Leeper Park Duck Pond Water Sampling

City of South Bend, St. Joseph County, Indiana

Cardno
Shaping the Future

Document Information

Prepared for	City of South Bend_South Bend Venues Parks and Arts
Project Name	Leeper Park Duck Pond Water Sampling
Project Number	J176356000
Project Manager	Tom Estrem
Date	June 23, 2017

Prepared for:

South Bend Venues Parks and Arts

321 E. Walter Street
South Bend, IN 46614

Prepared by:

708 Roosevelt Road
Walkerton, Indiana 46574

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1 Introduction

1.1 Project Description

Cardno was contracted by the South Bend Venus Parks and Arts to complete water sampling within the duck pond "pond" at Leeper Park in South Bend, Indiana. The purpose of the sampling was to gather baseline water quality data on chemical, physical and bacterial conditions of the existing pond. This report describes the field methods completed to collect the water samples and the results of the water samples collected. General comments on how the sampled water quality parameters relate to existing Indiana State water quality standards and functioning natural ecosystems is presented.

1.2 Site Description

The Leeper Park duck pond is located to the south of Riverside Drive, in between North Michigan Street and North Lafayette Boulevard (Figure 1). The pond has a surface area of approximately 0.8 acres and is a man-made structure with concrete and gravel surrounding the perimeter of the pond. A functioning water feature is located near the center of the pond.

Figure 1. Water sampling locations at Leeper Park Duck Pond, St. Joseph County, Indiana.

2 Methods

2.1 Water Sampling

Cardno completed the water sampling effort on June 14th, 2017 at approximately 11 am. The weather conditions at the time of sampling were sunny skies and approximately 80 degrees Fahrenheit (F). Water samples were collected from two locations in the pond (Figure 1). Site 1 was located on the eastside of the pond and taken from the northside of the foot bridge that provides access to the island. Site 2 was located near the middle of the pond and collected from the westside of the island. The two sampling locations were selected based on their orientation to the existing water feature in the pond. The sampling plan wanted to determine if water quality changed further away from the water feature. Site 1 is suggested to receive less impact from water circulation/disturbance caused by the water feature while Site 2 should be representative of water quality impacted directly by the water feature.

At each sampling location the following parameters were collected: temperature, dissolved oxygen, pH, conductivity, turbidity and a grab water sample collected for laboratory analysis of nutrients and bacteria. Laboratory analysis completed from water grab samples included, ammonia, nitrate+nitrite, total phosphorous, orthophosphate (dissolved phosphorous), total Kjeldahl nitrogen (TKN), total suspended solids (TSS) and *E. coli*. Representative photos were taken at each sampling location (Figure 2; Figure 3). Water samples were brought to Element Materials Technology lab in South Bend immediately following collection for analysis.

Element Materials Technology completed laboratory analysis for all nutrient and bacteria parameters. Conductivity and pH was measured using a Hanna Instruments HI98129 pH/conductivity meter. Turbidity was measured using a Hach 2100Q Portable Turbidity meter. Temperature and dissolved oxygen was measured using a Hach HQ40D meter with LDO D.O. probe.

Figure 2. Representative photo at sampling Site 1.

Figure 3. Representative photo at sampling Site 2.

3 Results

Results of the water sampling at Site 1 and Site 2 are presented below in Table 1 and indicate the two sites exhibit the same water quality across all nutrient, bacterial and physical parameters. Laboratory analytical reports can be found in Appendix A.

Table 1. Leeper Park Duck Pond Site 1 and Site 2 water sampling results.

