B**	2.4	0.40	mg/Kg	☼	05/13/13 10:22	05/13/13 18:40	1
Copper	**24**		2.4	0.65	mg/Kg	☼	05/13/13 10:22	05/13/13 18:40	1
Iron	**7700**		48	21	mg/Kg	☼	05/13/13 10:22	05/13/13 18:40	1
Lead	**15**		1.2	0.41	mg/Kg	☼	05/13/13 10:22	05/13/13 18:40	1
Manganese	**190**		2.4	0.34	mg/Kg	☼	05/13/13 10:22	05/13/13 18:40	1
Nickel	**7.8**		2.4	0.52	mg/Kg	☼	05/13/13 10:22	05/13/13 18:40	1
Zinc	**35**		4.8	1.6	mg/Kg	☼	05/13/13 10:22	05/13/13 18:40	1

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**78**		43	20	ug/Kg	☼	05/13/13 13:30	05/14/13 09:12	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrogen, Kjeldahl	**940**	**B**	82	21	mg/Kg	☼	05/17/13 06:45	05/17/13 10:57	1
TOC Dup	**10000**		130	20	mg/Kg			05/15/13 13:58	1
Ammonia	**500**	**B**	51	7.9	mg/Kg	☼	05/14/13 09:35	05/14/13 15:26	1
Phosphorus as P	**900**		180	47	mg/Kg	☼	05/15/13 11:30	05/15/13 16:16	2

Method: D422 - Grain Size

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gravel	**0.0**				%			05/14/13 16:56	1

Client Sample ID: WB-1 0-2
Date Collected: 05/09/13 13:30
Date Received: 05/11/13 09:45

Lab Sample ID: 500-56913-1
Matrix: Solid

Method: D422 - Grain Size (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sieve Size 3 inch - Percent Finer	100.0				% Passing			05/14/13 16:56	1
Sand	32.4				%			05/14/13 16:56	1
Sieve Size 2 inch - Percent Finer	100.0				% Passing			05/14/13 16:56	1
Coarse Sand	0.3				%			05/14/13 16:56	1
Sieve Size 1.5 inch - Percent Finer	100.0				% Passing			05/14/13 16:56	1
Medium Sand	5.5				%			05/14/13 16:56	1
Sieve Size 1 inch - Percent Finer	100.0				% Passing			05/14/13 16:56	1
Fine Sand	26.6				%			05/14/13 16:56	1
Sieve Size 0.75 inch - Percent Finer	100.0				% Passing			05/14/13 16:56	1
Sieve Size 0.375 inch - Percent Finer	100.0				% Passing			05/14/13 16:56	1
Silt	59.3				%			05/14/13 16:56	1
Clay	8.3				%			05/14/13 16:56	1
Sieve Size #4 - Percent Finer	100.0				% Passing			05/14/13 16:56	1
Sieve Size #10 - Percent Finer	99.7				% Passing			05/14/13 16:56	1
Sieve Size #20 - Percent Finer	98.6				% Passing			05/14/13 16:56	1
Sieve Size #40 - Percent Finer	94.2				% Passing			05/14/13 16:56	1
Sieve Size #60 - Percent Finer	83.9				% Passing			05/14/13 16:56	1
Sieve Size #80 - Percent Finer	76.6				% Passing			05/14/13 16:56	1
Sieve Size #100 - Percent Finer	73.3				% Passing			05/14/13 16:56	1
Sieve Size #200 - Percent Finer	67.6				% Passing			05/14/13 16:56	1
Hydrometer Reading 1 - Percent Finer	30.9				% Passing			05/14/13 16:56	1
Hydrometer Reading 2 - Percent Finer	26.4				% Passing			05/14/13 16:56	1
Hydrometer Reading 3 - Percent Finer	18.7				% Passing			05/14/13 16:56	1
Hydrometer Reading 4 - Percent Finer	11.8				% Passing			05/14/13 16:56	1
Hydrometer Reading 5 - Percent Finer	8.3				% Passing			05/14/13 16:56	1
Hydrometer Reading 6 - Percent Finer	5.7				% Passing			05/14/13 16:56	1
Hydrometer Reading 7 - Percent Finer	3.5				% Passing			05/14/13 16:56	1

Client Sample ID: WB-1 2-4
Date Collected: 05/09/13 14:45
Date Received: 05/11/13 09:45

Lab Sample ID: 500-56913-2
Matrix: Solid
Percent Solids: 82.1

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Methylnaphthalene	<20		40	20	ug/Kg	☼	05/15/13 17:23	05/20/13 17:52	1
2-Methylnaphthalene	<52		200	52	ug/Kg	☼	05/15/13 17:23	05/20/13 17:52	1
Acenaphthene	<12		40	12	ug/Kg	☼	05/15/13 17:23	05/20/13 17:52	1
Acenaphthylene	<9.2		40	9.2	ug/Kg	☼	05/15/13 17:23	05/20/13 17:52	1
Anthracene	<9.5		40	9.5	ug/Kg	☼	05/15/13 17:23	05/20/13 17:52	1
Benzo[a]anthracene	<8.4		40	8.4	ug/Kg	☼	05/15/13 17:23	05/20/13 17:52	1
Benzo[a]pyrene	<7.3		40	7.3	ug/Kg	☼	05/15/13 17:23	05/20/13 17:52	1
Benzo[b]fluoranthene	<7.8		40	7.8	ug/Kg	☼	05/15/13 17:23	05/20/13 17:52	1
Benzo[g,h,i]perylene	<14		40	14	ug/Kg	☼	05/15/13 17:23	05/20/13 17:52	1

Client: Cedar Corporation
Project/Site: City of Menomonie - Wolske Bay

TestAmerica Job ID: 500-56913-1

Client Sample ID: WB-1 2-4
Date Collected: 05/09/13 14:45
Date Received: 05/11/13 09:45

Lab Sample ID: 500-56913-2
Matrix: Solid
Percent Solids: 82.1

Method: 8270D - Semivolatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[k]fluoranthene	<9.6		40	9.6	ug/Kg	☼	05/15/13 17:23	05/20/13 17:52	1
Chrysene	<9.1		40	9.1	ug/Kg	☼	05/15/13 17:23	05/20/13 17:52	1
Dibenz(a,h)anthracene	<11		40	11	ug/Kg	☼	05/15/13 17:23	05/20/13 17:52	1
Fluoranthene	<16		40	16	ug/Kg	☼	05/15/13 17:23	05/20/13 17:52	1
Fluorene	<9.1		40	9.1	ug/Kg	☼	05/15/13 17:23	05/20/13 17:52	1
Indeno[1,2,3-cd]pyrene	<14		40	14	ug/Kg	☼	05/15/13 17:23	05/20/13 17:52	1
Naphthalene	<7.8		40	7.8	ug/Kg	☼	05/15/13 17:23	05/20/13 17:52	1
Phenanthrene	<17		40	17	ug/Kg	☼	05/15/13 17:23	05/20/13 17:52	1
Pyrene	<15		40	15	ug/Kg	☼	05/15/13 17:23	05/20/13 17:52	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*57*		*30 - 119*	*05/15/13 17:23*	*05/20/13 17:52*	*1*
Nitrobenzene-d5 (Surr)	*48*		*30 - 115*	*05/15/13 17:23*	*05/20/13 17:52*	*1*
Terphenyl-d14 (Surr)	*68*		*36 - 134*	*05/15/13 17:23*	*05/20/13 17:52*	*1*

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.68**	**J**	1.2	0.25	mg/Kg	☼	05/13/13 10:22	05/13/13 18:44	1
Cadmium	**0.081**	**J**	0.23	0.057	mg/Kg	☼	05/13/13 10:22	05/13/13 18:44	1
Chromium	**5.9**	**B**	1.2	0.19	mg/Kg	☼	05/13/13 10:22	05/13/13 18:44	1
Copper	**2.6**		1.2	0.31	mg/Kg	☼	05/13/13 10:22	05/13/13 18:44	1
Iron	**2000**		23	10	mg/Kg	☼	05/13/13 10:22	05/13/13 18:44	1
Lead	**2.1**		0.58	0.20	mg/Kg	☼	05/13/13 10:22	05/13/13 18:44	1
Manganese	**32**		1.2	0.16	mg/Kg	☼	05/13/13 10:22	05/13/13 18:44	1
Nickel	**2.7**		1.2	0.25	mg/Kg	☼	05/13/13 10:22	05/13/13 18:44	1
Zinc	**7.6**		2.3	0.79	mg/Kg	☼	05/13/13 10:22	05/13/13 18:44	1

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<8.4		18	8.4	ug/Kg	☼	05/13/13 13:30	05/14/13 09:18	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrogen, Kjeldahl	**90**	**B**	39	9.7	mg/Kg	☼	05/17/13 06:45	05/17/13 11:03	1
TOC Dup	**2100**		130	20	mg/Kg			05/15/13 14:30	1
Ammonia	**36**	**B**	20	3.1	mg/Kg	☼	05/14/13 09:35	05/14/13 15:29	1
Phosphorus as P	**130**		25	6.6	mg/Kg	☼	05/15/13 11:30	05/15/13 16:17	1

Method: D422 - Grain Size

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gravel	**6.1**				%			05/14/13 16:59	1
Sieve Size 3 inch - Percent Finer	**100.0**				% Passing			05/14/13 16:59	1
Sand	**87.7**				%			05/14/13 16:59	1
Sieve Size 2 inch - Percent Finer	**100.0**				% Passing			05/14/13 16:59	1
Coarse Sand	**2.7**				%			05/14/13 16:59	1
Sieve Size 1.5 inch - Percent Finer	**100.0**				% Passing			05/14/13 16:59	1
Medium Sand	**35.8**				%			05/14/13 16:59	1
Sieve Size 1 inch - Percent Finer	**100.0**				% Passing			05/14/13 16:59	1
Fine Sand	**49.2**				%			05/14/13 16:59	1
Sieve Size 0.75 inch - Percent Finer	**100.0**				% Passing			05/14/13 16:59	1

Client Sample ID: WB-1 2-4
Date Collected: 05/09/13 14:45
Date Received: 05/11/13 09:45

Lab Sample ID: 500-56913-2
Matrix: Solid

Method: D422 - Grain Size (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sieve Size 0.375 inch - Percent Finer	97.1				% Passing			05/14/13 16:59	1
Silt	4.6				%			05/14/13 16:59	1
Clay	1.5				%			05/14/13 16:59	1
Sieve Size #4 - Percent Finer	93.9				% Passing			05/14/13 16:59	1
Sieve Size #10 - Percent Finer	91.2				% Passing			05/14/13 16:59	1
Sieve Size #20 - Percent Finer	81.6				% Passing			05/14/13 16:59	1
Sieve Size #40 - Percent Finer	55.4				% Passing			05/14/13 16:59	1
Sieve Size #60 - Percent Finer	31.0				% Passing			05/14/13 16:59	1
Sieve Size #80 - Percent Finer	13.8				% Passing			05/14/13 16:59	1
Sieve Size #100 - Percent Finer	9.9				% Passing			05/14/13 16:59	1
Sieve Size #200 - Percent Finer	6.2				% Passing			05/14/13 16:59	1
Hydrometer Reading 1 - Percent Finer	4.3				% Passing			05/14/13 16:59	1
Hydrometer Reading 2 - Percent Finer	3.9				% Passing			05/14/13 16:59	1
Hydrometer Reading 3 - Percent Finer	3.0				% Passing			05/14/13 16:59	1
Hydrometer Reading 4 - Percent Finer	2.5				% Passing			05/14/13 16:59	1
Hydrometer Reading 5 - Percent Finer	1.5				% Passing			05/14/13 16:59	1
Hydrometer Reading 6 - Percent Finer	1.0				% Passing			05/14/13 16:59	1
Hydrometer Reading 7 - Percent Finer	0.5				% Passing			05/14/13 16:59	1

Client Sample ID: WB-2 0-2
Date Collected: 05/09/13 14:15
Date Received: 05/11/13 09:45