Leeper Park Duck Pond Water Samples: Collected 06/14/2017		
Parameter	**Site 1**	**Site 2**
Temperature (°F)	78.6	79.1
Dissolved Oxygen (mg/L)	7.65	8.68
pH	8.6	8.72
Conductivity (µS/cm)	1,458	1,010
Turbidity (NTU)	33.1	29.1
Ammonia NH3-N (mg/L)	<0.10	<0.10
Nitrate+Nitrite NO3-N + NO2-N (mg/L)	<0.10	<0.10
Orthophosphate PO4-P (mg/L)	0.89	0.88
Total Phosphorous (mg/L)	1.16	1.19
Total Kjeldahl Nitrogen (mg/L)	3.02	3.12
Total Suspended Solids (mg/L)	35	41
E. coli (mpn/100 mL)	>2,420	>2,420

3.1 Physical Parameters

Water temperature was similar to that of the surrounding air temperature which is common in shallow pond environments. The water depth at Site 1 and Site 2 was between 2.5 feet and 3 .0 feet deep. Water temperature at the time of sampling did not exceed the June monthly Indiana state standard of 87 °F (Indiana Administrative Code: 327 IAC 2-1-6). Dissolved oxygen levels were satisfactory and above the Indiana State minimum of 4.0 mg/L. Dissolved oxygen levels varied between 7.65 mg/L and 8.68 mg/L at Site 1 and Site 2, respectively. The measured pH values varied between 8.6 and 8.72, at Site 1 and Site 2 respectively and fell between the acceptable range of 6.0 and 9.0 as outlined in the Indiana State water quality standards. Turbidity was measured at 33.1 NTU at Site 1 and 29.1 NTU at Site 2, which is above the target level of 10.4 NTU recommended by the U.S. EPA. Indiana does not have a State standard for turbidity.

3.2 Chemical Parameters

Ammonia concentrations at both Site 1 and Site 2 were below the laboratory detection limit of 0.10 mg/L and below the Indiana State water quality standard as outlined in 327 IAC 2-1-6. The state maximum ammonia concentration is variable depending on water temperature and pH and would be set at 0.2137 mg/L considering the measured temperature and pH at the time of sampling. Nitrate+Nitrite concentrations at both Site 1 and Site 2 were below the laboratory detection limit of 0.10 mg/L and below the State standard of 10 mg/L. Total phosphorous concentrations which include dissolved and particulate forms of phosphorous were measured at 1.16 mg/L and 1.19 mg/L, at Site 1 and Site 2, respectively. Orthophosphate which is the dissolved form of phosphorus and included in total phosphorous concentration was measured at 0.89 mg/L and 0.88 mg/L at Site 1 and Site 2, respectively. Phosphorous analysis indicates the most abundant form of phosphorus in the pond is orthophosphate. While Indiana does not have a state standard for total phosphorous or orthophosphate, the Indiana Department of Environmental Management (IDEM) does list a water body as impaired if total phosphorous concentrations exceed 0.3 mg/L. Total Kjeldahl Nitrogen (TKN) is the amount of organic nitrogen and ammonia nitrogen. Indiana does not have a state standard for TKN but the U.S. EPA recommends TKN concentrations be below 0.591 mg/L. TKN measured at Site 1 and Site 2 exceeded the EPA recommendation with a measured concentration of just over 3 mg/L at both sites. Total suspended solids (TSS), are solids that can be trapped by a filter and can include particles such as silt, plant material, animal matter etc. TSS concentrations in the pond were between 35 mg/L and 41 mg/L. Indiana does not have a state standard for TSS. *E. coli* concentrations exceed the Indiana state standard of 235 mpn/100 mL at both Site 1 and Site 2, with both concentrations reported at >2,420 mpn/100mL. MPN stands for “most probable number.”

4 Discussion

Analysis of the two water sampling locations indicate water quality parameters are comparable throughout the area of the pond. Water quality parameters which were found to be within satisfactory levels or concentrations include, dissolved oxygen, pH, ammonia and nitrate-nitrite. The only sampled parameter which exceeded state water quality standards for surface water, as outlined in the Indiana Administrative Code 327 IAC 2-1-6 was *E. coli*. The state standard for *E. coli* is 235 mpn/100mL and the reported value at both sampling sites was >2,420 mpn/100mL. Phosphorous levels were high in the pond and exceeded IDEM's target maximum concentration of 0.3 mg/L. While Indiana does not have a state total phosphorous standard, IDEM does list waterbodies as "impaired" when concentrations exceed 0.3 mg/L. Water temperature at the time of sampling did not exceed the June state standard of 87°F; however, water temperature could likely be exceeded if air temperatures exceed 87°F due to the shallow water depth of the pond. Overall the pond is suitable for habitation by aquatic fauna due to suitable pH and dissolved oxygen levels, but variably high water temperatures and excess nutrient levels would limit use to only very tolerate species.

Leeper Park Duck Pond Water Sampling –
South Bend, St. Joseph County, Indiana

APPENDIX A

LABORATORY ANALYTICAL REPORTS

Element Materials Technology - Fort Wayne
328 Ley Rd.
Fort Wayne, IN 46825
TEL: (260) 424-1622 FAX: (260) 424-9124
Website: www.element.com

June 20, 2017

Mr. Tom Estrem
Cardno JF New
708 Roosevelt Road
Walkerton, IN 46574
TEL: (574) 586-3400
FAX: (574) 586-3446

RE: Site 1 & Site 2 Order No.: 17061743

Dear Mr. Tom Estrem:

Element Materials Technology - Fort Wayne received 2 sample(s) on 6/14/2017 for the analyses presented in the following report.

In accordance with your instructions, Element Materials Technology Indiana conducted the analysis shown on the following pages on samples submitted by your company. The results relate only to the items tested. Unless otherwise noted, all analysis was conducted using approved methodologies from EPA, SM, or other client-specified methods. All relevant sampling information is on the attached chain-of-custody form. The initials SUB as the analyst designate any testing sub-contracted by Element Materials Technology Indiana.

This report shall not be reproduced except in full, without the written approval of the laboratory.

If you have any questions regarding these test results, please feel free to call.

Sincerely,

Serena Shane

Serena Shane
Project Manager
328 Ley Rd.
Fort Wayne, IN 46825

Element Materials Technology - Fort Wayne
328 Ley Rd.
Fort Wayne, IN 46825
TEL: (260) 424-1622 FAX: (260) 424-9124
Website: www.element.com

Analytical Report

(continuous)

WO#: **17061743**

Date Reported **6/20/2017**

CLIENT: Cardno JF New **Lab Order:** 17061743

Project: Site 1 & Site 2

Lab ID: 17061743-001 **Collection Date:** 6/14/2017 11:08:00 AM

Client Sample ID: Site 1 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
AMMONIA AS N				**E350.1**		Analyst: **CRT**
Nitrogen, Ammonia (As N)	< 0.100	0.100		mg/L	1	6/16/2017 5:43:00 AM
NITRATE/NITRITE				**E353.2**		Analyst: **AJE**
Nitrogen, Nitrate-Nitrite	< 0.10	0.10		mg/L	1	6/15/2017 2:14:44 PM
ORTHOPHOSPHATE (PO4) AS P IN WATER				**M4500-P E**		Analyst: **LER**
Ortho-Phosphate, Soluble	0.89	0.02		mg/L	1	6/15/2017 5:15:00 PM
TOTAL PHOSPHORUS				**M4500-P F**		Analyst: **LER**
Total Phosphorus	1.16	0.200		mg/L	1	6/19/2017 10:30:00 AM
TOTAL KJELDAHL NITROGEN IN WW				**E351.2**		Analyst: **LER**
Nitrogen, Kjeldahl, Total	3.02	0.50		mg/L	1	6/16/2017 12:10:00 PM
TOTAL SUSPENDED SOLIDS				**M2540 D**		Analyst: **JXF**
Suspended Solids (Residue, Non-Filterable)	35	8		mg/L	1	6/15/2017 6:33:00 PM
E COLI BACTERIA BY MPN				**M9223B**		Analyst: **DXS**
E. Coli Bacteria	>2420	1.0		MPN/100ml	1	6/14/2017 2:40:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected at the Reporting Limit	PL	Permit Limit
PQL	Practical Quantitation Limit	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