Lab Sample ID: 500-56913-3
Matrix: Solid
Percent Solids: 68.3

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Methylnaphthalene	<23		47	23	ug/Kg	☼	05/15/13 17:23	05/20/13 18:14	1
2-Methylnaphthalene	<61		240	61	ug/Kg	☼	05/15/13 17:23	05/20/13 18:14	1
Acenaphthene	<14		47	14	ug/Kg	☼	05/15/13 17:23	05/20/13 18:14	1
Acenaphthylene	<11		47	11	ug/Kg	☼	05/15/13 17:23	05/20/13 18:14	1
Anthracene	<11		47	11	ug/Kg	☼	05/15/13 17:23	05/20/13 18:14	1
Benzo[a]anthracene	<9.8		47	9.8	ug/Kg	☼	05/15/13 17:23	05/20/13 18:14	1
Benzo[a]pyrene	<8.5		47	8.5	ug/Kg	☼	05/15/13 17:23	05/20/13 18:14	1
Benzo[b]fluoranthene	<9.1		47	9.1	ug/Kg	☼	05/15/13 17:23	05/20/13 18:14	1
Benzo[g,h,i]perylene	<16		47	16	ug/Kg	☼	05/15/13 17:23	05/20/13 18:14	1
Benzo[k]fluoranthene	<11		47	11	ug/Kg	☼	05/15/13 17:23	05/20/13 18:14	1
Chrysene	<11		47	11	ug/Kg	☼	05/15/13 17:23	05/20/13 18:14	1
Dibenz(a,h)anthracene	<13		47	13	ug/Kg	☼	05/15/13 17:23	05/20/13 18:14	1
Fluoranthene	<19		47	19	ug/Kg	☼	05/15/13 17:23	05/20/13 18:14	1
Fluorene	<11		47	11	ug/Kg	☼	05/15/13 17:23	05/20/13 18:14	1
Indeno[1,2,3-cd]pyrene	<16		47	16	ug/Kg	☼	05/15/13 17:23	05/20/13 18:14	1
Naphthalene	<9.0		47	9.0	ug/Kg	☼	05/15/13 17:23	05/20/13 18:14	1
Phenanthrene	<20		47	20	ug/Kg	☼	05/15/13 17:23	05/20/13 18:14	1
Pyrene	<17		47	17	ug/Kg	☼	05/15/13 17:23	05/20/13 18:14	1

Client: Cedar Corporation
Project/Site: City of Menomonie - Wolske Bay

TestAmerica Job ID: 500-56913-1

Client Sample ID: WB-2 0-2
Date Collected: 05/09/13 14:15
Date Received: 05/11/13 09:45

Lab Sample ID: 500-56913-3
Matrix: Solid
Percent Solids: 68.3

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
2-Fluorobiphenyl	38		30 - 119	05/15/13 17:23	05/20/13 18:14	1
Nitrobenzene-d5 (Surr)	30		30 - 115	05/15/13 17:23	05/20/13 18:14	1
Terphenyl-d14 (Surr)	50		36 - 134	05/15/13 17:23	05/20/13 18:14	1

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.57	J	1.4	0.31	mg/Kg	☼	05/13/13 10:22	05/13/13 18:48	1
Cadmium	0.097	J	0.28	0.070	mg/Kg	☼	05/13/13 10:22	05/13/13 18:48	1
Chromium	8.6	B	1.4	0.24	mg/Kg	☼	05/13/13 10:22	05/13/13 18:48	1
Copper	6.9		1.4	0.38	mg/Kg	☼	05/13/13 10:22	05/13/13 18:48	1
Iron	3100		28	12	mg/Kg	☼	05/13/13 10:22	05/13/13 18:48	1
Lead	4.3		0.70	0.24	mg/Kg	☼	05/13/13 10:22	05/13/13 18:48	1
Manganese	45		1.4	0.20	mg/Kg	☼	05/13/13 10:22	05/13/13 18:48	1
Nickel	3.8		1.4	0.31	mg/Kg	☼	05/13/13 10:22	05/13/13 18:48	1
Zinc	11		2.8	0.97	mg/Kg	☼	05/13/13 10:22	05/13/13 18:48	1

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	17	J	23	11	ug/Kg	☼	05/13/13 13:30	05/14/13 09:19	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrogen, Kjeldahl	530	B	54	14	mg/Kg	☼	05/17/13 06:45	05/17/13 11:07	1
TOC Dup	4500		130	20	mg/Kg			05/15/13 14:37	1
Ammonia	110	B	18	2.9	mg/Kg	☼	05/14/13 09:35	05/14/13 15:31	1
Phosphorus as P	340		40	11	mg/Kg	☼	05/15/13 11:30	05/15/13 16:18	1

Method: D422 - Grain Size

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gravel	1.9				%			05/14/13 17:01	1
Sieve Size 3 inch - Percent Finer	100.0				% Passing			05/14/13 17:01	1
Sand	84.7				%			05/14/13 17:01	1
Sieve Size 2 inch - Percent Finer	100.0				% Passing			05/14/13 17:01	1
Coarse Sand	1.5				%			05/14/13 17:01	1
Sieve Size 1.5 inch - Percent Finer	100.0				% Passing			05/14/13 17:01	1
Medium Sand	14.4				%			05/14/13 17:01	1
Sieve Size 1 inch - Percent Finer	100.0				% Passing			05/14/13 17:01	1
Fine Sand	68.8				%			05/14/13 17:01	1
Sieve Size 0.75 inch - Percent Finer	100.0				% Passing			05/14/13 17:01	1
Sieve Size 0.375 inch - Percent Finer	100.0				% Passing			05/14/13 17:01	1
Silt	9.1				%			05/14/13 17:01	1
Clay	4.4				%			05/14/13 17:01	1
Sieve Size #4 - Percent Finer	98.1				% Passing			05/14/13 17:01	1
Sieve Size #10 - Percent Finer	96.6				% Passing			05/14/13 17:01	1
Sieve Size #20 - Percent Finer	95.3				% Passing			05/14/13 17:01	1
Sieve Size #40 - Percent Finer	82.2				% Passing			05/14/13 17:01	1
Sieve Size #60 - Percent Finer	55.9				% Passing			05/14/13 17:01	1
Sieve Size #80 - Percent Finer	30.8				% Passing			05/14/13 17:01	1
Sieve Size #100 - Percent Finer	20.6				% Passing			05/14/13 17:01	1

Client Sample ID: WB-2 0-2
Date Collected: 05/09/13 14:15
Date Received: 05/11/13 09:45

Lab Sample ID: 500-56913-3
Matrix: Solid

Method: D422 - Grain Size (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sieve Size #200 - Percent Finer	13.4				% Passing			05/14/13 17:01	1
Hydrometer Reading 1 - Percent Finer	12.4				% Passing			05/14/13 17:01	1
Hydrometer Reading 2 - Percent Finer	10.4				% Passing			05/14/13 17:01	1
Hydrometer Reading 3 - Percent Finer	7.1				% Passing			05/14/13 17:01	1
Hydrometer Reading 4 - Percent Finer	5.8				% Passing			05/14/13 17:01	1
Hydrometer Reading 5 - Percent Finer	4.4				% Passing			05/14/13 17:01	1
Hydrometer Reading 6 - Percent Finer	2.8				% Passing			05/14/13 17:01	1
Hydrometer Reading 7 - Percent Finer	1.4				% Passing			05/14/13 17:01	1

Client Sample ID: WB-2 2-4
Date Collected: 05/09/13 14:30
Date Received: 05/11/13 09:45

Lab Sample ID: 500-56913-4
Matrix: Solid
Percent Solids: 76.6

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Methylnaphthalene	<21		41	21	ug/Kg	☼	05/15/13 17:23	05/20/13 18:37	1
2-Methylnaphthalene	<54		210	54	ug/Kg	☼	05/15/13 17:23	05/20/13 18:37	1
Acenaphthene	<12		41	12	ug/Kg	☼	05/15/13 17:23	05/20/13 18:37	1
Acenaphthylene	<9.6		41	9.6	ug/Kg	☼	05/15/13 17:23	05/20/13 18:37	1
Anthracene	12	J	41	9.8	ug/Kg	☼	05/15/13 17:23	05/20/13 18:37	1
Benzo[a]anthracene	<8.7		41	8.7	ug/Kg	☼	05/15/13 17:23	05/20/13 18:37	1
Benzo[a]pyrene	<7.6		41	7.6	ug/Kg	☼	05/15/13 17:23	05/20/13 18:37	1
Benzo[b]fluoranthene	<8.1		41	8.1	ug/Kg	☼	05/15/13 17:23	05/20/13 18:37	1
Benzo[g,h,i]perylene	<14		41	14	ug/Kg	☼	05/15/13 17:23	05/20/13 18:37	1
Benzo[k]fluoranthene	<9.9		41	9.9	ug/Kg	☼	05/15/13 17:23	05/20/13 18:37	1
Chrysene	<9.4		41	9.4	ug/Kg	☼	05/15/13 17:23	05/20/13 18:37	1
Dibenz(a,h)anthracene	<12		41	12	ug/Kg	☼	05/15/13 17:23	05/20/13 18:37	1
Fluoranthene	<17		41	17	ug/Kg	☼	05/15/13 17:23	05/20/13 18:37	1
Fluorene	<9.5		41	9.5	ug/Kg	☼	05/15/13 17:23	05/20/13 18:37	1
Indeno[1,2,3-cd]pyrene	<14		41	14	ug/Kg	☼	05/15/13 17:23	05/20/13 18:37	1
Naphthalene	<8.0		41	8.0	ug/Kg	☼	05/15/13 17:23	05/20/13 18:37	1
Phenanthrene	18	J	41	17	ug/Kg	☼	05/15/13 17:23	05/20/13 18:37	1
Pyrene	<15		41	15	ug/Kg	☼	05/15/13 17:23	05/20/13 18:37	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*55*		*30 - 119*	*05/15/13 17:23*	*05/20/13 18:37*	*1*
Nitrobenzene-d5 (Surr)	*45*		*30 - 115*	*05/15/13 17:23*	*05/20/13 18:37*	*1*
Terphenyl-d14 (Surr)	*70*		*36 - 134*	*05/15/13 17:23*	*05/20/13 18:37*	*1*

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.49	J	1.1	0.24	mg/Kg	☼	05/13/13 10:22	05/13/13 18:52	1
Cadmium	0.10	J	0.22	0.055	mg/Kg	☼	05/13/13 10:22	05/13/13 18:52	1
Chromium	8.6	B	1.1	0.18	mg/Kg	☼	05/13/13 10:22	05/13/13 18:52	1
Copper	6.7		1.1	0.30	mg/Kg	☼	05/13/13 10:22	05/13/13 18:52	1

Client: Cedar Corporation
Project/Site: City of Menomonie - Wolske Bay

TestAmerica Job ID: 500-56913-1

Client Sample ID: WB-2 2-4
Date Collected: 05/09/13 14:30
Date Received: 05/11/13 09:45

Lab Sample ID: 500-56913-4
Matrix: Solid
Percent Solids: 76.6

Method: 6010B - Metals (ICP) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	3000		22	9.6	mg/Kg	☼	05/13/13 10:22	05/13/13 18:52	1
Lead	3.8		0.55	0.19	mg/Kg	☼	05/13/13 10:22	05/13/13 18:52	1
Manganese	50		1.1	0.16	mg/Kg	☼	05/13/13 10:22	05/13/13 18:52	1
Nickel	3.7		1.1	0.24	mg/Kg	☼	05/13/13 10:22	05/13/13 18:52	1
Zinc	11		2.2	0.76	mg/Kg	☼	05/13/13 10:22	05/13/13 18:52	1

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	18	J	20	9.3	ug/Kg	☼	05/13/13 13:30	05/14/13 09:21	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrogen, Kjeldahl	290	B	40	10	mg/Kg	☼	05/17/13 06:45	05/17/13 11:10	1
TOC Dup	4900		130	20	mg/Kg			05/15/13 14:47	1
Ammonia	130	B	22	3.4	mg/Kg	☼	05/14/13 09:35	05/14/13 15:34	1
Phosphorus as P	280		57	15	mg/Kg	☼	05/15/13 11:30	05/15/13 16:18	1

Method: D422 - Grain Size

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gravel	0.6				%			05/14/13 17:04	1
Sieve Size 3 inch - Percent Finer	100.0				% Passing			05/14/13 17:04	1
Sand	76.8				%			05/14/13 17:04	1
Sieve Size 2 inch - Percent Finer	100.0				% Passing			05/14/13 17:04	1
Coarse Sand	0.7				%			05/14/13 17:04	1
Sieve Size 1.5 inch - Percent Finer	100.0				% Passing			05/14/13 17:04	1
Medium Sand	21.8				%			05/14/13 17:04	1
Sieve Size 1 inch - Percent Finer	100.0				% Passing			05/14/13 17:04	1
Fine Sand	54.3				%			05/14/13 17:04	1
Sieve Size 0.75 inch - Percent Finer	100.0				% Passing			05/14/13 17:04	1
Sieve Size 0.375 inch - Percent Finer	100.0				% Passing			05/14/13 17:04	1
Silt	12.6				%			05/14/13 17:04	1
Clay	10				%			05/14/13 17:04	1
Sieve Size #4 - Percent Finer	99.4				% Passing			05/14/13 17:04	1
Sieve Size #10 - Percent Finer	98.7				% Passing			05/14/13 17:04	1
Sieve Size #20 - Percent Finer	96.0				% Passing			05/14/13 17:04	1
Sieve Size #40 - Percent Finer	76.9				% Passing			05/14/13 17:04	1
Sieve Size #60 - Percent Finer	51.9				% Passing			05/14/13 17:04	1
Sieve Size #80 - Percent Finer	34.7				% Passing			05/14/13 17:04	1
Sieve Size #100 - Percent Finer	28.2				% Passing			05/14/13 17:04	1
Sieve Size #200 - Percent Finer	22.6				% Passing			05/14/13 17:04	1
Hydrometer Reading 1 - Percent Finer	22.2				% Passing			05/14/13 17:04	1
Hydrometer Reading 2 - Percent Finer	19.2				% Passing			05/14/13 17:04	1
Hydrometer Reading 3 - Percent Finer	14.9				% Passing			05/14/13 17:04	1
Hydrometer Reading 4 - Percent Finer	12.5				% Passing			05/14/13 17:04	1
Hydrometer Reading 5 - Percent Finer	10				% Passing			05/14/13 17:04	1

Client: Cedar Corporation
Project/Site: City of Menomonie - Wolske Bay

TestAmerica Job ID: 500-56913-1

Client Sample ID: WB-2 2-4
Date Collected: 05/09/13 14:30
Date Received: 05/11/13 09:45

Lab Sample ID: 500-56913-4
Matrix: Solid

Method: D422 - Grain Size (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hydrometer Reading 6 - Percent Finer	7.4				% Passing			05/14/13 17:04	1
Hydrometer Reading 7 - Percent Finer	4.9				% Passing			05/14/13 17:04	1

METHOD SUMMARY

Client: Cedar Corporation | Job Number: 500-56913-1

Description	Lab Location	Method	Preparation Method
Matrix: Solid			
Semivolatile Organic Compounds (GC/MS)	TAL CHI	SW846 8270D	
Automated Soxhlet Extraction	TAL CHI		SW846 3541
Metals (ICP)	TAL CHI	SW846 6010B	
Preparation, Metals	TAL CHI		SW846 3050B
Mercury (CVAA)	TAL CHI	SW846 7471A	
Preparation, Mercury	TAL CHI		SW846 7471A
4500NH3 G - Nitrogen, Total Kjeldahl'	TAL CHI	SM 4500 NH3 G	
Preparation, Nitrogen -Total Kjeldahl	TAL CHI		SM SM4500Norg_C
Organic Carbon, Total (TOC)	TAL CHI	EPA Lloyd Kahn	
Percent Moisture	TAL CHI	EPA Moisture	
Ammonia	TAL CHI	SM SM 4500 NH3 G	
Ammonia, Distillation	TAL CHI		SM SM 4500 NH3 B
Phosphorus	TAL CHI	SM SM 4500 P E	
Phosphorous, Total and Ortho	TAL CHI		SM SM 4500 P B
Grain Size	TAL BUR	ASTM D422	

Lab References:

TAL BUR = TestAmerica Burlington

TAL CHI = TestAmerica Chicago

Method References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

METHOD / ANALYST SUMMARY

Client: Cedar Corporation

Job Number: 500-56913-1

Method	Analyst	Analyst ID
SW846 8270D	Diaz, Alfonso	AD
SW846 6010B	Gillins, Lauren E	LEG
SW846 7471A	Bills, Brandon J	BJB
SM 4500 NH3 G	Brogan, Mary T	MTB
EPA Lloyd Kahn	Deb, Khona	KD
EPA Moisture	Veldhuizen, Chris M	CMV
SM SM 4500 NH3 G	Brogan, Mary T	MTB
SM SM 4500 P E	Wasowicz, Andrew P	APW
ASTM D422	Peterson, Mark A	MAP

SAMPLE SUMMARY

Client: Cedar Corporation

Job Number: 500-56913-1

Lab Sample ID	Client Sample ID	Client Matrix	Date/Time Sampled	Date/Time Received
500-56913-1	WB-1 0-2	Solid	05/09/2013 1330	05/11/2013 0945
500-56913-2	WB-1 2-4	Solid	05/09/2013 1445	05/11/2013 0945
500-56913-3	WB-2 0-2	Solid	05/09/2013 1415	05/11/2013 0945
500-56913-4	WB-2 2-4	Solid	05/09/2013 1430	05/11/2013 0945

SAMPLE RESULTS

Client: Cedar Corporation

Job Number: 500-56913-1

Client Sample ID: **WB-1 0-2**

Lab Sample ID: 500-56913-1
Client Matrix: Solid

% Moisture: 62.9

Date Sampled: 05/09/2013 1330
Date Received: 05/11/2013 0945

8270D Semivolatile Organic Compounds (GC/MS)

Analysis Method:	8270D	Analysis Batch:	500-186786	Instrument ID:	CMS20
Prep Method:	3541	Prep Batch:	500-186402	Lab File ID:	500-56913-A-1-E.D
Dilution:	1.0			Initial Weight/Volume:	15.1346 g
Analysis Date:	05/20/2013 1729			Final Weight/Volume:	0.5 mL
Prep Date:	05/15/2013 1723			Injection Volume:	1 uL

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
1-Methylnaphthalene		<44		44	88
2-Methylnaphthalene		<120		120	450
Acenaphthene		<27		27	88
Acenaphthylene		<20		20	88
Anthracene		<21		21	88
Benzo[a]anthracene		<19		19	88
Benzo[a]pyrene		<16		16	88
Benzo[b]fluoranthene		<17		17	88
Benzo[g,h,i]perylene		<30		30	88
Benzo[k]fluoranthene		<21		21	88
Chrysene		<20		20	88
Dibenz(a,h)anthracene		<25		25	88
Fluoranthene		<36		36	88
Fluorene		<20		20	88
Indeno[1,2,3-cd]pyrene		<30		30	88
Naphthalene		<17		17	88
Phenanthrene		<37		37	88
Pyrene		<32		32	88

Surrogate	%Rec	Qualifier	Acceptance Limits
2-Fluorobiphenyl	41		30 - 119
Nitrobenzene-d5 (Surr)	33		30 - 115
Terphenyl-d14 (Surr)	54		36 - 134

Client: Cedar Corporation

Job Number: 500-56913-1

Client Sample ID: **WB-1 2-4**

Lab Sample ID: 500-56913-2
Client Matrix: Solid

% Moisture: 17.9

Date Sampled: 05/09/2013 1445
Date Received: 05/11/2013 0945

8270D Semivolatile Organic Compounds (GC/MS)

Analysis Method:	8270D	Analysis Batch:	500-186786	Instrument ID:	CMS20
Prep Method:	3541	Prep Batch:	500-186402	Lab File ID:	500-56913-A-2-E.D
Dilution:	1.0			Initial Weight/Volume:	15.0902 g
Analysis Date:	05/20/2013 1752			Final Weight/Volume:	0.5 mL
Prep Date:	05/15/2013 1723			Injection Volume:	1 uL

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
1-Methylnaphthalene		<20		20	40
2-Methylnaphthalene		<52		52	200
Acenaphthene		<12		12	40
Acenaphthylene		<9.2		9.2	40
Anthracene		<9.5		9.5	40
Benzo[a]anthracene		<8.4		8.4	40
Benzo[a]pyrene		<7.3		7.3	40
Benzo[b]fluoranthene		<7.8		7.8	40
Benzo[g,h,i]perylene		<14		14	40
Benzo[k]fluoranthene		<9.6		9.6	40
Chrysene		<9.1		9.1	40
Dibenz(a,h)anthracene		<11		11	40
Fluoranthene		<16		16	40
Fluorene		<9.1		9.1	40
Indeno[1,2,3-cd]pyrene		<14		14	40
Naphthalene		<7.8		7.8	40
Phenanthrene		<17		17	40
Pyrene		<15		15	40

Surrogate	%Rec	Qualifier	Acceptance Limits
2-Fluorobiphenyl	57		30 - 119
Nitrobenzene-d5 (Surr)	48		30 - 115
Terphenyl-d14 (Surr)	68		36 - 134

Client: Cedar Corporation

Job Number: 500-56913-1

Client Sample ID: WB-2 0-2

Lab Sample ID: 500-56913-3
Client Matrix: Solid

% Moisture: 31.7

Date Sampled: 05/09/2013 1415
Date Received: 05/11/2013 0945

8270D Semivolatile Organic Compounds (GC/MS)

Analysis Method:	8270D	Analysis Batch:	500-186786	Instrument ID:	CMS20
Prep Method:	3541	Prep Batch:	500-186402	Lab File ID:	500-56913-A-3-E.D
Dilution:	1.0			Initial Weight/Volume:	15.5451 g
Analysis Date:	05/20/2013 1814			Final Weight/Volume:	0.5 mL
Prep Date:	05/15/2013 1723			Injection Volume:	1 uL

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
1-Methylnaphthalene		<23		23	47
2-Methylnaphthalene		<61		61	240
Acenaphthene		<14		14	47
Acenaphthylene		<11		11	47
Anthracene		<11		11	47
Benzo[a]anthracene		<9.8		9.8	47
Benzo[a]pyrene		<8.5		8.5	47
Benzo[b]fluoranthene		<9.1		9.1	47
Benzo[g,h,i]perylene		<16		16	47
Benzo[k]fluoranthene		<11		11	47
Chrysene		<11		11	47
Dibenz(a,h)anthracene		<13		13	47
Fluoranthene		<19		19	47
Fluorene		<11		11	47
Indeno[1,2,3-cd]pyrene		<16		16	47
Naphthalene		<9.0		9.0	47
Phenanthrene		<20		20	47
Pyrene		<17		17	47

Surrogate	%Rec	Qualifier	Acceptance Limits
2-Fluorobiphenyl	38		30 - 119
Nitrobenzene-d5 (Surr)	30		30 - 115
Terphenyl-d14 (Surr)	50		36 - 134

Client: Cedar Corporation

Job Number: 500-56913-1

Client Sample ID: **WB-2 2-4**

Lab Sample ID: 500-56913-4
Client Matrix: Solid
% Moisture: 23.4

Date Sampled: 05/09/2013 1430
Date Received: 05/11/2013 0945

8270D Semivolatile Organic Compounds (GC/MS)

Analysis Method:	8270D	Analysis Batch:	500-186786	Instrument ID:	CMS20
Prep Method:	3541	Prep Batch:	500-186402	Lab File ID:	500-56913-A-4-E.D
Dilution:	1.0			Initial Weight/Volume:	15.6296 g
Analysis Date:	05/20/2013 1837			Final Weight/Volume:	0.5 mL
Prep Date:	05/15/2013 1723			Injection Volume:	1 uL

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
1-Methylnaphthalene		<21		21	41
2-Methylnaphthalene		<54		54	210
Acenaphthene		<12		12	41
Acenaphthylene		<9.6		9.6	41
Anthracene		12	J	9.8	41
Benzo[a]anthracene		<8.7		8.7	41
Benzo[a]pyrene		<7.6		7.6	41
Benzo[b]fluoranthene		<8.1		8.1	41
Benzo[g,h,i]perylene		<14		14	41
Benzo[k]fluoranthene		<9.9		9.9	41
Chrysene		<9.4		9.4	41
Dibenz(a,h)anthracene		<12		12	41
Fluoranthene		<17		17	41
Fluorene		<9.5		9.5	41
Indeno[1,2,3-cd]pyrene		<14		14	41
Naphthalene		<8.0		8.0	41
Phenanthrene		18	J	17	41
Pyrene		<15		15	41

Surrogate	%Rec	Qualifier	Acceptance Limits
2-Fluorobiphenyl	55		30 - 119
Nitrobenzene-d5 (Surr)	45		30 - 115
Terphenyl-d14 (Surr)	70		36 - 134

Client: Cedar Corporation

Job Number: 500-56913-1

Client Sample ID: **WB-1 0-2**

Lab Sample ID: 500-56913-1
Client Matrix: Solid

% Moisture: 62.9

Date Sampled: 05/09/2013 1330
Date Received: 05/11/2013 0945

6010B Metals (ICP)

Analysis Method:	6010B	Analysis Batch:	500-186178	Instrument ID:	ICP6
Prep Method:	3050B	Prep Batch:	500-186059	Lab File ID:	P6051313B.asc
Dilution:	1.0			Initial Weight/Volume:	1.1297 g
Analysis Date:	05/13/2013 1840			Final Weight/Volume:	100 mL
Prep Date:	05/13/2013 1022				

Analyte	DryWt Corrected: Y	Result (mg/Kg)	Qualifier	MDL	RL
Arsenic		1.8	J	0.52	2.4
Cadmium		0.34	J	0.12	0.48
Chromium		18	B	0.40	2.4
Copper		24		0.65	2.4
Iron		7700		21	48
Lead		15		0.41	1.2
Manganese		190		0.34	2.4
Nickel		7.8		0.52	2.4
Zinc		35		1.6	4.8

7471A Mercury (CVAA)

Analysis Method:	7471A	Analysis Batch:	500-186220	Instrument ID:	HG5
Prep Method:	7471A	Prep Batch:	500-186051	Lab File ID:	051413A.PRN
Dilution:	1.0			Initial Weight/Volume:	0.6320 g
Analysis Date:	05/14/2013 0912			Final Weight/Volume:	50 mL
Prep Date:	05/13/2013 1330				

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
Mercury		78		20	43

Client: Cedar Corporation

Job Number: 500-56913-1

Client Sample ID: WB-1 2-4

Lab Sample ID: 500-56913-2
Client Matrix: Solid

% Moisture: 17.9

Date Sampled: 05/09/2013 1445
Date Received: 05/11/2013 0945

6010B Metals (ICP)

Analysis Method:	6010B	Analysis Batch:	500-186178	Instrument ID:	ICP6
Prep Method:	3050B	Prep Batch:	500-186059	Lab File ID:	P6051313B.asc
Dilution:	1.0			Initial Weight/Volume:	1.0582 g
Analysis Date:	05/13/2013 1844			Final Weight/Volume:	100 mL
Prep Date:	05/13/2013 1022				

Analyte	DryWt Corrected: Y	Result (mg/Kg)	Qualifier	MDL	RL
Arsenic		0.68	J	0.25	1.2
Cadmium		0.081	J	0.057	0.23
Chromium		5.9	B	0.19	1.2
Copper		2.6		0.31	1.2
Iron		2000		10	23
Lead		2.1		0.20	0.58
Manganese		32		0.16	1.2
Nickel		2.7		0.25	1.2
Zinc		7.6		0.79	2.3

7471A Mercury (CVAA)

Analysis Method:	7471A	Analysis Batch:	500-186220	Instrument ID:	HG5
Prep Method:	7471A	Prep Batch:	500-186051	Lab File ID:	051413A.PRN
Dilution:	1.0			Initial Weight/Volume:	0.6798 g
Analysis Date:	05/14/2013 0918			Final Weight/Volume:	50 mL
Prep Date:	05/13/2013 1330				

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
Mercury		<8.4		8.4	18

Client: Cedar Corporation

Job Number: 500-56913-1

Client Sample ID: WB-2 0-2

Lab Sample ID: 500-56913-3
Client Matrix: Solid

% Moisture: 31.7

Date Sampled: 05/09/2013 1415
Date Received: 05/11/2013 0945

6010B Metals (ICP)

Analysis Method:	6010B	Analysis Batch:	500-186178	Instrument ID:	ICP6
Prep Method:	3050B	Prep Batch:	500-186059	Lab File ID:	P6051313B.asc
Dilution:	1.0			Initial Weight/Volume:	1.0400 g
Analysis Date:	05/13/2013 1848			Final Weight/Volume:	100 mL
Prep Date:	05/13/2013 1022				

Analyte	DryWt Corrected: Y	Result (mg/Kg)	Qualifier	MDL	RL
Arsenic		0.57	J	0.31	1.4
Cadmium		0.097	J	0.070	0.28
Chromium		8.6	B	0.24	1.4
Copper		6.9		0.38	1.4
Iron		3100		12	28
Lead		4.3		0.24	0.70
Manganese		45		0.20	1.4
Nickel		3.8		0.31	1.4
Zinc		11		0.97	2.8

7471A Mercury (CVAA)

Analysis Method:	7471A	Analysis Batch:	500-186220	Instrument ID:	HG5
Prep Method:	7471A	Prep Batch:	500-186051	Lab File ID:	051413A.PRN
Dilution:	1.0			Initial Weight/Volume:	0.6482 g
Analysis Date:	05/14/2013 0919			Final Weight/Volume:	50 mL
Prep Date:	05/13/2013 1330				

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
Mercury		17	J	11	23

Client: Cedar Corporation

Job Number: 500-56913-1

Client Sample ID: WB-2 2-4

Lab Sample ID: 500-56913-4
Client Matrix: Solid

% Moisture: 23.4

Date Sampled: 05/09/2013 1430
Date Received: 05/11/2013 0945

6010B Metals (ICP)

Analysis Method:	6010B	Analysis Batch:	500-186178	Instrument ID:	ICP6
Prep Method:	3050B	Prep Batch:	500-186059	Lab File ID:	P6051313B.asc
Dilution:	1.0			Initial Weight/Volume:	1.1824 g
Analysis Date:	05/13/2013 1852			Final Weight/Volume:	100 mL
Prep Date:	05/13/2013 1022				

Analyte	DryWt Corrected: Y	Result (mg/Kg)	Qualifier	MDL	RL
Arsenic		0.49	J	0.24	1.1
Cadmium		0.10	J	0.055	0.22
Chromium		8.6	B	0.18	1.1
Copper		6.7		0.30	1.1
Iron		3000		9.6	22
Lead		3.8		0.19	0.55
Manganese		50		0.16	1.1
Nickel		3.7		0.24	1.1
Zinc		11		0.76	2.2

7471A Mercury (CVAA)

Analysis Method:	7471A	Analysis Batch:	500-186220	Instrument ID:	HG5
Prep Method:	7471A	Prep Batch:	500-186051	Lab File ID:	051413A.PRN
Dilution:	1.0			Initial Weight/Volume:	0.6601 g
Analysis Date:	05/14/2013 0921			Final Weight/Volume:	50 mL
Prep Date:	05/13/2013 1330				

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
Mercury		18	J	9.3	20

General Chemistry

Client Sample ID: **WB-1 0-2**

Lab Sample ID: 500-56913-1 Date Sampled: 05/09/2013 1330
Client Matrix: Solid % Moisture: 62.9 Date Received: 05/11/2013 0945

Analyte	Result	Qual	Units	MDL	RL	Dil	Method
Nitrogen, Kjeldahl	940	B	mg/Kg	21	82	1.0	4500 NH3 G
Analysis Batch: 500-186640	Analysis Date: 05/17/2013 1057						DryWt Corrected: Y
Prep Batch: 500-186486	Prep Date: 05/17/2013 0645						
TOC Dup	10000		mg/Kg	20	130	1.0	Lloyd Kahn
Analysis Batch: 500-186385	Analysis Date: 05/15/2013 1358						DryWt Corrected: N
Percent Moisture	63		%	0.10	0.10	1.0	Moisture
Analysis Batch: 500-185967	Analysis Date: 05/11/2013 1356						DryWt Corrected: N
Percent Solids	37		%	0.10	0.10	1.0	Moisture
Analysis Batch: 500-185967	Analysis Date: 05/11/2013 1356						DryWt Corrected: N
Ammonia	500	B	mg/Kg	7.9	51	1.0	SM 4500 NH3 G
Analysis Batch: 500-186280	Analysis Date: 05/14/2013 1526						DryWt Corrected: Y
Prep Batch: 500-186166	Prep Date: 05/14/2013 0935						
Phosphorus as P	900		mg/Kg	47	180	2.0	SM 4500 P E
Analysis Batch: 500-186400	Analysis Date (Start): 05/15/2013 1616 (End) 05/15/2013 1616						DryWt Corrected: Y
Prep Batch: 500-186356	Prep Date: 05/15/2013 1130						

General Chemistry

Client Sample ID: WB-1 2-4

Lab Sample ID: 500-56913-2
Client Matrix: Solid

% Moisture: 17.9

Date Sampled: 05/09/2013 1445
Date Received: 05/11/2013 0945

Analyte	Result	Qual	Units	MDL	RL	Dil	Method
Nitrogen, Kjeldahl	90	B	mg/Kg	9.7	39	1.0	4500 NH3 G
Analysis Batch: 500-186640	Analysis Date: 05/17/2013 1103						DryWt Corrected: Y
Prep Batch: 500-186486	Prep Date: 05/17/2013 0645						
TOC Dup	2100		mg/Kg	20	130	1.0	Lloyd Kahn
Analysis Batch: 500-186385	Analysis Date: 05/15/2013 1430						DryWt Corrected: N
Percent Moisture	18		%	0.10	0.10	1.0	Moisture
Analysis Batch: 500-185967	Analysis Date: 05/11/2013 1356						DryWt Corrected: N
Percent Solids	82		%	0.10	0.10	1.0	Moisture
Analysis Batch: 500-185967	Analysis Date: 05/11/2013 1356						DryWt Corrected: N
Ammonia	36	B	mg/Kg	3.1	20	1.0	SM 4500 NH3 G
Analysis Batch: 500-186280	Analysis Date: 05/14/2013 1529						DryWt Corrected: Y
Prep Batch: 500-186166	Prep Date: 05/14/2013 0935						
Phosphorus as P	130		mg/Kg	6.6	25	1.0	SM 4500 P E
Analysis Batch: 500-186400	Analysis Date (Start): 05/15/2013 1617 (End) 05/15/2013 1618						DryWt Corrected: Y
Prep Batch: 500-186356	Prep Date: 05/15/2013 1130						

General Chemistry

Client Sample ID: WB-2 0-2

Lab Sample ID: 500-56913-3
Client Matrix: Solid

% Moisture: 31.7

Date Sampled: 05/09/2013 1415
Date Received: 05/11/2013 0945

Analyte	Result	Qual	Units	MDL	RL	Dil	Method
Nitrogen, Kjeldahl	530	B	mg/Kg	14	54	1.0	4500 NH3 G
Analysis Batch: 500-186640	Analysis Date: 05/17/2013 1107						DryWt Corrected: Y
Prep Batch: 500-186486	Prep Date: 05/17/2013 0645						
TOC Dup	4500		mg/Kg	20	130	1.0	Lloyd Kahn
Analysis Batch: 500-186385	Analysis Date: 05/15/2013 1437						DryWt Corrected: N
Percent Moisture	32		%	0.10	0.10	1.0	Moisture
Analysis Batch: 500-185967	Analysis Date: 05/11/2013 1356						DryWt Corrected: N
Percent Solids	68		%	0.10	0.10	1.0	Moisture
Analysis Batch: 500-185967	Analysis Date: 05/11/2013 1356						DryWt Corrected: N
Ammonia	110	B	mg/Kg	2.9	18	1.0	SM 4500 NH3 G
Analysis Batch: 500-186280	Analysis Date: 05/14/2013 1531						DryWt Corrected: Y
Prep Batch: 500-186166	Prep Date: 05/14/2013 0935						
Phosphorus as P	340		mg/Kg	11	40	1.0	SM 4500 P E
Analysis Batch: 500-186400	Analysis Date (Start): 05/15/2013 1618 (End) 05/15/2013 1618						DryWt Corrected: Y
Prep Batch: 500-186356	Prep Date: 05/15/2013 1130						

Client: Cedar Corporation

Job Number: 500-56913-1

General Chemistry

Client Sample ID: WB-2 2-4

Lab Sample ID: 500-56913-4
Client Matrix: Solid

% Moisture: 23.4

Date Sampled: 05/09/2013 1430
Date Received: 05/11/2013 0945

Analyte	Result	Qual	Units	MDL	RL	Dil	Method
Nitrogen, Kjeldahl	290	B	mg/Kg	10	40	1.0	4500 NH3 G
Analysis Batch: 500-186640	Analysis Date: 05/17/2013 1110						DryWt Corrected: Y
Prep Batch: 500-186486	Prep Date: 05/17/2013 0645						
TOC Dup	4900		mg/Kg	20	130	1.0	Lloyd Kahn
Analysis Batch: 500-186385	Analysis Date: 05/15/2013 1447						DryWt Corrected: N
Percent Moisture	23		%	0.10	0.10	1.0	Moisture
Analysis Batch: 500-185967	Analysis Date: 05/11/2013 1356						DryWt Corrected: N
Percent Solids	77		%	0.10	0.10	1.0	Moisture
Analysis Batch: 500-185967	Analysis Date: 05/11/2013 1356						DryWt Corrected: N
Ammonia	130	B	mg/Kg	3.4	22	1.0	SM 4500 NH3 G
Analysis Batch: 500-186280	Analysis Date: 05/14/2013 1534						DryWt Corrected: Y
Prep Batch: 500-186166	Prep Date: 05/14/2013 0935						
Phosphorus as P	280		mg/Kg	15	57	1.0	SM 4500 P E
Analysis Batch: 500-186400	Analysis Date (Start): 05/15/2013 1618 (End) 05/15/2013 1619						DryWt Corrected: Y
Prep Batch: 500-186356	Prep Date: 05/15/2013 1130						

Client: Cedar Corporation

Job Number: 500-56913-1

Client Sample ID: **WB-1 0-2**

Lab Sample ID: 500-56913-1
Client Matrix: Solid

Date Sampled: 05/09/2013 1330
Date Received: 05/11/2013 0945

D422 Grain Size

Analysis Method:	D422	Analysis Batch:	200-55652	Instrument ID:	D422_import
	N/A	Prep Batch:	N/A	Lab File ID:	500-56913-B-1.txt
Dilution:	1.0			Initial Weight/Volume:	178.13 g
Analysis Date:	05/14/2013 1656			Final Weight/Volume:	
Prep Date:	N/A				

Analyte	DryWt Corrected: N	Result (% Passing)	Qualifier	MDL	RL
Sieve Size 3 inch - Percent Finer		100.0			
Sieve Size 2 inch - Percent Finer		100.0			
Sieve Size 1.5 inch - Percent Finer		100.0			
Sieve Size 1 inch - Percent Finer		100.0			
Sieve Size 0.75 inch - Percent Finer		100.0			
Sieve Size 0.375 inch - Percent Finer		100.0			
Sieve Size #4 - Percent Finer		100.0			
Sieve Size #10 - Percent Finer		99.7			
Sieve Size #20 - Percent Finer		98.6			
Sieve Size #40 - Percent Finer		94.2			
Sieve Size #60 - Percent Finer		83.9			
Sieve Size #80 - Percent Finer		76.6			
Sieve Size #100 - Percent Finer		73.3			
Sieve Size #200 - Percent Finer		67.6			
Hydrometer Reading 1 - Percent Finer		30.9			
Hydrometer Reading 2 - Percent Finer		26.4			
Hydrometer Reading 3 - Percent Finer		18.7			
Hydrometer Reading 4 - Percent Finer		11.8			
Hydrometer Reading 5 - Percent Finer		8.3			
Hydrometer Reading 6 - Percent Finer		5.7			
Hydrometer Reading 7 - Percent Finer		3.5			

Client: Cedar Corporation

Job Number: 500-56913-1

Client Sample ID: **WB-1 0-2**

Lab Sample ID: 500-56913-1
Client Matrix: Solid

Date Sampled: 05/09/2013 1330
Date Received: 05/11/2013 0945

D422 Grain Size

Analysis Method:	D422	Analysis Batch:	200-55652	Instrument ID:	D422_import
	N/A	Prep Batch:	N/A	Lab File ID:	500-56913-B-1.txt
Dilution:	1.0			Initial Weight/Volume:	178.13 g
Analysis Date:	05/14/2013 1656			Final Weight/Volume:	
Prep Date:	N/A				

Analyte	DryWt Corrected: N	Result (%)	Qualifier	MDL	RL
Gravel		0.0			
Sand		32.4			
Coarse Sand		0.3			
Medium Sand		5.5			
Fine Sand		26.6			
Silt		59.3			
Clay		8.3			

Client: Cedar Corporation

Job Number: 500-56913-1

Client Sample ID: WB-1 2-4

Lab Sample ID: 500-56913-2
Client Matrix: Solid

Date Sampled: 05/09/2013 1445
Date Received: 05/11/2013 0945

D422 Grain Size

Analysis Method:	D422	Analysis Batch:	200-55652	Instrument ID:	D422_import
	N/A	Prep Batch:	N/A	Lab File ID:	500-56913-B-2.txt
Dilution:	1.0			Initial Weight/Volume:	237.89 g
Analysis Date:	05/14/2013 1659			Final Weight/Volume:	
Prep Date:	N/A				

Analyte	DryWt Corrected: N	Result (% Passing)	Qualifier	MDL	RL
Sieve Size 3 inch - Percent Finer		100.0			
Sieve Size 2 inch - Percent Finer		100.0			
Sieve Size 1.5 inch - Percent Finer		100.0			
Sieve Size 1 inch - Percent Finer		100.0			
Sieve Size 0.75 inch - Percent Finer		100.0			
Sieve Size 0.375 inch - Percent Finer		97.1			
Sieve Size #4 - Percent Finer		93.9			
Sieve Size #10 - Percent Finer		91.2			
Sieve Size #20 - Percent Finer		81.6			
Sieve Size #40 - Percent Finer		55.4			
Sieve Size #60 - Percent Finer		31.0			
Sieve Size #80 - Percent Finer		13.8			
Sieve Size #100 - Percent Finer		9.9			
Sieve Size #200 - Percent Finer		6.2			
Hydrometer Reading 1 - Percent Finer		4.3			
Hydrometer Reading 2 - Percent Finer		3.9			
Hydrometer Reading 3 - Percent Finer		3.0			
Hydrometer Reading 4 - Percent Finer		2.5			
Hydrometer Reading 5 - Percent Finer		1.5			
Hydrometer Reading 6 - Percent Finer		1.0			
Hydrometer Reading 7 - Percent Finer		0.5			

Client: Cedar Corporation

Job Number: 500-56913-1

Client Sample ID: **WB-1 2-4**

Lab Sample ID: 500-56913-2
Client Matrix: Solid

Date Sampled: 05/09/2013 1445
Date Received: 05/11/2013 0945

D422 Grain Size

Analysis Method:	D422	Analysis Batch:	200-55652	Instrument ID:	D422_import
	N/A	Prep Batch:	N/A	Lab File ID:	500-56913-B-2.txt
Dilution:	1.0			Initial Weight/Volume:	237.89 g
Analysis Date:	05/14/2013 1659			Final Weight/Volume:	
Prep Date:	N/A				

Analyte	DryWt Corrected: N	Result (%)	Qualifier	MDL	RL
Gravel		6.1			
Sand		87.7			
Coarse Sand		2.7			
Medium Sand		35.8			
Fine Sand		49.2			
Silt		4.6			
Clay		1.5			

Client: Cedar Corporation

Job Number: 500-56913-1

Client Sample ID: **WB-2 0-2**

Lab Sample ID: 500-56913-3
Client Matrix: Solid

Date Sampled: 05/09/2013 1415
Date Received: 05/11/2013 0945

D422 Grain Size

Analysis Method:	D422	Analysis Batch:	200-55652	Instrument ID:	D422_import
	N/A	Prep Batch:	N/A	Lab File ID:	500-56913-B-3.txt
Dilution:	1.0			Initial Weight/Volume:	181.86 g
Analysis Date:	05/14/2013 1701			Final Weight/Volume:	
Prep Date:	N/A				

Analyte	DryWt Corrected: N	Result (% Passing)	Qualifier	MDL	RL
Sieve Size 3 inch - Percent Finer		100.0			
Sieve Size 2 inch - Percent Finer		100.0			
Sieve Size 1.5 inch - Percent Finer		100.0			
Sieve Size 1 inch - Percent Finer		100.0			
Sieve Size 0.75 inch - Percent Finer		100.0			
Sieve Size 0.375 inch - Percent Finer		100.0			
Sieve Size #4 - Percent Finer		98.1			
Sieve Size #10 - Percent Finer		96.6			
Sieve Size #20 - Percent Finer		95.3			
Sieve Size #40 - Percent Finer		82.2			
Sieve Size #60 - Percent Finer		55.9			
Sieve Size #80 - Percent Finer		30.8			
Sieve Size #100 - Percent Finer		20.6			
Sieve Size #200 - Percent Finer		13.4			
Hydrometer Reading 1 - Percent Finer		12.4			
Hydrometer Reading 2 - Percent Finer		10.4			
Hydrometer Reading 3 - Percent Finer		7.1			
Hydrometer Reading 4 - Percent Finer		5.8			
Hydrometer Reading 5 - Percent Finer		4.4			
Hydrometer Reading 6 - Percent Finer		2.8			
Hydrometer Reading 7 - Percent Finer		1.4			

Client: Cedar Corporation

Job Number: 500-56913-1

Client Sample ID: **WB-2 0-2**

Lab Sample ID: 500-56913-3
Client Matrix: Solid

Date Sampled: 05/09/2013 1415
Date Received: 05/11/2013 0945

D422 Grain Size

Analysis Method:	D422	Analysis Batch:	200-55652	Instrument ID:	D422_import
	N/A	Prep Batch:	N/A	Lab File ID:	500-56913-B-3.txt
Dilution:	1.0			Initial Weight/Volume:	181.86 g
Analysis Date:	05/14/2013 1701			Final Weight/Volume:	
Prep Date:	N/A				

Analyte	DryWt Corrected: N	Result (%)	Qualifier	MDL	RL
Gravel		1.9			
Sand		84.7			
Coarse Sand		1.5			
Medium Sand		14.4			
Fine Sand		68.8			
Silt		9.1			
Clay		4.4			

Client: Cedar Corporation

Job Number: 500-56913-1

Client Sample ID: **WB-2 2-4**

Lab Sample ID: 500-56913-4
Client Matrix: Solid

Date Sampled: 05/09/2013 1430
Date Received: 05/11/2013 0945

D422 Grain Size

Analysis Method:	D422	Analysis Batch:	200-55652	Instrument ID:	D422_import
	N/A	Prep Batch:	N/A	Lab File ID:	500-56913-B-4.txt
Dilution:	1.0			Initial Weight/Volume:	188.51 g
Analysis Date:	05/14/2013 1704			Final Weight/Volume:	
Prep Date:	N/A				

Analyte	DryWt Corrected: N	Result (% Passing)	Qualifier	MDL	RL
Sieve Size 3 inch - Percent Finer		100.0			
Sieve Size 2 inch - Percent Finer		100.0			
Sieve Size 1.5 inch - Percent Finer		100.0			
Sieve Size 1 inch - Percent Finer		100.0			
Sieve Size 0.75 inch - Percent Finer		100.0			
Sieve Size 0.375 inch - Percent Finer		100.0			
Sieve Size #4 - Percent Finer		99.4			
Sieve Size #10 - Percent Finer		98.7			
Sieve Size #20 - Percent Finer		96.0			
Sieve Size #40 - Percent Finer		76.9			
Sieve Size #60 - Percent Finer		51.9			
Sieve Size #80 - Percent Finer		34.7			
Sieve Size #100 - Percent Finer		28.2			
Sieve Size #200 - Percent Finer		22.6			
Hydrometer Reading 1 - Percent Finer		22.2			
Hydrometer Reading 2 - Percent Finer		19.2			
Hydrometer Reading 3 - Percent Finer		14.9			
Hydrometer Reading 4 - Percent Finer		12.5			
Hydrometer Reading 5 - Percent Finer		10			
Hydrometer Reading 6 - Percent Finer		7.4			
Hydrometer Reading 7 - Percent Finer		4.9			

Client: Cedar Corporation

Job Number: 500-56913-1

Client Sample ID: **WB-2 2-4**

Lab Sample ID: 500-56913-4
Client Matrix: Solid

Date Sampled: 05/09/2013 1430
Date Received: 05/11/2013 0945

D422 Grain Size

Analysis Method:	D422	Analysis Batch:	200-55652	Instrument ID:	D422_import
	N/A	Prep Batch:	N/A	Lab File ID:	500-56913-B-4.txt
Dilution:	1.0			Initial Weight/Volume:	188.51 g
Analysis Date:	05/14/2013 1704			Final Weight/Volume:	
Prep Date:	N/A				

Analyte	DryWt Corrected: N	Result (%)	Qualifier	MDL	RL
Gravel		0.6			
Sand		76.8			
Coarse Sand		0.7			
Medium Sand		21.8			
Fine Sand		54.3			
Silt		12.6			
Clay		10			

DATA REPORTING QUALIFIERS

Client: Cedar Corporation

Job Number: 500-56913-1

Lab Section	Qualifier	Description
GC/MS Semi VOA		
	J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
Metals		
	B	Compound was found in the blank and sample.
	J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
General Chemistry		
	B	Compound was found in the blank and sample.
	J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
	F	RPD of the MS and MSD exceeds the control limits

QUALITY CONTROL RESULTS

Client: Cedar Corporation

Job Number: 500-56913-1

QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
GC/MS Semi VOA					
Prep Batch: 500-186402					
LCS 500-186402/2-A	Lab Control Sample	T	Solid	3541	
MB 500-186402/1-A	Method Blank	T	Solid	3541	
500-56913-1	WB-1 0-2	T	Solid	3541	
500-56913-2	WB-1 2-4	T	Solid	3541	
500-56913-3	WB-2 0-2	T	Solid	3541	
500-56913-4	WB-2 2-4	T	Solid	3541	
Analysis Batch:500-186458					
LCS 500-186402/2-A	Lab Control Sample	T	Solid	8270D	500-186402
MB 500-186402/1-A	Method Blank	T	Solid	8270D	500-186402
Analysis Batch:500-186786					
500-56913-1	WB-1 0-2	T	Solid	8270D	500-186402
500-56913-2	WB-1 2-4	T	Solid	8270D	500-186402
500-56913-3	WB-2 0-2	T	Solid	8270D	500-186402
500-56913-4	WB-2 2-4	T	Solid	8270D	500-186402

Report Basis
T = Total

Client: Cedar Corporation

Job Number: 500-56913-1

QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
Metals					
Prep Batch: 500-186051					
LCS 500-186051/8-A	Lab Control Sample	T	Solid	7471A	
MB 500-186051/7-A	Method Blank	T	Solid	7471A	
500-56913-1	WB-1 0-2	T	Solid	7471A	
500-56913-2	WB-1 2-4	T	Solid	7471A	
500-56913-3	WB-2 0-2	T	Solid	7471A	
500-56913-4	WB-2 2-4	T	Solid	7471A	
Prep Batch: 500-186059					
LCS 500-186059/2-A	Lab Control Sample	T	Solid	3050B	
MB 500-186059/1-A	Method Blank	T	Solid	3050B	
500-56913-1	WB-1 0-2	T	Solid	3050B	
500-56913-2	WB-1 2-4	T	Solid	3050B	
500-56913-3	WB-2 0-2	T	Solid	3050B	
500-56913-4	WB-2 2-4	T	Solid	3050B	
Analysis Batch:500-186178					
LCS 500-186059/2-A	Lab Control Sample	T	Solid	6010B	500-186059
MB 500-186059/1-A	Method Blank	T	Solid	6010B	500-186059
500-56913-1	WB-1 0-2	T	Solid	6010B	500-186059
500-56913-2	WB-1 2-4	T	Solid	6010B	500-186059
500-56913-3	WB-2 0-2	T	Solid	6010B	500-186059
500-56913-4	WB-2 2-4	T	Solid	6010B	500-186059
Analysis Batch:500-186220					
LCS 500-186051/8-A	Lab Control Sample	T	Solid	7471A	500-186051
MB 500-186051/7-A	Method Blank	T	Solid	7471A	500-186051
500-56913-1	WB-1 0-2	T	Solid	7471A	500-186051
500-56913-2	WB-1 2-4	T	Solid	7471A	500-186051
500-56913-3	WB-2 0-2	T	Solid	7471A	500-186051
500-56913-4	WB-2 2-4	T	Solid	7471A	500-186051

Report Basis
T = Total

Client: Cedar Corporation

Job Number: 500-56913-1

QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
General Chemistry					
Analysis Batch:500-185967					
500-56913-1	WB-1 0-2	T	Solid	Moisture	
500-56913-2	WB-1 2-4	T	Solid	Moisture	
500-56913-3	WB-2 0-2	T	Solid	Moisture	
500-56913-4	WB-2 2-4	T	Solid	Moisture	
Prep Batch: 500-186166					
LCS 500-186166/20-A	Lab Control Sample	T	Solid	SM 4500 NH3 B	
MB 500-186166/19-A	Method Blank	T	Solid	SM 4500 NH3 B	
500-56913-1	WB-1 0-2	T	Solid	SM 4500 NH3 B	
500-56913-2	WB-1 2-4	T	Solid	SM 4500 NH3 B	
500-56913-3	WB-2 0-2	T	Solid	SM 4500 NH3 B	
500-56913-4	WB-2 2-4	T	Solid	SM 4500 NH3 B	
Analysis Batch:500-186280					
LCS 500-186166/20-A	Lab Control Sample	T	Solid	SM 4500 NH3 G	500-186166
MB 500-186166/19-A	Method Blank	T	Solid	SM 4500 NH3 G	500-186166
500-56913-1	WB-1 0-2	T	Solid	SM 4500 NH3 G	500-186166
500-56913-2	WB-1 2-4	T	Solid	SM 4500 NH3 G	500-186166
500-56913-3	WB-2 0-2	T	Solid	SM 4500 NH3 G	500-186166
500-56913-4	WB-2 2-4	T	Solid	SM 4500 NH3 G	500-186166
Prep Batch: 500-186356					
LCS 500-186356/2-A	Lab Control Sample	T	Solid	SM 4500 P B	
MB 500-186356/1-A	Method Blank	T	Solid	SM 4500 P B	
500-56913-1	WB-1 0-2	T	Solid	SM 4500 P B	
500-56913-2	WB-1 2-4	T	Solid	SM 4500 P B	
500-56913-3	WB-2 0-2	T	Solid	SM 4500 P B	
500-56913-4	WB-2 2-4	T	Solid	SM 4500 P B	
Analysis Batch:500-186385					
LCS 500-186385/3	Lab Control Sample	T	Solid	Lloyd Kahn	
MB 500-186385/2	Method Blank	T	Solid	Lloyd Kahn	
500-56913-1	WB-1 0-2	T	Solid	Lloyd Kahn	
500-56913-1MS	Matrix Spike	T	Solid	Lloyd Kahn	
500-56913-1MSD	Matrix Spike Duplicate	T	Solid	Lloyd Kahn	
500-56913-2	WB-1 2-4	T	Solid	Lloyd Kahn	
500-56913-3	WB-2 0-2	T	Solid	Lloyd Kahn	
500-56913-4	WB-2 2-4	T	Solid	Lloyd Kahn	

Client: Cedar Corporation

Job Number: 500-56913-1

QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
General Chemistry					
Analysis Batch:500-186400					
LCS 500-186356/2-A	Lab Control Sample	T	Solid	SM 4500 P E	500-186356
MB 500-186356/1-A	Method Blank	T	Solid	SM 4500 P E	500-186356
500-56913-1	WB-1 0-2	T	Solid	SM 4500 P E	500-186356
500-56913-2	WB-1 2-4	T	Solid	SM 4500 P E	500-186356
500-56913-3	WB-2 0-2	T	Solid	SM 4500 P E	500-186356
500-56913-4	WB-2 2-4	T	Solid	SM 4500 P E	500-186356
Prep Batch: 500-186486					
LCS 500-186486/21-A	Lab Control Sample	T	Solid	SM4500Norg_C	
MB 500-186486/20-A	Method Blank	T	Solid	SM4500Norg_C	
500-56913-1	WB-1 0-2	T	Solid	SM4500Norg_C	
500-56913-2	WB-1 2-4	T	Solid	SM4500Norg_C	
500-56913-3	WB-2 0-2	T	Solid	SM4500Norg_C	
500-56913-4	WB-2 2-4	T	Solid	SM4500Norg_C	
Analysis Batch:500-186640					
LCS 500-186486/21-A	Lab Control Sample	T	Solid	4500 NH3 G	500-186486
MB 500-186486/20-A	Method Blank	T	Solid	4500 NH3 G	500-186486
500-56913-1	WB-1 0-2	T	Solid	4500 NH3 G	500-186486
500-56913-2	WB-1 2-4	T	Solid	4500 NH3 G	500-186486
500-56913-3	WB-2 0-2	T	Solid	4500 NH3 G	500-186486
500-56913-4	WB-2 2-4	T	Solid	4500 NH3 G	500-186486

Report Basis
T = Total

Geotechnical					
Analysis Batch:200-55652					
500-56913-1	WB-1 0-2	T	Solid	D422	
500-56913-2	WB-1 2-4	T	Solid	D422	
500-56913-3	WB-2 0-2	T	Solid	D422	
500-56913-4	WB-2 2-4	T	Solid	D422	

Report Basis
T = Total

Client: Cedar Corporation

Job Number: 500-56913-1

Surrogate Recovery Report

8270D Semivolatile Organic Compounds (GC/MS)

Client Matrix: Solid

Lab Sample ID	Client Sample ID	FBP %Rec	NBZ %Rec	TPH %Rec
500-56913-1	WB-1 0-2	41	33	54
500-56913-2	WB-1 2-4	57	48	68
500-56913-3	WB-2 0-2	38	30	50
500-56913-4	WB-2 2-4	55	45	70
MB 500-186402/1-A		77	79	87
LCS 500-186402/2-A		76	78	84

Surrogate	Acceptance Limits
FBP = 2-Fluorobiphenyl	30-119
NBZ = Nitrobenzene-d5 (Surr)	30-115
TPH = Terphenyl-d14 (Surr)	36-134

Client: Cedar Corporation

Job Number: 500-56913-1

Method Blank - Batch: 500-186402

Method: 8270D
Preparation: 3541

Lab Sample ID:	MB 500-186402/1-A	Analysis Batch:	500-186458	Instrument ID:	CMS24
Client Matrix:	Solid	Prep Batch:	500-186402	Lab File ID:	186402mb.d
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	15.0000 g
Analysis Date:	05/16/2013 1022	Units:	ug/Kg	Final Weight/Volume:	0.5 mL
Prep Date:	05/15/2013 1723			Injection Volume:	1 uL
Leach Date:	N/A				

Analyte	Result	Qual	MDL	RL
1-Methylnaphthalene	<17		17	33
2-Methylnaphthalene	<43		43	170
Acenaphthene	<9.9		9.9	33
Acenaphthylene	<7.6		7.6	33
Anthracene	<7.8		7.8	33
Benzo[a]anthracene	<7.0		7.0	33
Benzo[a]pyrene	<6.1		6.1	33
Benzo[b]fluoranthene	<6.5		6.5	33
Benzo[g,h,i]perylene	<11		11	33
Benzo[k]fluoranthene	<7.9		7.9	33
Chrysene	<7.5		7.5	33
Dibenz(a,h)anthracene	<9.3		9.3	33
Fluoranthene	<14		14	33
Fluorene	<7.6		7.6	33
Indeno[1,2,3-cd]pyrene	<11		11	33
Naphthalene	<6.4		6.4	33
Phenanthrene	<14		14	33
Pyrene	<12		12	33

Surrogate	% Rec	Acceptance Limits
2-Fluorobiphenyl	77	30 - 119
Nitrobenzene-d5 (Surr)	79	30 - 115
Terphenyl-d14 (Surr)	87	36 - 134

Client: Cedar Corporation

Job Number: 500-56913-1

Lab Control Sample - Batch: 500-186402

Method: 8270D
Preparation: 3541

Lab Sample ID:	LCS 500-186402/2-A	Analysis Batch:	500-186458	Instrument ID:	CMS24
Client Matrix:	Solid	Prep Batch:	500-186402	Lab File ID:	186402lcs.d
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	15.0000 g
Analysis Date:	05/16/2013 1148	Units:	ug/Kg	Final Weight/Volume:	0.5 mL
Prep Date:	05/15/2013 1723			Injection Volume:	1 uL
Leach Date:	N/A				

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
2-Methylnaphthalene	1670	1190	72	51 - 110	
Acenaphthene	1670	1200	72	53 - 110	
Acenaphthylene	1670	1300	78	51 - 110	
Anthracene	1670	1300	78	52 - 110	
Benzo[a]anthracene	1670	1310	78	57 - 110	
Benzo[a]pyrene	1670	1300	78	56 - 110	
Benzo[b]fluoranthene	1670	1380	83	50 - 110	
Benzo[g,h,i]perylene	1670	1420	85	54 - 117	
Benzo[k]fluoranthene	1670	1160	70	43 - 121	
Chrysene	1670	1530	92	54 - 110	
Dibenz(a,h)anthracene	1670	1300	78	52 - 118	
Fluoranthene	1670	1370	82	55 - 113	
Fluorene	1670	1180	71	52 - 112	
Indeno[1,2,3-cd]pyrene	1670	1320	79	53 - 116	
Naphthalene	1670	1220	73	48 - 110	
Phenanthrene	1670	1400	84	51 - 116	
Pyrene	1670	1390	83	50 - 112	

Surrogate	% Rec	Acceptance Limits
2-Fluorobiphenyl	76	30 - 119
Nitrobenzene-d5 (Surr)	78	30 - 115
Terphenyl-d14 (Surr)	84	36 - 134

Client: Cedar Corporation

Job Number: 500-56913-1

Method Blank - Batch: 500-186059

Method: 6010B
Preparation: 3050B

Lab Sample ID:	MB 500-186059/1-A	Analysis Batch:	500-186178	Instrument ID:	ICP6
Client Matrix:	Solid	Prep Batch:	500-186059	Lab File ID:	P6051313B.asc
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	1 g
Analysis Date:	05/13/2013 1647	Units:	mg/Kg	Final Weight/Volume:	100 mL
Prep Date:	05/13/2013 1022				
Leach Date:	N/A				

Analyte	Result	Qual	MDL	RL
Arsenic	<0.22		0.22	1.0
Cadmium	<0.050		0.050	0.20
Chromium	0.240	J	0.17	1.0
Copper	<0.27		0.27	1.0
Iron	<8.7		8.7	20
Lead	<0.17		0.17	0.50
Manganese	<0.14		0.14	1.0
Nickel	<0.22		0.22	1.0
Zinc	<0.69		0.69	2.0

Lab Control Sample - Batch: 500-186059

Method: 6010B
Preparation: 3050B

Lab Sample ID:	LCS 500-186059/2-A	Analysis Batch:	500-186178	Instrument ID:	ICP6
Client Matrix:	Solid	Prep Batch:	500-186059	Lab File ID:	P6051313B.asc
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	1 g
Analysis Date:	05/13/2013 1652	Units:	mg/Kg	Final Weight/Volume:	100 mL
Prep Date:	05/13/2013 1022				
Leach Date:	N/A				

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Arsenic	10.0	9.18	92	80 - 120	
Cadmium	5.00	4.70	94	80 - 120	
Chromium	20.0	20.9	105	80 - 120	
Copper	25.0	24.6	99	80 - 120	
Iron	100	88.4	88	80 - 120	
Lead	10.0	9.84	98	80 - 120	
Manganese	50.0	47.6	95	80 - 120	
Nickel	50.0	50.0	100	80 - 120	
Zinc	50.0	46.6	93	80 - 120	

Client: Cedar Corporation

Job Number: 500-56913-1

Method Blank - Batch: 500-186051

Method: 7471A
Preparation: 7471A

Lab Sample ID:	MB 500-186051/7-A	Analysis Batch:	500-186220	Instrument ID:	HG5
Client Matrix:	Solid	Prep Batch:	500-186051	Lab File ID:	051413A.PRN
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	0.6 g
Analysis Date:	05/14/2013 0857	Units:	ug/Kg	Final Weight/Volume:	50 mL
Prep Date:	05/13/2013 1330				
Leach Date:	N/A				

Analyte	Result	Qual	MDL	RL
Mercury	<7.9		7.9	17

Lab Control Sample - Batch: 500-186051

Method: 7471A
Preparation: 7471A

Lab Sample ID:	LCS 500-186051/8-A	Analysis Batch:	500-186220	Instrument ID:	HG5
Client Matrix:	Solid	Prep Batch:	500-186051	Lab File ID:	051413A.PRN
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	0.6 g
Analysis Date:	05/14/2013 0859	Units:	ug/Kg	Final Weight/Volume:	50 mL
Prep Date:	05/13/2013 1330				
Leach Date:	N/A				

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Mercury	167	168	101	80 - 120	

Client: Cedar Corporation

Job Number: 500-56913-1

Method Blank - Batch: 500-186486

Method: 4500 NH3 G
Preparation: SM4500Norg_C

Lab Sample ID:	MB 500-186486/20-A	Analysis Batch:	500-186640	Instrument ID:	SYSTEA
Client Matrix:	Solid	Prep Batch:	500-186486	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	1 g
Analysis Date:	05/17/2013 1142	Units:	mg/Kg	Final Weight/Volume:	100 mL
Prep Date:	05/17/2013 0645				
Leach Date:	N/A				

Analyte	Result	Qual	MDL	RL
Nitrogen, Kjeldahl	38.0	J	10	40

Lab Control Sample - Batch: 500-186486

Method: 4500 NH3 G
Preparation: SM4500Norg_C

Lab Sample ID:	LCS 500-186486/21-A	Analysis Batch:	500-186640	Instrument ID:	SYSTEA
Client Matrix:	Solid	Prep Batch:	500-186486	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	1 g
Analysis Date:	05/17/2013 1054	Units:	mg/Kg	Final Weight/Volume:	100 mL
Prep Date:	05/17/2013 0645				
Leach Date:	N/A				

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Nitrogen, Kjeldahl	250	280	112	80 - 120	

Client: Cedar Corporation

Job Number: 500-56913-1

Method Blank - Batch: 500-186385

Method: Lloyd Kahn
Preparation: N/A

Lab Sample ID:	MB 500-186385/2	Analysis Batch:	500-186385	Instrument ID:	TOC4
Client Matrix:	Solid	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	0.16 g
Analysis Date:	05/15/2013 1337	Units:	mg/Kg	Final Weight/Volume:	0.16 g
Prep Date:	N/A				
Leach Date:	N/A				

Analyte	Result	Qual	MDL	RL
TOC Dup	<20		20	130

Lab Control Sample - Batch: 500-186385

Method: Lloyd Kahn
Preparation: N/A

Lab Sample ID:	LCS 500-186385/3	Analysis Batch:	500-186385	Instrument ID:	TOC4
Client Matrix:	Solid	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	0.0156 g
Analysis Date:	05/15/2013 1341	Units:	mg/Kg	Final Weight/Volume:	0.05 g
Prep Date:	N/A				
Leach Date:	N/A				

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
TOC Dup	4110	5960	145	33 - 167	

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 500-186385

Method: Lloyd Kahn
Preparation: N/A

MS Lab Sample ID:	500-56913-1	Analysis Batch:	500-186385	Instrument ID:	TOC4
Client Matrix:	Solid	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	0.0020 g
Analysis Date:	05/15/2013 1412			Final Weight/Volume:	0.0020 g
Prep Date:	N/A				
Leach Date:	N/A				

MSD Lab Sample ID:	500-56913-1	Analysis Batch:	500-186385	Instrument ID:	TOC4
Client Matrix:	Solid	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	0.0040 g
Analysis Date:	05/15/2013 1422			Final Weight/Volume:	0.0040 g
Prep Date:	N/A				
Leach Date:	N/A				

	% Rec.						
Analyte	MS	MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
TOC Dup	121	122	75 - 125	54	30		F

Client: Cedar Corporation

Job Number: 500-56913-1

Method Blank - Batch: 500-186166

Method: SM 4500 NH3 G
Preparation: SM 4500 NH3 B

Lab Sample ID:	MB 500-186166/19-A	Analysis Batch:	500-186280	Instrument ID:	SYSTEA
Client Matrix:	Solid	Prep Batch:	500-186166	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	1 g
Analysis Date:	05/14/2013 1509	Units:	mg/Kg	Final Weight/Volume:	100 mL
Prep Date:	05/14/2013 0935				
Leach Date:	N/A				

Analyte	Result	Qual	MDL	RL
Ammonia	5.20	J	3.1	20

Lab Control Sample - Batch: 500-186166

Method: SM 4500 NH3 G
Preparation: SM 4500 NH3 B

Lab Sample ID:	LCS 500-186166/20-A	Analysis Batch:	500-186280	Instrument ID:	SYSTEA
Client Matrix:	Solid	Prep Batch:	500-186166	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	1 g
Analysis Date:	05/14/2013 1512	Units:	mg/Kg	Final Weight/Volume:	100 mL
Prep Date:	05/14/2013 0935				
Leach Date:	N/A				

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Ammonia	250	275	110	80 - 120	

Client: Cedar Corporation

Job Number: 500-56913-1

Method Blank - Batch: 500-186356

Method: SM 4500 P E
Preparation: SM 4500 P B

Lab Sample ID:	MB 500-186356/1-A	Analysis Batch:	500-186400	Instrument ID:	SPEC5
Client Matrix:	Solid	Prep Batch:	500-186356	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	1 g
Analysis Date:	05/15/2013 1606	Units:	mg/Kg	Final Weight/Volume:	50 mL
Prep Date:	05/15/2013 1130				
Leach Date:	N/A				

Analyte	Result	Qual	MDL	RL
Phosphorus as P	<1.3		1.3	5.0

Lab Control Sample - Batch: 500-186356

Method: SM 4500 P E
Preparation: SM 4500 P B

Lab Sample ID:	LCS 500-186356/2-A	Analysis Batch:	500-186400	Instrument ID:	SPEC5
Client Matrix:	Solid	Prep Batch:	500-186356	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	1 g
Analysis Date:	05/15/2013 1606	Units:	mg/Kg	Final Weight/Volume:	50 mL
Prep Date:	05/15/2013 1130				
Leach Date:	N/A				

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Phosphorus as P	25.0	25.1	100	80 - 120	

TestAmerica

THE LEADER IN ENVIRONMENTAL

2417 Bond Street, University Park, IL 60
Phone: 708.534.5200 Fax: 708.534

500-56913 COC

(optional)

Report To
Contact: Scott McCurdy
Company: Cedar Corp
Address: 604 Wilson Ave
Address: Menomonie WI 54751
Phone: 715-235-9081
Fax:
E-Mail:

(optional)

Bill To
Contact: Same
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-56913

Chain of Custody Number:

Page 1 of 1

Temperature °C of Cooler: 0c 8

Client: Cedar Corporation
Client Project #:
Project Name: City of Menomonie - Wolske Bay
Project Location/State: Menomonie, WI
Lab Project #:
Sampler: RDS / SEM
Lab PM: Sandie Fredrick

Preservative: 8
Parameter: See Attached

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix		Comments
1		WB-1 0-2	5/09/13	1330	1		X	
2		WB-1 2-4		1345	1		X	
3		WB-2 0-2		1415	1		X	
4		WB-2 2-4		1430	1		X	

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days ___ 10 Days ___ 15 Days _____ Other
Requested Due Date _____

Sample Disposal
[ ] Return to Client [X] Disposal by Lab [ ] Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Ryan Shye	Cedar Corp	5/09/13	1600	Sherri Scott	TA-CHI	5/11/13	0945
Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Relinquished By	Company	Date	Time	Received By	Company	Date	Time

Lab Courier:
Shipped: FedEx
Hand Delivered:

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments:

Lab Comments:

TAL-4124-500 (1209)

ANALYSES COMMONLY PERFORMED ON WCR SEDIMENT SAMPLES

	Suggested method	Expected detection (ug/g dry)
INORGANICS		
Arsenic	EPA 6010 or 7060	5
Cadmium	EPA 7131	0.6
Chromium (total)	EPA 6010 or 7191	10
Copper	EPA 6010 or 7211	5
Iron	EPA 6010	9
Lead	EPA 6010 or 7421	10
Manganese	EPA 6010	5
Mercury	EPA 7471	0.1
Nickel	EPA 6010	5
Zinc	EPA 6010 or 7951	10
Phosphorus		
Ammonia Nitrogen		
Total volatile solids		
Total Kjeldahl Nitrogen		
Particle size (i.e. % sand, silt, clay)	SIEVE & HYDROMETER	
ORGANICS		
		0.01
		0.01
		0.01
		0.05
		0.01
		0.01
		0.01
		0.01
		0.01
		0.01
Total organic carbon	EPA 9060	
PAHs (including the following)	EPA 8310	
Acenaphthylene	Chrysene	
Athracene	Dibenzo(ah)anthracene	
Benzo(a)anthracene	Fluorene	
Benzo(a)pyrene	Fluoranthene	
Benzo(b)fluoranthene	Indeno(1,2,3-cd)pyrene	
Benzo(e)pyrene	Naphthalene	
Benzo(ghi)perylene	Phenanthrene	
Benzo(k)fluoranthene	Pyrene	

Sediment Quality Guideline Screening Concentrations and Associated Risk Descriptors Derived For PAHs From the WDNR (2003) Consensus-Based Sediment Quality Guidelines to Protect Benthic Macroinvertebrates.

PAHs	ug/kg @ 1% TOC dry wt						
	≤ TEC	TEC	> TEC ≤ MEC	MEC	> MEC ≤ PEC	PEC	> PEC
Concern Level	Concern Level		Concern Level 2		Concern Level 3		Concern Level 4
Effect Description	≤ Threshold Effect Concentration No or Limited Adverse Effects		As concentrations increase between TEC and PEC, it is assumed incidences of toxicity (adverse impacts to growth, reproduction, and survival)) also increase. More organisms impacted by chronic toxicity. Acute effects to sensitive organisms may be expected in upper parts of this range				≥ Upper Effect Concentration Probable Adverse Effects to Survival, Growth, and Reproduction
Risk Category Description	No Risk or Some Possible Limited Risk		Some Possible Risk		Some Probable Risk		Probable Risk
LMW PAHs							
Naphthalene	←	176	↔	307	↔	536	→
Anthracene	←	57.2	↔	451	↔	845	→
Acenaphthalene	←	6.7	↔	48	↔	89	→
Acenaphthylene	←	5.9	↔	67	↔	128	→
Fluorene	←	77.4	↔	307	↔	536	→
Phenanthrene	←	204	↔	687	↔	1,170	→
HMW PAHs							
Benzo(a) anthracene	←	108	↔	579	↔	1,050	→
Benzo(a)pyrene	←	150	↔	800	↔	1,450	→
Benzo(b) fluoranthene	←	240	↔	6,820	↔	13,490	→
Benzo (g,h,i)perylene	←	170	↔	1,685	↔	3,200	→
Benzo(k) fluoranthene	←	240	↔	6,820	↔	13,400	→
Chrysene	←	166	↔	728	↔	1,290	→
Dibenzo(a,h) anthracene	←	33	↔	84	↔	135	→
Fluoranthene	←	423	↔	1,327	↔	2,230	→
Indeno(1,2,3cd) pyrene	←	200	↔	1,700	↔	3,200	→
Pyrene	←	195	↔	858	↔	1,520	→
Total PAHs	←	1,610	↔	12,205	↔	22,800	→

22.

minimum method detection level for PAH

TestAmerica Chicago
2417 Bond Street
University Park, IL 60484
Phone (708) 534-5200 Fax (708) 534-5211

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Fredrick, Sandie	Carrier Tracking No(s):	COC No. 500-34853.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: sandie.fredrick@testamericainc.com		Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.				Job #: 500-56913-1
Address: 30 Community Drive, Suite 11.	Due Date Requested: 5/23/2013			
City: South Burlington	TAT Requested (days):			
State, Zip: VT, 05403				
Phone: 802-660-1990(Tel)	PO #:			
Email:	WO #:			
Project Name: City of Menomonie - Wolske Bay	Project #: 50007046			
Site:	SSOW#:			

Analysis Requested

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	D422/ (MOD) % Passing Routine List	D422/ Routine List	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
WB-1 0-2 (500-56913-1)	5/9/13	13:30 Central		Solid			X	X	1	
WB-1 2-4 (500-56913-2)	5/9/13	14:45 Central		Solid			X	X	1	
WB-2 0-2 (500-56913-3)	5/9/13	14:15 Central		Solid			X	X	1	
WB-2 2-4 (500-56913-4)	5/9/13	14:30 Central		Solid			X	X	1	

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

500-56913 Chain of Custody

Possible Hazard Identification
Unconfirmed

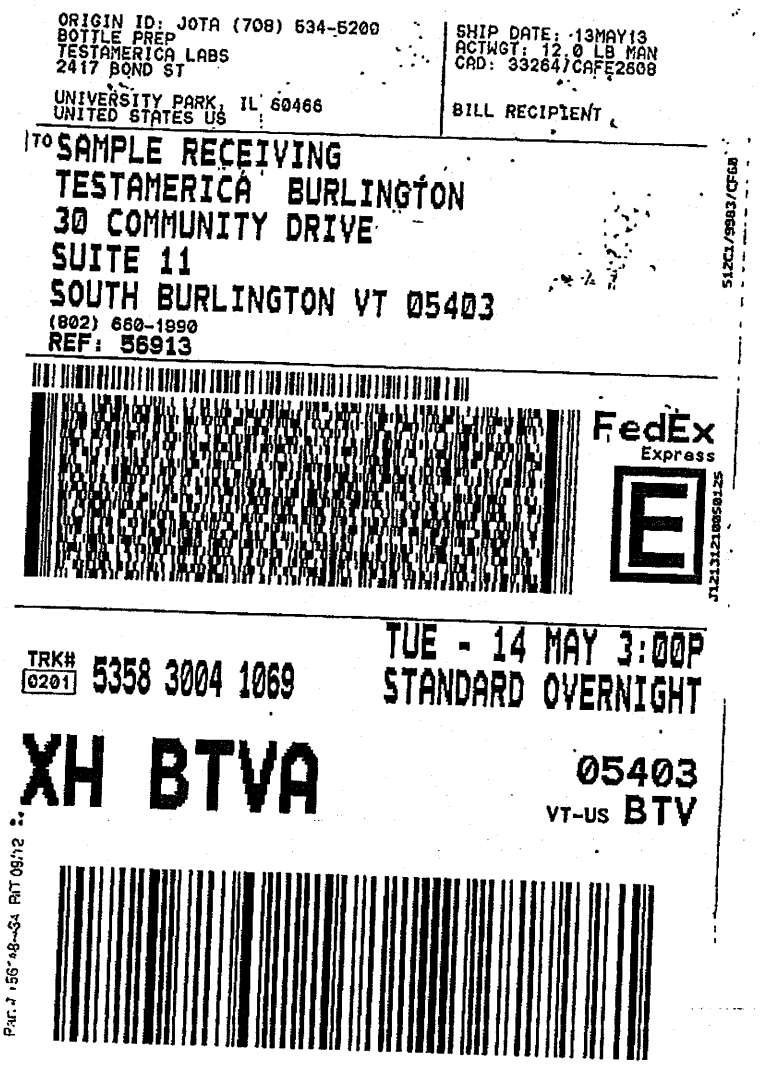
Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
[signature]	5/13/13 1400	TA-CHI	[signature]	5/14/13 1015	TAIBVA
Relinquished by	Date/Time	Company	Received by	Date/Time	Company
Relinquished by	Date/Time	Company	Received by	Date/Time	Company


ORIGIN ID: JOTA (708) 534-5200
BOTTLE PREP
TESTAMERICA LABS
2417 BOND ST
UNIVERSITY PARK, IL 60466
UNITED STATES US
SHIP DATE: 13MAY13
ACTWGT: 12.0 LB MAN
CAD: 33264/CAFE2608
BILL RECIPIENT
TO SAMPLE RECEIVING
TESTAMERICA BURLINGTON
30 COMMUNITY DRIVE
SUITE 11
SOUTH BURLINGTON VT 05403
(802) 660-1990
REF: 56913
FedEx
Express
TRK# 0201 5358 3004 1069
TUE - 14 MAY 3:00P
STANDARD OVERNIGHT
XH BTVA
05403
VT-US BTV

Login Sample Receipt Checklist

Client: Cedar Corporation

Job Number: 500-56913-1

Login Number: 56913
List Number: 1
Creator: Scott, Sherri L

List Source: TestAmerica Chicago

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	0.8
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

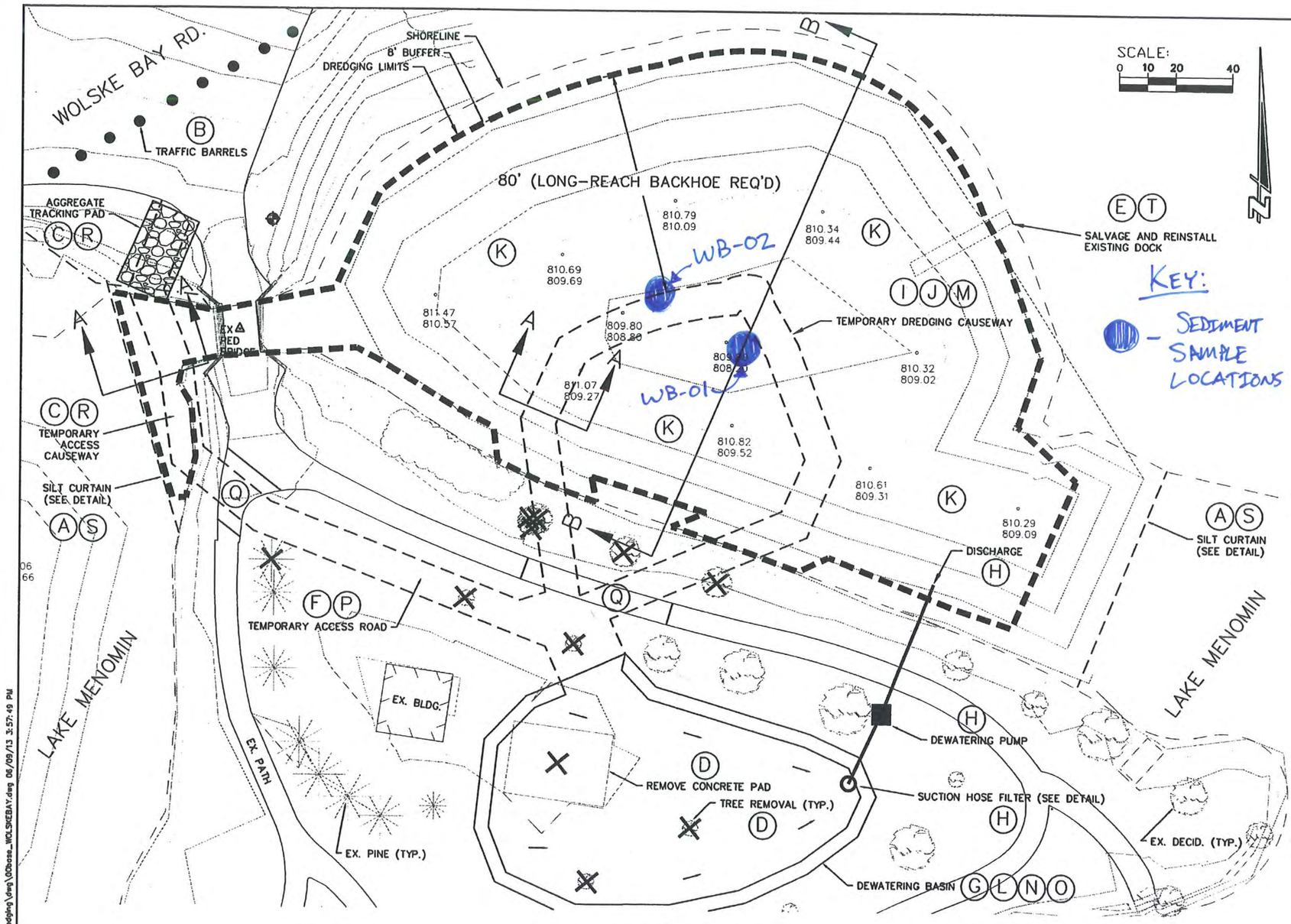
Client: Cedar Corporation

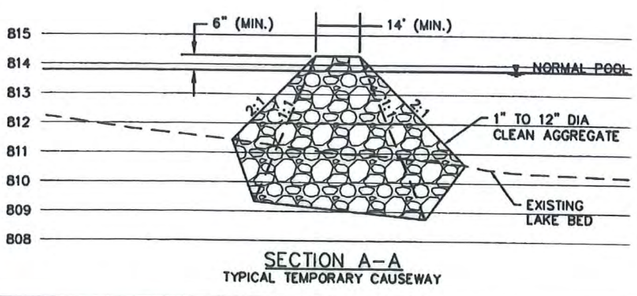
Job Number: 500-56913-1

Login Number: 56913
List Number: 1
Creator: Marion, Greg T

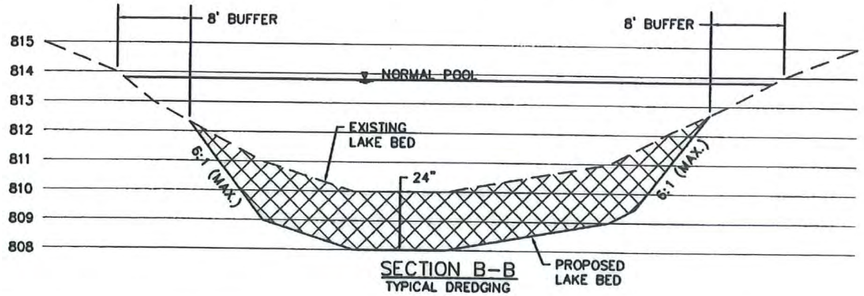
List Source: TestAmerica Burlington
List Creation: 05/14/13 01:45 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	True	659958
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	3.0°C IR GUN ID 181/CF=0
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	N/A	
Residual Chlorine Checked.	N/A	





SECTION A-A
TYPICAL TEMPORARY CAUSEWAY



SECTION B-B
TYPICAL DREDGING

DREDGE SITE NOTES:

A. CONTRACTOR SHALL INSTALL AND MAINTAIN SILT CURTAINS WITH NAVIGATIONAL WARNING BOUYS.
B. CONTRACTOR SHALL INSTALL AND MAINTAIN TRAFFIC CONTROL.
C. CONTRACTOR SHALL CONSTRUCT AGGREGATE TRACKING PAD AND TEMPORARY ACCESS CAUSEWAY (PEDESTRIAN BRIDGE CANNOT SUPPORT CONSTRUCTION TRAFFIC). WILL REQUIRE REMOVAL OF BOTTOM MUCK WITHIN 1:1 SLOPE (HAUL MUCK DIRECTLY TO DISPOSAL SITE).
D. CONTRACTOR SHALL REMOVE TREES AND CONCRETE PAD DESIGNATED FOR REMOVAL.
E. CONTRACTOR SHALL SALVAGE PRIVATE DOCK.
F. CONTRACTOR SHALL STRIP TOPSOIL AND CONSTRUCT TEMPORARY ACCESS ROAD.
G. CONTRACTOR SHALL STRIP TOPSOIL AND CONSTRUCT BERM AT PERIMETER OF DEWATERING BASIN.
H. CONTRACTOR SHALL INSTALL, OPERATE AND MAINTAIN SUCTION HOSE FILTER, SUCTION HOSE, DEWATERING PUMP AND DISCHARGE HOSE. DISCHARGE SHALL BE DIRECTED BACK INTO DREDGING AREA.
I. CONTRACTOR SHALL DREDGE AREA UNDER PROPOSED TEMPORARY DREDGING CAUSEWAY WITH A LONG-REACH BACKHOE. DREDGED MATERIAL SHALL BE PLACED IN DEWATERING BASIN.
J. CONTRACTOR SHALL CONSTRUCT TEMPORARY DREDGING CAUSEWAY.
K. CONTRACTOR SHALL DREDGE REMAINING DREDGING AREA WITH A LONG-REACH BACKHOE. DREDGED MATERIAL SHALL BE PLACED IN DEWATERING BASIN.
L. CONTRACTOR SHALL WORK DREDGED MATERIAL WITHIN THE DEWATERING BASIN AND MAINTAIN DRAINAGE CHANNELS TO SUCTION HOSE FILTER TO MAXIMIZE DRYING.
M. UPON COMPLETION OF DREDGING OPERATIONS, CONTRACTOR SHALL REMOVE TEMPORARY DREDGING CAUSEWAY.
N. AFTER DRYING, CITY WILL LOADOUT, HAUL AND PLACE DREDGED MATERIAL AT DISPOSAL SITE (SEE SHEETS 2 AND 3).
O. UPON COMPLETION OF LOADOUT, CONTRACTOR SHALL REGRADE, TOPSOIL AND SEED/MULCH/FERTILIZE DEWATERING BASIN.
P. CONTRACTOR SHALL REMOVE TEMPORARY ACCESS ROAD, RESPREAD TOPSOIL AND SEED/MULCH/FERTILIZE.
Q. PRIOR TO REMOVAL OF TEMPORARY ACCESS CAUSEWAY, CITY WILL REPAIR ASPHALT PATHS.
R. CONTRACTOR SHALL REMOVE TEMPORARY ACCESS CAUSEWAY AND AGGREGATE TRACKING PAD AND RESTORE ALL UPLAND AREAS WITH SEED/MULCH/FERTILIZE.
S. AFTER WATER WITHIN THE DREDGING AREA HAS FALLEN BELOW 80 mg/L TOTAL SUSPENDED SOLIDS, CONTRACTOR SHALL REMOVE SILT CURTAIN.
T. CONTRACTOR SHALL REINSTALL PRIVATE DOCK.

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CITY OF MENOMONIE
WOLSKE BAY DREDGING
DREDGE SITE
MENOMONIE, DUNN COUNTY, WISCONSIN

SHEET NO. 1 OF 3