Element Materials Technology - Fort Wayne
328 Ley Rd.
Fort Wayne, IN 46825
TEL: (260) 424-1622 FAX: (260) 424-9124
Website: www.element.com

Analytical Report

(continuous)

WO#: **17061743**

Date Reported **6/20/2017**

CLIENT: Cardno JF New **Lab Order:** 17061743

Project: Site 1 & Site 2

Lab ID: 17061743-002 **Collection Date:** 6/14/2017 11:20:00 AM

Client Sample ID: Site 2 **Matrix:** AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
AMMONIA AS N				**E350.1**		Analyst: **CRT**
Nitrogen, Ammonia (As N)	< 0.100	0.100		mg/L	1	6/16/2017 5:43:00 AM
NITRATE/NITRITE				**E353.2**		Analyst: **AJE**
Nitrogen, Nitrate-Nitrite	< 0.10	0.10		mg/L	1	6/15/2017 2:14:44 PM
ORTHOPHOSPHATE (PO4) AS P IN WATER				**M4500-P E**		Analyst: **LER**
Ortho-Phosphate, Soluble	0.88	0.02		mg/L	1	6/15/2017 5:15:00 PM
TOTAL PHOSPHORUS				**M4500-P F**		Analyst: **LER**
Total Phosphorus	1.19	0.200		mg/L	1	6/19/2017 10:30:00 AM
TOTAL KJELDAHL NITROGEN IN WW				**E351.2**		Analyst: **LER**
Nitrogen, Kjeldahl, Total	3.12	0.50		mg/L	1	6/16/2017 12:10:00 PM
TOTAL SUSPENDED SOLIDS				**M2540 D**		Analyst: **JXF**
Suspended Solids (Residue, Non-Filterable)	41	8		mg/L	1	6/15/2017 6:33:00 PM
E COLI BACTERIA BY MPN				**M9223B**		Analyst: **DXS**
E. Coli Bacteria	>2420	1.0		MPN/100ml	1	6/14/2017 2:40:00 PM

Qualifiers:

H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
ND	Not Detected at the Reporting Limit	PL	Permit Limit
PQL	Practical Quantitation Limit	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

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Chain of Custody

Laboratory Number: 1706-1743

Client Information:	Billing Information:	PO Number:	Project Name/Number:	Page of
Company Name: Cardno				**Matrix Code**
Contact Name: Tom Estrem		Quote Number:		DW = Drinking Water
Address:			Sampler's Signature	WW = Waste Water
		Required QC Level	Tom Estrem	GW = Ground Water
City, State Zip:				AQ = Aqueous
Phone Number: Ext:	Ext:	Bill Monthly	Shipping Method:	OT = Other
Fax Number:		☐Yes	UPS / FedEx / NOW	SL = Sludge SOL = Solid
E-mail Address:		☐No	DHL / Element / Hand / Mail	O = Oil SO = Soil
				F = Food SW = Swab
				NG = Natural Gas
				NGL = Natural Gas Liquid
				PW = Produced Water
				CF = Completion Fluid

Which Regulations Apply:
☐RCRA ☐Drinking Water
☐POTW ☐Distribution
☐NPDES ☐Special
☐USDA/FDA ☐State
☐RECAP/RISC ☐Other

Turn Time
☐Standard
RUSH
☐1 Day
☐2 Day
☐Other
(Rush turn times will incur a surcharge and must be pre-approved by lab.)

Sample ID/Description	Collection Information: Date	Time	Grab / Composite	Matrix	Container: Quantity	Container: Type P=Plastic, G=Glass, V=Vial	Pres.: HCl, HNO_3, H_2SO_4, NaOH, $Na_2S_2O_3$	Requested Tests: E. Coli	Soluble-Ortho Phos	T. Phos, NH_3	TKN, NO_3-NO_2	TSS	Comments
Site 1	6.14.17	11:08	G	Aq	1	P	$Na_2S_2O_3$	X					* H_2SO_4 preserved @ lab upon receipt
							None		X				
							*H_2SO_4			X	X		
							None					X	SAMPLE ACCEPTED AS RECEIVED
Site 2		11:20					$Na_2S_2O_3$	X					
							None		X				
							*H_2SO_4			X	X		
							None					X	

	Relinquished by	Date/Time	Received by	Date/Time
1	X Tom Estrem	6.14.17 11:55	S. Shen	6.14.17 11:55
2				
3				

Field Notes:

Received at lab on ice?
☒Yes ☐No Temp: 22°C

All samples submitted to Element Materials Technology for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples. Element Materials Technology reserves the right to return unused sample portions.

9301 Innovation Drive, Suite 115, Daleville, IN 47334-0569 USA, P 765-378-4103, F 765-378-4109
629 Washington St. Suite 300, Columbus, IN 47201-6231 USA, P 812-375-0531, F 812-375-0731
2121 East Washington Boulevard, Fort Wayne, IN 46803-1328 USA, P 260-471-7000, F 260-471-7777
909 Executive Dr, Warsaw, IN 46580-2368 USA, P 574-267-3305, F 574-269-6569
3371 Cleveland Road, Suite 100A, South Bend, IN 46628-9780 USA, P 574-277-0707, F 574-273-5699
2417 W. Pinhook Rd, Lafayette, LA 70508-3344 USA, P 337-235-0483, F 337-233-6540

element™ materials technology

CHAIN OF CUSTODY RECORD

Omega COCID 93641 | PAGE: 1 | OF: 1

ADDRESS

Element Materials Technology - Daleville
9301 Innovation Drive
Daleville, IN 47334
TEL: (765) 378-4103
FAX: (765) 378-4109
Website: www.element.com

Lab ID: **FTW01**	Lab Name: **Element Materials Technology**
ADDRESS: **328 Ley Rd.**	
CITY, STATE, ZIP: **Fort Wayne, IN 46825**	
PHONE: **(260) 424-1622** FAX: **(260) 424-9124** EMAIL:	
ACCOUNT #:	

SPECIAL INSTRUCTIONS / COMMENTS:
CARDNO----SOUTH BEND--DUE 6/21

ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.
1	17061743-001B	Site 1	250HDPE	Aqueous	6/14/2017 11:08:00 AM	1	please filter me W43
	ORTH_P_SOL_FW						
2	17061743-001C	Site 1	500HDPEH2SO4	Aqueous	6/14/2017 11:08:00 AM	1	W43
	NH3_FW, NO3_2, T_PHOS, TKN_WW						
3	17061743-001D	Site 1	1LHDPE	Aqueous	6/14/2017 11:08:00 AM	1	W43
	TSS_FW						
4	17061743-002B	Site 2	250HDPE	Aqueous	6/14/2017 11:20:00 AM	1	please filter me W43
	ORTH_P_SOL_FW						
5	17061743-002C	Site 2	500HDPEH2SO4	Aqueous	6/14/2017 11:20:00 AM	1	W43
	NH3_FW, NO3_2, T_PHOS, TKN_WW						
6	17061743-002D	Site 2	1LHDPE	Aqueous	6/14/2017 11:20:00 AM	1	W43
	TSS_FW						

Shipping Method: (circle)

(NOW) / UPS / Fed Ex

Relinquished By: Serena Shane	Date: 6/14/2017	Time: 12:06 PM	Received By:	Date: 6/14/17	Time: 1558
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

TAT: Standard ☐ **RUSH** Next BD ☐ 2nd BD ☐ 3rd BD ☐

Note: RUSH requests will incur surcharges!

REPORT TRANSMITTAL DESIRED:

☐ HARDCOPY (extra cost) ☐ FAX ☐ EMAIL ☐ ONLINE

FOR LAB USE ONLY

Temp of samples 6 °C Attempt to Cool? Yes

Comments: