Illinois Environmental Protection Agency

Bureau of Water • 1021 N. Grand Avenue E. • P.O. Box 19276 • Springfield • Illinois • 62794-9276

Division of Water Pollution Control
ANNUAL FACILITY INSPECTION REPORT
for NPDES Permit for Storm Water Discharges from Separate Storm Sewer Systems (MS4)

This fillable form may be completed online, a copy saved locally, printed and signed before it is submitted to the Compliance Assurance Section at the above address. Complete each section of this report.

Report Period: From March, 2014 To March, 2015

Permit No. ILR40 0303

MS4 OPERATOR INFORMATION: (As it appears on the current permit)

Name: Michael J. Reynolds Mailing Address 1: 51 Raupp Blvd.

Mailing Address 2: County: Cook & Lake

City: Buffalo Grove State: IL Zip: 60089 Telephone: 847-459-2547

Contact Person: Michael J. Reynolds Email Address: mreynolds@vbg.org
(Person responsible for Annual Report)

Name(s) of governmental entity(ies) in which MS4 is located: (As it appears on the current permit)

Village of Buffalo Grove

THE FOLLOWING ITEMS MUST BE ADDRESSED.

A. Changes to best management practices (check appropriate BMP change(s) and attach information regarding change(s) to BMP and measurable goals.)

1. Public Education and Outreach ☐
2. Public Participation/Involvement ☐
3. Illicit Discharge Detection & Elimination ☐
4. Construction Site Runoff Control ☐
5. Post-Construction Runoff Control ☐
6. Pollution Prevention/Good Housekeeping ☐

B. Attach the status of compliance with permit conditions, an assessment of the appropriateness of your identified best management practices and progress towards achieving the statutory goal of reducing the discharge of pollutants to the MEP, and your identified measurable goals for each of the minimum control measures.

C. Attach results of information collected and analyzed, including monitoring data, if any during the reporting period.

D. Attach a summary of the storm water activities you plan to undertake during the next reporting cycle (including an implementation schedule.)

E. Attach notice that you are relying on another government entity to satisfy some of your permit obligations (if applicable).

F. Attach a list of construction projects that your entity has paid for during the reporting period.

Any person who knowingly makes a false, fictitious, or fraudulent material statement, orally or in writing, to the Illinois EPA commits a Class 4 felony. A second or subsequent offense after conviction is a Class 3 felony. (415 ILCS 5/44(h))

Owner Signature: Date: 3-9-15

Michael J. Reynolds
Printed Name:

Director of Public Works
Title:

EMAIL COMPLETED FORM TO: epa.ms4annualinsp@illinois.gov

or Mail to: ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
WATER POLLUTION CONTROL
COMPLIANCE ASSURANCE SECTION #19
1021 NORTH GRAND AVENUE EAST
POST OFFICE BOX 19276
SPRINGFIELD, ILLINOIS 62794-9276

This Agency is authorized to require this information under Section 4 and Title X of the Environmental Protection Act (415 ILCS 5/4, 5/39). Failure to disclose this information may result in: a civil penalty of not to exceed $50,000 for the violation and an additional civil penalty of not to exceed $10,000 for each day during which the violation continues (415 ILCS 5/42) and may also prevent this form from being processed and could result in your application being denied. This form has been approved by the Forms Management Center.

IL 532 2585
WPC 691 Rev 6/10

Village of Buffalo Grove Annual Report to IEPA for period from March 2014 through February 2015 Related to General NPDES permit for discharge from small municipal separate storm sewer systems (General NPDES Permit No. ILR 400303)

I. SUMMARY

A review has been performed of the provisions of General NPDES Permit No. ILR400303 and the Notice of Intent for renewal of participation in the General NPDES Permit for Discharge from Small Municipal Separate Storm Sewer Systems (MS4) which was authorized for submittal by the Village of Buffalo Grove's Resolution No. 2009-27 (A Resolution Authorizing Submittal of a Notice of Intent for Renewal of a General Permit for Discharges from Small Municipal Separate Storm Sewer Systems). The review has not identified any items of non-compliance related to the Village of Buffalo Grove's various activities related to the provisions of General NPDES Permit No. ILR400303.

II. BACKGROUND

The Village of Buffalo Grove has a long history of responsible operation of the Village's storm water management system.

The continuation of the Village's established practices has served as the basis of the Village's activities related to complying with the provisions of General NPDES Permit No. ILR40.

III. SUMMARY OF THE COMPLETED 6th YEAR AND THE NEXT YEAR (7th YEAR) PLANNED STORMWATER ACTIVITIES RELATED TO NPDES PERMIT NO. ILR400303 AS ISSUED ON FEBRUARY 20, 2009 (EFFECTIVE ON APRIL 1, 2009 AND EXPIRING ON MARCH 31, 2014) (INCLUDING IMPLEMENTATION SCHEDULE)

Buffalo Grove's Resolution No. 2009-27 entitled "A Resolution Authorizing Submittal of a Notice of Intent for Renewal of a General Permit for Discharges from Small Municipal Separate Storm Sewer Systems (MS4)" and the "Notice of Intent Form (NOI)", established Buffalo Grove's measurable goals for each of the minimum control measures for the 1st, 2nd, 3rd, 4th, 5th and 6th years of the term of NPDES Permit No. ILR400303. Buffalo Grove's NOI denoted an annual implementation schedule of storm water activities which serve as the Village's

"milestones" for activities to be accomplished which are related to each BMP which has been identified related to each minimum control measure. Buffalo Grove Resolution No. 2009-27, 2013-09 and the corresponding NOI are incorporated hereto as Attachment No. 1.

This report has been prepared to address the attachment requirements of the following items of the "Illinois Environmental Protection Agency Annual Facility Inspection Report NPDES Permit for Storm Water Discharges from Municipal Separate Storm Sewer Systems (MS4)":

B – See Section V "Conclusion" of this report.

C – See Section IV "Summary of 6th Year Completed Activities and Results of Information Collected and Analyzed" of this report.

D – See Section III "Summary of the Completed 6th years and the next year (7th year) Planned Stormwater Activities related to NPDES Permit No. ILR400303 as issued on February 20, 2009 (effective on April 1, 2009 and expiring on March 31, 2014) (including Implementation Schedule) of this report.

E – Not Applicable

F – See Section IV "Summary of 6th Year Completed Activities and Results of Information Collected and Analyzed" of this report. (Particularly, see Section A.7 "List of Construction Projects which have been paid for by the Village of Buffalo Grove" of "Attachment No. 2" of this report.)

IV. Summary of 6th Year Completed Activities and Results of Information Collected and Analyzed

A summary of activities performed during the March 2014 through February 2015 period in addition to a summary of results of information collected and analyzed are provided as Attachment No. 2.

V. CONCLUSION

The Village of Buffalo Grove is in compliance with the conditions of General NPDES Permit No. ILR400303. The Village's identified Best Management Practices have been found to be appropriate and progress towards achieving the Village's identified measurable goals for each of the minimum control measures and the statutory goal of reducing the discharge of pollutants to the maximum extent practicable (MEP) has been effectively achieved.

TABLE OF ATTACHMENTS

Attachment Number	Title
1	Buffalo Grove Resolution No. 2009-27 and 2013-29 and their related NOI submittals.
2	Summary of 6th Year Activities and Results of Information Collected and Analyzed.
3	"2014 Water Quality Monitoring Results for NPDES Phase II Permit Requirements, Buffalo Grove, Lake & Cook Counties, Illinois (CBBEL Project No. 140488".)
4	Related Activities for Buffalo Grove
5	2014 Monitoring Report White Pine Channel restoration Stantec Consulting Services

ATTACHMENT NO. 1

Buffalo Grove Resolution No. 2009-27 and the Executed NOI Submittal
which Resolution No. 2009-27 authorized

AND

Buffalo Grove Resolution No. 2013-29 and Executed NOI Submittal
which Resolution No. 2013-29 authorized
(Issuance Pending)

RESOLUTION NO. 2009- 27

A RESOLUTION AUTHORIZING SUBMITTAL OF A NOTICE OF INTENT FOR RENEWAL OF A GENERAL PERMIT FOR DISCHARGES FROM SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4)

WHEREAS, the Illinois Environmental Protection Agency has notified the Village of Buffalo Grove that the Village is required to submit a Notice of Intent to renew its NPDES General Permit related to the Village's small municipal separate storm sewer systems (MS4s); and,

WHEREAS, the Village had discussed its strategy and approach to complying with the six (6) required categories of control measures at staff Integrated Management Team (IMT) meetings and also at public meetings of the Village Board; and,

WHEREAS, a "Notice of Intent for General Permit for Discharges from Small Municipal Separate Storm Sewer Systems" had been developed as a result of these meetings;

NOW, THEREFORE, BE IT RESOLVED BY THE VILLAGE PRESIDENT AND BOARD OF TRUSTEES OF THE VILLAGE OF BUFFALO GROVE, LAKE AND COOK COUNTIES, ILLINOIS, as follows:

Section 1. The Village Manager is authorized to execute the "Notice of Intent" form which has been compiled for submittal by the Village of Buffalo Grove to renew its MS4 (small municipal separate storm sewer systems) permit. A copy of said completed "Notice of Intent" form is attached hereto and made a part hereof.

AYES: 5 - Braiman, Glover, Berman, Trilling, Sussman
NAYES: 0 - None
ABSENT: 1 - Stone
PASSED: June 1, 2009
APPROVED: June 1, 2009

APPROVED:

Village President

ATTEST:

Village Clerk

G:\PWDIRGRP\LHC\npdes\res09.doc

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
NOTICE OF INTENT FOR NEW OR RENEWAL OF GENERAL PERMIT FOR DISCHARGES FROM SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s)

Input forms in Word format are available via email. terri.lemasters@illinois.gov or by calling the Permit Section at 217/782-0610 See address for mailing on page 4

For Office Use Only – Permit No. ILR40_____

Part I. General Information

1. MS4 Operator Name: Village of Buffalo Grove

2. MS4 Operator Mailing Address:
   Street- 51 Raupp Boulevard City- Buffalo Grove
   State- Illinois Zip Code- 60089

3. Operator Type: Village

4. Operator Status: Local

5. Name(s) of Governmental Entity(ies) in which MS4 is located: Village of Buffalo Grove

6. Area of land that drains to your MS4 (in square miles): Buffalo Grove = 9.2453

7. Latitude/Longitude at approximate geographical center of MS4 for which you are requesting authorization to discharge:
   Latitude: 42 (DEG.) 9 (MIN.) 7.96049 (SEC.) Longitude: 87 (DEG.) 57 (MIN) 58.98531 (SEC.)

8. Name(s) of known receiving waters: *Attach additional sheets (Attachment 1) as necessary*:

1.	Indian Creek	2.	Des Plaines River
3.	Aptakisic Creek	4.	McDonald Creek
5.	Buffalo Creek (including segment previously named Wheeling Drainage Ditch)	6.	
7.		8.	
9.		10.	

9. Persons Responsible for Implementation/Coordination of Storm Water Management Program:

Name	Title	Telephone No.	Area of Responsibility
Gregory P. Boysen, P.E.	Director of Public Works	847-459-2547	Infrastructure Management including Storm Sewer System (MS4)

Information required by this form must be provided to comply with 415 ILCS 5/39 (2000). Failure to do so may prevent this form from being processed and could result in your application being denied.

Part II. Best Management Practices (include shared responsibilities) which has been implemented in the MS4 area or proposed to be implemented

(Details of BMP implementation for each checked BMP number, e.g., A.1, E.2, is required in Part IV of this NOI.)

A. Public Education and Outreach
- ☒ A.1 Distributed Paper Material
- ☐ A.2 Speaking Engagement
- ☐ A.3 Public Service Announcement
- ☐ A.4 Community Event
- ☐ A.5 Classroom Education Material
- ☐ A.6 Other Public Education

B. Public Participation/Involvement
- ☐ B.1 Public Panel
- ☐ B.2 Educational Volunteer
- ☐ B.3 Stakeholder Meeting
- ☐ B.4 Public Hearing
- ☐ B.5 Volunteer Monitoring
- ☐ B.6 Program Coordination
- ☒ B.7 Other Public Involvement

C. Illicit Discharge Detection and Elimination
- ☒ C.1 Storm Sewer Map Preparation
- ☒ C.2 Regulatory Control Program
- ☒ C.3 Detection/Elimination Prioritization Plan
- ☒ C.4 Illicit Discharge Tracing Procedures
- ☒ C.5 Illicit Source Removal Procedures
- ☒ C.6 Program Evaluation and Assessment
- ☐ C.7 Visual Dry Weather Screening
- ☐ C.8 Pollutant Field Testing
- ☐ C.9 Public Notification
- ☐ C.10 Other Illicit Discharge Controls

D. Construction Site Runoff Control
- ☒ D.1 Regulatory Control Program
- ☒ D.2 Erosion and Sediment Control BMPs
- ☒ D.3 Other Waste Control Program
- ☒ D.4 Site Plan Review Procedures
- ☒ D.5 Public Information Handling Procedures
- ☒ D.6 Site Inspection/Enforcement Procedures
- ☐ D.7 Other Construction Site Runoff Controls

E. Post-Construction Runoff Control
- ☒ E.1 Community Control Strategy
- ☒ E.2 Regulatory Control Program
- ☒ E.3 Long Term O&M Procedures
- ☒ E.4 Pre-Const Review of BMP Designs
- ☒ E.5 Site Inspections During Construction
- ☒ E.6 Post-Construction Inspections
- ☐ E.7 Other Post-Const Runoff Controls

F. Pollution Prevention/Good Housekeeping
- ☒ F.1 Employee Training Program
- ☒ F.2 Inspection and Maintenance Program
- ☐ F.3 Muni Operations Storm Water Control
- ☒ F.4 Municipal Operations Waste Disposal
- ☐ F.5 Flood Management/Assess Guidelines
- ☐ F.6 Other Municipal Operations Controls

Information required by this form must be provided to comply with 415 ILCS 5/39 (2000). Failure to do so may prevent this form from being processed and could result in your application being denied.

Part III. Qualifying Local Programs

Attach additional sheets (Attachment 2) as necessary:

(Describe any qualifying local programs that your MS4 has implemented or will propose to implement)

1. **Public Education and Outreach:**

The Village of Buffalo Grove newsletter or handout materials will be used to annually provide information for the purpose of providing public education and outreach. Other methods will also be evaluated for use each year.

2. **Public Participation/Involvement:**

A public meeting or open house program will be used each year to provide public participation and involvement in the Village's surface water management program. Other public participation and involvement activities will also be evaluated for use each year.

3. **Illicit Discharge Detection and Elimination:**

The Village of Buffalo Grove has established a high quality suburban environment through adoption and enforcement of building and other codes which provide for polluted discharges to be properly routed to the sanitary sewer system for treatment. The Village's Municipal Code prohibits improper discharges and Village staff effectively follow up any observation of improper discharges of pollutants.

4. **Construction Site Runoff Control:**

The Village of Buffalo Grove has established construction site runoff control regulations which are enforced so as to accomplish control of construction site runoff.

5. **Post-Construction Runoff Control:**

The Village of Buffalo Grove provides for the long-term operation and maintenance of originally constructed items such as catch basins and sediment capturing features of ponds and detention basins.

6. **Pollution Prevention/Good Housekeeping:**

The Village of Buffalo Grove's ordinances and related enforcement activities provide for pollution prevention. Good housekeeping practices of the Village Public Works Department also serve to accomplish pollution prevention.

Part IV. Measurable Goals (include shared responsibilities) implemented by the MS4 in the past 5 years. Also, describe new goals proposed to be implemented by the MS4.
Attach additional sheets (Attachment 3) as necessary

(BMP No. should match that checked in Part II of this NOI. The applicant may repeat the same BMP No. where more than one BMP of similar type is to be implemented. Where necessary, attach additional sheets to provide more detail on each specific BMP.)

BMP No. A.1
Brief Description of BMP: The Village of Buffalo Grove newsletter or handout materials will be used to annually provide information for the purpose of providing public education and outreach.

Measurable Goal(s), including frequencies: Annual publication of newsletter articles or provision of handout material.

Milestones: Year 1: Publication of annual newsletter article or provision of handout material.
Year 2: Publication of annual newsletter article or provision of handout material.
Year 3: Publication of annual newsletter article or provision of handout material.
Year 4: Publication of annual newsletter article or provision of handout material.
Year 5: Publication of annual newsletter article or provision of handout material.

BMP No. B.7
Brief Description of BMP: A public meeting or open house will be used each year to provide public participation and involvement in the Village's surface water management program.

Measurable Goal(s), including frequencies: Use of an annual public meeting or open house providing for public participation.

Milestones: Year 1: Use of an annual public meeting or open house to accomplish participation/involvement in the Village's surface water management program.
Year 2: Use of an annual public meeting or open house to accomplish participation/involvement in the Village's surface water management program.
Year 3: Use of an annual public meeting or open house to accomplish participation/involvement in the Village's surface water management program.
Year 4: Use of an annual public meeting or open house to accomplish participation/involvement in the Village's surface water management program.
Year 5: Use of an annual public meeting or open house to accomplish participation/involvement in the Village's surface water management program.

BMP No. C.1
Brief Description of BMP: The Buffalo Grove storm sewer maps will continue to be maintained and updated as necessary.

Measurable Goal(s), including frequencies: Continue to perform the above described BMP and annually perform an evaluation of the practices identifying any modification needed to keep it effective.

Milestones: Year 1: Continue to maintain Buffalo Grove's storm sewer maps and update as needed.
Year 2: Continue to maintain Buffalo Grove's storm sewer maps and update as needed.
Year 3: Continue to maintain Buffalo Grove's storm sewer maps and update as needed.
Year 4: Continue to maintain Buffalo Grove's storm sewer maps and update as needed.
Year 5: Continue to maintain Buffalo Grove's storm sewer maps and update as needed.

BMP No. C.2
Brief Description of BMP: The Village of Buffalo Grove will continue to perform a regulatory control program related to illicit discharge detection and elimination.

Measurable Goal(s), including frequencies: Continue to perform the above described BMP and annually perform an evaluation of the practices identifying any modification needed to keep it effective.

Milestones: Year 1: An annual review of the effectiveness of the regulatory program will be performed by an IMT (Integrated Management Team) appointed by the Village Manager.
Year 2: An annual review of the effectiveness of the regulatory program will be performed by an IMT (Integrated Management Team) appointed by the Village Manager.
Year 3: An annual review of the effectiveness of the regulatory program will be performed by an IMT (Integrated Management Team) appointed by the Village Manger.
Year 4: An annual review of the effectiveness of the regulatory program will be performed by an IMT (Integrated Management Team) appointed by the Village Manager.
Year 5: An annual review of the effectiveness of the regulatory program will be performed by an IMT (Integrated Management Team) appointed by the Village Manager.

BMP No. C.3
Brief Description of BMP: An Integrated Management Team (IMT), appointed by the Village Manager, will establish a detection/elimination prioritization plan for illicit discharge as necessary and review and revise the prioritization plan annually to the extent necessary.

Measurable Goal(s), including frequencies: Continue goal of continuing to detect and eliminate all illicit discharges and annually review and revise a prioritization plan to accomplish this goal.

Milestones: Year 1: The IMT should review the need for a prioritization plan and establish a plan as needed.
Year 2: The IMT should review the prioritization plan and revise as needed.
Year 3: The IMT should review the prioritization plan and revise as needed.
Year 4: The IMT should review the prioritization plan and revise as needed.
Year 5: The IMT should review the prioritization plan and revise as needed.

BMP No. C.4, C.5 and C.6
Brief Description of BMP: The Village will continue to conduct illicit discharge tracing procedures (C.4) and illicit source removal procedures (C.5) as needed. A program evaluation and assessment (C.6) of the entire illicit discharge and detection and elimination program, including the illicit discharge tracing procedures and illicit source removal procedures, will be performed by the Integrated Management Team (IMT) appointed by the Village Manager.

Measurable Goal(s), including frequencies: Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modification needed to keep them effective.

Milestones: Year 1: An annual evaluation of the effectiveness of the program, including the illicit discharge tracing procedures and illicit source removal procedures, shall be performed by the IMT appointed by the Village Manager.
Year 2: An annual evaluation of the effectiveness of the program, including the illicit discharge tracing procedures and illicit source removal procedures, shall be performed by the IMT appointed by the Village Manager.

Year 3: An annual evaluation of the effectiveness of the program, including the illicit discharge tracing procedures and illicit source removal procedures, shall be performed by the IMT appointed by the Village Manager.

Year 4: An annual evaluation of the effectiveness of the program, including the illicit discharge tracing procedures and illicit source removal procedures, shall be performed by the IMT appointed by the Village Manager.

Year 5: An annual evaluation of the effectiveness of the program, including the illicit discharge tracing procedures and illicit source removal procedures, shall be performed by the IMT appointed by the Village Manager.

BMP No. D.1, D.2, D.3, D.4, D.5 and D.6

Brief Description of BMP: Construction site runoff control is accomplished in Buffalo Grove through the Village's regulations (D.1), which include requirements to accomplish erosion and sedimentation control BMP's (D.2), site plan review procedures (D.4) and site inspection and enforcement procedures (D.6). Other wastes which would leave the site, such as littering, are also prohibited (D.3). The Village also has procedures for handling information which is provided by the public (D.5).

Measurable Goal(s), including frequencies: Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modification needed to keep them effective.

Milestones: Year 1: An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 2: An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 3: An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 4: An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 5: An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

BMP No. E.1, E.2, E.3, E.4, E.5 and E.6

Brief Description of BMP: Buffalo Grove's control strategy is to continue its current post-construction runoff control practices (E.1). The Village intends to continue its current regulatory control program (E.2), long-term O & M procedures (E.3), pre-construction review of BMP designs which are developed to comply with Village regulations (E.4), inspections of construction sites (E.5) and post-construction inspections (E.6).

Measurable Goal(s), including frequencies: Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modification needed to keep them effective.

Milestones: Year 1: An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 2: An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 3: An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 4: An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 5: An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

BMP No. F.1, F.2 and F.4

Brief Description of BMP: The Village's pollution prevention and good housekeeping practices will continue, including employee training programs (F.1), the Public Works Department's inspection and maintenance program of the Village's MS4 (F.2) and the Village practice of waste disposal related to municipal operations, which comply with applicable legal regulations (F.4).

Measurable Goal(s), including frequencies: Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modification needed to keep them effective.

Milestones: Year 1: An annual evaluation of the performance of the Village's pollution prevention and related housekeeping activities shall be performed by an IMT appointed by the Village Manager.

Year 2: An annual evaluation of the performance of the Village's pollution prevention and related housekeeping activities shall be performed by an IMT appointed by the Village Manager.

Year 3: An annual evaluation of the performance of the Village's pollution prevention and related housekeeping activities shall be performed by an IMT appointed by the Village Manager.

Year 4: An annual evaluation of the performance of the Village's pollution prevention and related housekeeping activities shall be performed by an IMT appointed by the Village Manager.

Year 5: An annual evaluation of the performance of the Village's pollution prevention and related housekeeping activities shall be performed by an IMT appointed by the Village Manager.

Part V. Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for knowingly submitting false information, including the possibility of fine and imprisonment.

Authorized Representative Name and Title	Signature	Date
William H. Brimm, Village Manager	William H Brimm	6/1/09

Mail completed form to:

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF WATER POLLUTION CONTROL
ATTN: PERMIT SECTION
POST OFFICE BOX 19276
SPRINGFIELD, ILLINOIS 62794-9276

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RESOLUTION NO. 2013- 29

A RESOLUTION AUTHORIZING SUBMITTAL OF A NOTICE OF INTENT FOR RENEWAL OF A GENERAL PERMIT FOR DISCHARGES FROM SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4)

WHEREAS, the Illinois Environmental Protection Agency has notified the Village of Buffalo Grove that the Village is required to submit a Notice of Intent to renew its NPDES General Permit related to the Village's small municipal separate storm sewer systems (MS4s); and,

WHEREAS, the Village had discussed its strategy and approach to complying with the six (6) required categories of control measures at staff Integrated Management Team (IMT) meetings and also at public meetings of the Village Board; and,

WHEREAS, a "Notice of Intent for General Permit for Discharges from Small Municipal Separate Storm Sewer Systems" had been developed as a result of these meetings;

NOW, THEREFORE, BE IT RESOLVED BY THE VILLAGE PRESIDENT AND BOARD OF TRUSTEES OF THE VILLAGE OF BUFFALO GROVE, LAKE AND COOK COUNTIES, ILLINOIS, as follows:

Section 1. The Village Manager is authorized to execute the "Notice of Intent" form which has been compiled for submittal by the Village of Buffalo Grove to renew its MS4 (small municipal separate storm sewer systems) permit. A copy of said completed "Notice of Intent" form is attached hereto and made a part hereof.

AYES: 5- Berman, Trilling, Sussman, Terson, Stein
NAYES: 0- None
ABSENT: 1- Ottenheimer
PASSED: August 19, 2013
APPROVED: August 19, 2013

APPROVED:

Village President

ATTEST:

Village Clerk

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Illinois Environmental Protection Agency

Bureau of Water • 1021 North Grand Avenue East • P.O. Box 19276 • Springfield • Illinois • 62794-9276

Notice of Intent for New or Renewal of General Permit for Discharges from Small Municipal Separate Storm Sewer Systems - MS4's

Part I. General Information

1. MS 4 Operator Name: Village of Buffalo Grove
2. MS4 Mailing Address: 51 Raupp Boulevard

   City: Buffalo Grove State: IL
3. Operator Type: Village Other:
4. Operator Status: Local Other:
5. Name(s) of governmental entity(ies) in which MS4 is located:

   Village of Buffalo Grove
6. Area of land that drains to your MS4 in square miles: Buffalo Grove = 9.2453
7. Latitude and Longitude at approximate geographical center of MS4 for which you are requesting authorization to discharge:

   Latitude: 42 Degrees 9 Minutes: 7.98049 Seconds:

   Longitude: 87 Degrees: 57 Minutes: 58.985[redacted] Seconds:
8. Name(s) of known receiving waters

   Indian Creek
   Aptakisic Creek
   Buffalo Creek
   (including segment previously name Wheeling Drainage Ditch)
   Des Plaines River
   McDonald Creek

9. Persons responsible for implementation or coordination of Stormwater Management Program:

Name: Michael J. Reynolds Title: Director of Public Works Phone: 847-459-2547

Area of Responsibility: Infrastructure Management including Storm Sewer System (MS4)

Name: Title: Phone:

Area of Responsibility:

Part II. Best Management Practices (include shared responsibilities) which have been implemented or are proposed to be implemented in the MS4 area:

A. Public Education and Outreach

Qualifying Local Programs:

The Village of Buffalo Grove newsletter or handout materials will be used to annually provide information for the purpose of providing public education and outreach. Other methods will also be evaluated for use each year.

Measurable Goals (include shared responsibilities)

☒ A.1 Distributed Paper Material

Brief Description of BMP:

The Village of Buffalo Grove newsletter or handout materials will be used to annually provide information for the purpose of providing public education and outreach.

Measurable Goals, including frequencies:

Annual publication of newsletter articles or provision of handout materials.

Milestones:

Go to Additional Pages

Year 1:

Publication of annual newsletter article or provision of handout material.

Year 2:

Publication of annual newsletter article or provision of handout material.

Year 3:

Publication of annual newsletter article or provision of handout material.

Year 4:

Publication of annual newsletter article or provision of handout material.

Year 5:

Publication of annual newsletter article or provision of handout material.

☐ A.2 Speaking Engagement

☐ A.3 Public Service Announcement

☐ A.4 Community Event

☐ A.5 Classroom Education Material

☐ A.6 Other Public Education

B.Public Participation/Involvement

Measurable Goals (include shared responsibilities)

Qualifying Local Programs:

A public meeting or open house program will be used each year to provide public participation and involvement in the Village's surface water management program. Other public participation and involvement activities will also be evaluated for use each year.

- ☐ B.2 Educational Volunteer
- ☐ B.3 Stakeholder Meeting
- ☐ B.4 Public Hearing
- ☐ B.5 Volunteer Monitoring
- ☐ B.6. Program Involvement
- ☒ B.7 Other Public Involvement (You may need to go to the next page to fill in this information)

Brief Description of BMP:

A public meeting or open house program will be used each year to provide public participation and involvement in the Village's surface water management program.

Measurable Goals, including frequencies:

Use of an annual public meeting or open house providing for public participation.

Milestones:

Year 1:

Use of an annual public meeting or open house to accomplish participation/involvement in the Village's surface water management program.

Year 2:

Use of an annual public meeting or open house to accomplish participation/involvement in the Village's surface water management program.

Year 3:

Use of an annual public meeting or open house to accomplish participation/involvement in the Village's surface water management program.

Year 4:

Use of an annual public meeting or open house to accomplish participation/involvement in the Village's surface water management program.

Year 5:

Use of an annual public meeting or open house to accomplish participation/involvement in the Village's surface water management program.

Go to Additional Pages

C. Illicit Discharge Detection and Elimination

Qualifying Local Programs:

The Village of Buffalo Grove has established a high quality suburban environment through adoption and enforcement of building and other codes which provide for polluted discharges to be properly routed to the sanitary sewer system for treatment. The Village's Municipal Code prohibits improper discharges and Village staff effectively follow up any observation of improper discharges of pollutants.

Measurable Goals (include shared responsibilities)

☒ C.1 Sewer Map Preparation (You may need to go to the next page to fill in this information)

Brief Description of BMP:

The Buffalo Grove storm sewer maps will continue to be maintained and updated as necessary.

Measurable Goals, including frequencies:

Continue to perform the above described BMP and annually perform an evaluation of the practices identifying any modification needed to keep it effective.

Milestones:

Year 1:

Continue to maintain Buffalo Grove's storm sewer maps and update as needed.

Year 2:

Continue to maintain Buffalo Grove's storm sewer maps and update as needed.

Year 3:

Continue to maintain Buffalo Grove's storm sewer maps and update as needed.

Year 4:

Continue to maintain Buffalo Grove's storm sewer maps and update as needed.

Year 5:

Continue to maintain Buffalo Grove's storm sewer maps and update as needed.

Go to Additional Pages

☒ C.2 Regulatory Control Program (You may need to go to the next page to fill in this information)

Brief Description of BMP:

The Village of Buffalo Grove will continue to perform a regulatory control program related to illicit discharge detection and elimination.

Measurable Goals, including frequencies:

Continue to perform the above described BMP and annually perform an evaluation of the practices identifying any modification needed to keep it effective.

Milestones:

Year 1:

An annual review of the effectiveness of the regulatory program will be performed by an IMT (Integrated Management Team) appointed by the Village Manager.

Year 2:

An annual review of the effectiveness of the regulatory program will be performed by an IMT (Integrated Management Team) appointed by the Village Manager.

Year 3:

An annual review of the effectiveness of the regulatory program will be performed by an IMT (Integrated Management Team) appointed by the Village Manager.

Year 4:

An annual review of the effectiveness of the regulatory program will be performed by an IMT (Integrated Management Team) appointed by the Village Manager.

Year 5:

An annual review of the effectiveness of the regulatory program will be performed by an IMT (Integrated Management Team) appointed by the Village Manager.

Go to Additional Pages

☒ C.3 Detection/Elimination Prioritization Plan (You may need to go to the next page to fill in this information)

Brief Description of BMP:

An Integrated Management Team (IMT), appointed by the Village Manager, will establish a detection/elimination prioritization plan for illicit discharge as necessary and review and revise the prioritization plan annually to the extent possible.

Measurable Goals, including frequencies:

Continue goal of continuing to detect and eliminate all illicit discharges and annually review and revise a prioritization plan to accomplish this goal.

Milestones:

Year 1:

The IMT should review the need for a prioritization plan and establish a plan as needed.

Year 2:

The IMT should review the prioritization plan and revise as needed.

Year 3:

The IMT should review the prioritization plan and revise as needed.

Year 4:

The IMT should review the prioritization plan and revise as needed.

Year 5:

The IMT should review the prioritization plan and revise as needed.

Go to Additional Pages

☒ C.4 Illicit Discharge Tracing Procedures (You may need to go to the next page to fill in this information)

Brief Description of BMP:

The Village will continue to conduct illicit discharge tracing procedures (C.4) and illicit source removal procedures (C.5) as needed. A program evaluation and assessment (C.6) of the entire illicit discharge and detection and elimination program,

Measurable Goals, including frequencies:

Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modification needed to keep them effective.

Milestones:

Year 1:

An annual evaluation of the effectiveness of the program, including the illicit discharge tracing procedures and illicit source

Year 2:

An annual evaluation of the effectiveness of the program, including the illicit discharge tracing procedures and illicit source

Year 3:

An annual evaluation of the effectiveness of the program, including the illicit discharge tracing procedures and illicit source

Year 4:

An annual evaluation of the effectiveness of the program, including the illicit discharge tracing procedures and illicit source

Year 5:

An annual evaluation of the effectiveness of the program, including the illicit discharge tracing procedures and illicit source

Go to Additional Pages

☒ C.5 Illicit Source Removal Procedures (You may need to go to the next page to fill in this information)

Brief Description of BMP:

The Village will continue to conduct illicit discharge tracing procedures (C.4) and illicit source removal procedures (C.5) as needed. A program evaluation and assessment (C.6) of the entire illicit discharge and detection and elimination program, including the illicit discharge tracing procedures and illicit source removal procedures, will be performed by the Integrated Management Team (IMT) appointed by the Village Manager.

Measurable Goals, including frequencies:

Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modification needed to keep them effective.

Milestones:

Year 1:

An annual evaluation of the effectiveness of the program, including the illicit discharge tracing procedures and illicit source removal procedures, shall be performed by the IMT appointed by the Village Manager.

Year 2:

An annual evaluation of the effectiveness of the program, including the illicit discharge tracing procedures and illicit source removal procedures, shall be performed by the IMT appointed by the Village Manager.

Year 3:

An annual evaluation of the effectiveness of the program, including the illicit discharge tracing procedures and illicit source removal procedures, shall be performed by the IMT appointed by the Village Manager.

Year 4:

An annual evaluation of the effectiveness of the program, including the illicit discharge tracing procedures and illicit source removal procedures, shall be performed by the IMT appointed by the Village Manager.

Year 5:

An annual evaluation of the effectiveness of the program, including the illicit discharge tracing procedures and illicit source removal procedures, shall be performed by the IMT appointed by the Village Manager.

Go to Additional Pages

☒ C.6 Program Evaluation and Assessment (You may need to go to the next page to fill in this information)

Brief Description of BMP:

The Village will continue to conduct illicit discharge tracing procedures (C.4) and illicit source removal procedures (C.5) as needed. A program evaluation and assessment (C.6) of the entire illicit discharge and detection and elimination program, including the illicit discharge tracing procedures and illicit source removal procedures, will be performed by the Integrated Management Team (IMT) appointed by the Village Manager.

Measurable Goals, including frequencies:

Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modification needed to keep them effective.

Milestones:

Year 1:

An annual evaluation of the effectiveness of the program, including the illicit discharge tracing procedures and illicit source removal procedures, shall be performed by the IMT appointed by the Village Manager.

Year 2:

An annual evaluation of the effectiveness of the program, including the illicit discharge tracing procedures and illicit source removal procedures, shall be performed by the IMT appointed by the Village Manager.

Year 3:

An annual evaluation of the effectiveness of the program, including the illicit discharge tracing procedures and illicit source removal procedures, shall be performed by the IMT appointed by the Village Manager.

Year 4:

An annual evaluation of the effectiveness of the program, including the illicit discharge tracing procedures and illicit source removal procedures, shall be performed by the IMT appointed by the Village Manager.

Year 5:

An annual evaluation of the effectiveness of the program, including the illicit discharge tracing procedures and illicit source removal procedures, shall be performed by the IMT appointed by the Village Manager.

Go to Additional Pages

- ☐ C.7 Visual Dry Weather Screening
- ☐ C.8 Pollutant Field Testing
- ☐ C.9 Public Notification
- ☐ C.10 Other Illicit Discharge Controls

D. Construction Site Runoff Control

Measurable Goals (include shared responsibilities)

Qualifying Local Programs:

The Village of Buffalo Grove has established construction site runoff control regulations which are enforced so as to accomplish control of construction site runoff.

☒ D.1 Regulatory Control Program (You may need to go to the next page to fill in this information)

Brief Description of BMP:

Construction site runoff control is accomplished in Buffalo Grove through the Village's regulations (D.1), which include requirements to accomplish erosion and sedimentation control BMP's (D.2), site plan review procedures (D.4) and site inspection and enforcement procedures (D.6). Other wastes which would leave the site, such as littering, are also prohibited (D.3). The Village also has procedures for handling information which is provided by the public (D.5).

Measurable Goals, including frequencies:

Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modification needed to keep them effective.

Milestones:

Year 1:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 2:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 3:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 4:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 5:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Go to Additional Pages

☒ D.2 Erosion and Sediment Control BMPs (You may need to go to the next page to fill in this information)

Brief Description of BMP:

Construction site runoff control is accomplished in Buffalo Grove through the Village's regulations (D.1), which include requirements to accomplish erosion and sedimentation control BMP's (D.2), site plan review procedures (D.4) and site inspection and enforcement procedures (D.6). Other wastes which would leave the site, such as littering, are also prohibited (D.3). The Village also has procedures for handling information which is provided by the public (D.5).

Measurable Goals, including frequencies:

Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modification needed to keep them effective.

Milestones:

Year 1:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 2:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 3:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 4:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 5:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Go to Additional Pages

☒ D.3 Other Waste Control Program (You may need to go to the next page to fill in this information)

Brief Description of BMP:

Construction site runoff control is accomplished in Buffalo Grove through the Village's regulations (D.1), which include requirements to accomplish erosion and sedimentation control BMP's (D.2), site plan review procedures (D.4) and site inspection and enforcement procedures (D.6). Other wastes which would leave the site, such as littering, are also prohibited (D.3). The Village also has procedures for handling information which is provided by the public (D.5).

Measurable Goals, including frequencies:

Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modification needed to keep them effective.

Milestones:

Year 1:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 2:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 3:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 4:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 5:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Go to Additional Pages

☒ D.4 Site Plan Review Procedures (You may need to go to the next page to fill in this information)

Brief Description of BMP:

Construction site runoff control is accomplished in Buffalo Grove through the Village's regulations (D.1), which include requirements to accomplish erosion and sedimentation control BMP's (D.2), site plan review procedures (D.4) and site inspection and enforcement procedures (D.6). Other wastes which would leave the site, such as littering, are also prohibited (D.3). The Village also has procedures for handling information which is provided by the public (D.5).

Measurable Goals, including frequencies:

Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modification needed to keep them effective.

Milestones:

Year 1:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 2:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 3:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 4:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 5:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Go to Additional Pages

☒ D.5 Public Information Handling Procedures (You may need to go to the next page to fill in this information)

Brief Description of BMP:

Construction site runoff control is accomplished in Buffalo Grove through the Village's regulations (D.1), which include requirements to accomplish erosion and sedimentation control BMP's (D.2), site plan review procedures (D.4) and site inspection and enforcement procedures (D.6). Other wastes which would leave the site, such as littering, are also prohibited (D.3). The Village also has procedures for handling information which is provided by the public (D.5).

Measurable Goals, including frequencies:

Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modification needed to keep them effective.

Milestones:

Year 1:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 2:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 3:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 4:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 5:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Go to Additional Pages

☒ D.6 Site Inspection/Enforcement Procedures (You may need to go to the next page to fill in this information)

Brief Description of BMP:

Construction site runoff control is accomplished in Buffalo Grove through the Village's regulations (D.1), which include requirements to accomplish erosion and sedimentation control BMP's (D.2), site plan review procedures (D.4) and site inspection and enforcement procedures (D.6). Other wastes which would leave the site, such as littering, are also prohibited (D.3). The Village also has procedures for handling information which is provided by the public (D.5).

Measurable Goals, including frequencies:

Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modification needed to keep them effective.

Milestones:

Year 1:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 2:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 3:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 4:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Year 5:

An annual evaluation of the performance of the Village's construction site runoff control activities, including the regulatory control program, erosion and sedimentation control BMP's required by Village regulations, other waste control programs, site plan review procedures, public information handling procedures and site inspection/enforcement procedures shall be performed by the IMT appointed by the Village Manager.

Go to Additional Pages

☐ D.7 Other Construction Site Runoff Controls

E. Post-Construction Runoff Control

Qualifying Local Programs:

The Village of Buffalo Grove provides for the long-term operation and maintenance of originally constructed items such as catch basins and sediment capturing features of ponds and detention basins.

Measurable Goals (include shared responsibilities)

☒ E.1 Community Control Strategy (You may need to go to the next page to fill in this information)

Brief Description of BMP:

Buffalo Grove's control strategy is to continue its current post-construction runoff control practices (E.1). The Village intends to continue its current regulatory control program (E.2), long-term O & M procedures (E.3), pre-construction review of BMP designs which are developed to comply with Village regulations (E.4), inspections of construction sites (E.5) and post-construction inspections (E.6).

Measurable Goals, including frequencies:

Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modification needed to keep them effective.

Milestones:

Year 1:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 2:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 3:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 4:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 5:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Go to Additional Pages

☒ E.2 Regulatory Control Program

Brief Description of BMP:

Buffalo Grove's control strategy is to continue its current post-construction runoff control practices (E.1). The Village intends to continue its current regulatory control program (E.2), long-term O & M procedures (E.3), pre-construction review of BMP designs which are developed to comply with Village regulations (E.4), inspections of construction sites (E.5) and post-construction inspections (E.6).

Measurable Goals, including frequencies:

Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modification needed to keep them effective.

Milestones:

Year 1:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 2:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 3:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 4:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 5:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

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☒ E.3 Long Term O & M Procedures (You may need to go to the next page to fill in this information)

Brief Description of BMP:

Buffalo Grove's control strategy is to continue its current post-construction runoff control practices (E.1). The Village intends to continue its current regulatory control program (E.2), long-term O & M procedures (E.3), pre-construction review of BMP designs which are developed to comply with Village regulations (E.4), inspections of construction sites (E.5) and post-construction inspections (E.6).

Measurable Goals, including frequencies:

Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modification needed to keep them effective.

Milestones:

Year 1:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 2:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 3:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 4:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 5:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Go to Additional Pages

☒ E.4 Pre-Construction Review of BMP Designs (You may need to go to the next page to fill in this information)

Brief Description of BMP:

Buffalo Grove's control strategy is to continue its current post-construction runoff control practices (E.1). The Village intends to continue its current regulatory control program (E.2), long-term O & M procedures (E.3), pre-construction review of BMP designs which are developed to comply with Village regulations (E.4), inspections of construction sites (E.5) and post-construction inspections (E.6).

Measurable Goals, including frequencies:

Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modification needed to keep them effective.

Milestones:

Year 1:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 2:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 3:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 4:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 5:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Go t Additional Pages

☒ E.5 Site Inspections During Construction (You may need to go to the next page to fill in this information)

Brief Description of BMP:

Buffalo Grove's control strategy is to continue its current post-construction runoff control practices (E.1). The Village intends to continue its current regulatory control program (E.2), long-term O & M procedures (E.3), pre-construction review of BMP designs which are developed to comply with Village regulations (E.4), inspections of construction sites (E.5) and post-construction inspections (E.6).

Measurable Goals, including frequencies:

Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modification needed to keep them effective.

Milestones:

Year 1:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 2:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 3:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 4:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 5:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Go to Additional Pages

☒ E.6 Post-Construction Inspections

Brief Description of BMP:

Buffalo Grove's control strategy is to continue its current post-construction runoff control practices (E.1). The Village intends to continue its current regulatory control program (E.2), long-term O & M procedures (E.3), pre-construction review of BMP designs which are developed to comply with Village regulations (E.4), inspections of construction sites (E.5) and post-construction inspections (E.6).

Measurable Goals, including frequencies:

Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modification needed to keep them effective.

Milestones:

Year 1:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 2:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 3:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 4:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Year 5:

An annual evaluation of the performance of the Village's post-construction runoff control activities shall be performed by an IMT appointed by the Village Manager.

Go to Additional Pages

☐ E.7 Other Post-Construction Runoff Controls

F. Pollution Prevention/Good Housekeeping

Measurable Goals (include shared responsibilities)

Qualifying Local Programs:

The Village of Buffalo Grove's ordinances and related enforcement activities provide for pollution prevention. Good housekeeping practices of the Village Public Works Department also serve to accomplish pollution prevention.

☒ F.1 Employee Training Program (You may need to go to the next page to fill in this information)

Brief Description of BMP:

The Village's pollution prevention and good housekeeping practices will continue, including employee training programs (F.1), the Public Works Department's inspection and maintenance program of the Village's MS4 (F.2) and the Village practice of waste disposal related to municipal operations, which comply with applicable legal regulations (F.4).

Measurable Goals, including frequencies:

Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modification needed to keep them effective.

Milestones:

Year 1:

An annual evaluation of the performance of the Village's pollution prevention and related housekeeping activities shall be performed by an IMT appointed by the Village Manager.

Year 2:

An annual evaluation of the performance of the Village's pollution prevention and related housekeeping activities shall be performed by an IMT appointed by the Village Manager.

Year 3:

An annual evaluation of the performance of the Village's pollution prevention and related housekeeping activities shall be performed by an IMT appointed by the Village Manager.

Year 4:

An annual evaluation of the performance of the Village's pollution prevention and related housekeeping activities shall be performed by an IMT appointed by the Village Manager.

Year 5:

An annual evaluation of the performance of the Village's pollution prevention and related housekeeping activities shall be performed by an IMT appointed by the Village Manager.

Go to Additional Pages

☒ F.2 Inspection and Maintenance Program (You may need to go to the next page to fill in this information)

Brief Description of BMP:

The Village's pollution prevention and good housekeeping practices will continue, including employee training programs (F.1), the Public Works Department's inspection and maintenance program of the Village's MS4 (F.2) and the Village practice of waste disposal related to municipal operations, which comply with applicable legal regulations (F.4).

Measurable Goals, including frequencies:

Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modificatior needed to keep them effective.

Milestones:

Year 1:

An annual evaluation of the performance of the Village's pollution prevention and related housekeeping activities shall be performed by an IMT appointed by the Village Manager.

Year 2:

An annual evaluation of the performance of the Village's pollution prevention and related housekeeping activities shall be performed by an IMT appointed by the Village Manager.

Year 3:

An annual evaluation of the performance of the Village's pollution prevention and related housekeeping activities shall be performed by an IMT appointed by the Village Manager.

Year 4:

An annual evaluation of the performance of the Village's pollution prevention and related housekeeping activities shall be performed by an IMT appointed by the Village Manager.

Year 5:

An annual evaluation of the performance of the Village's pollution prevention and related housekeeping activities shall be performed by an IMT appointed by the Village Manager.

Go to Additional Pages

☐ F.3 Municipal Operations Storm Water Control

☒ F.4 Municipal Operations Waste Disposal (You may need to go to the next page to fill in this information)

Brief Description of BMP:

The Village's pollution prevention and good housekeeping practices will continue, including employee training programs (F.1), the Public Works Department's inspection and maintenance program of the Village's MS4 (F.2) and the Village practice of waste disposal related to municipal operations, which comply with applicable legal regulations (F.4).

Measurable Goals, including frequencies:

Continue to perform the above described BMP's and annually perform an evaluation of the practices identifying any modification needed to keep them effective.

Milestones:

Year 1:

An annual evaluation of the performance of the Village's pollution prevention and related housekeeping activities shall be performed by an IMT appointed by the Village Manager.

Year 2:

An annual evaluation of the performance of the Village's pollution prevention and related housekeeping activities shall be performed by an IMT appointed by the Village Manager.

Year 3:

An annual evaluation of the performance of the Village's pollution prevention and related housekeeping activities shall be performed by an IMT appointed by the Village Manager.

Year 4:

An annual evaluation of the performance of the Village's pollution prevention and related housekeeping activities shall be performed by an IMT appointed by the Village Manager.

Year 5:

An annual evaluation of the performance of the Village's pollution prevention and related housekeeping activities shall be performed by an IMT appointed by the Village Manager.

Go to Additional Pages

- ☐ F.5 Flood Management/Assess Guidelines
- ☐ F.6 Other Municipal Operations Controls

Part III. Certification

I certify under penalty of law that this document an all attachments were prepared under my direction or supervision i accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for knowingly submitting false information, including the possibility of fines and imprisonment.

Any person who knowingly makes a false, fictitious, or fraudulent material statement, orally or in writing, to the Illinois EPA commits a Class 4 felony. A second or subsequent offense after conviction is a Class 3 felony (415 ILCS 5/44 (h)

Dane C. Bragg	Village Manager	8/19/2013
Authorized Representative Name	Title	Date

Authorized Representative Signature

You may complete this form online and save a copy locally before printing and signing the form. It should then be sent to:

Illinois Environmental Protection Agency
Bureau of Water
Division of Water Pollution Control
Attn: Permit Section
P.O. Box 19276
1021 North Grand Avenue East
Springfield, IL 62794-9276

Information required by this form must be provided to comply with 415 ILCS 5/39 (2000). Failure to do so may prevent this form from being processed and could result in your application being denied.

Additional Info - Page 1

A. Public Education and Outreach

BMP Number _____

Add Another BMP

Delete Last Entry

Additional Info - Page 2

B. Public Participation/Involvement

BMP Number _____

Add Another BMP

Delete Last Entry

Additional Info - Page 3

C. Illicit Discharge Detection and Elimination

BMP Number _____

Add Another BMP

Delete Last Entry

Additional Info - Page 4

D. Construction Site Runoff Control

BMP Number _____

Add Another BMP

Delete Last Entry

Additional Info - Page 5

E. Post-Construction Runoff

BMP Number _____

Add Another BMP

Delete Last Entry

Additional Info - Page 6

F. Pollution Prevention/Good

BMP Number _____

Add Another BMP

Delete Last Entry

ATTACHMENT NO. 2

Summary of 6th Year Activities and
Results of Information Collected and Analyzed

Summary of 6th Year Activities and
Results of Information Collected and Analyzed

A. Summary of Activities

Buffalo Grove's sixth year activities have been performed as proposed for the sixth year in the NOI which was approved by Buffalo Grove Resolution No. 2009-27. The various areas of activity are described below.

1. Public Education and Outreach – (See Attachment 4)

The Village of Buffalo Grove newsletter has been used to provide information for the purpose of providing public outreach. Additionally, the Village's web site provides links to related sites.

2. Public Participation/Involvement – (See Attachment 4)

- Attendance at several Buffalo Creek Clean Water Partnership meeting held between March 1, 2014 and February 28, 2015.
- Attend several Center for Watershed Protection's 2014 Watershed & Stormwater Management Webcast Series.
- Held annual employee NPDES training in January of 2015.

3. Illicit Discharge Detection and Elimination

The Village of Buffalo Grove has established a high quality suburban environment through adoption and enforcement of building and other codes which provide for polluted discharges to be properly routed to the sanitary sewer system for treatment. The Village's Municipal Code prohibits improper discharges and Village staff effectively followed up any reports or observations of improper discharges of pollutants.

4. Construction Site Runoff Control

The Village of Buffalo Grove's established construction site runoff control regulations were enforced so as to accomplish control of construction site runoff.

5. Post-Construction Runoff Control

The Village of Buffalo Grove continued to provide for the long-term operation and maintenance of originally constructed items such as catch basins and sediment capturing features of ponds and detention basins.

6. Pollution Prevention/Good Housekeeping

The Village of Buffalo Grove's ordinances and related enforcement activities continued to provide for pollution prevention. Good housekeeping practices of the Village Public Works Department also accomplished pollution prevention.

7. List of Construction Projects which have been paid for by the Village of Buffalo Grove

In the 6th year of the term of the current NPDES permit, the Village of Buffalo Grove has paid for all or a portion of the following projects which have disturbed a land area near or greater than 1 acre in area:

- 2014 Village-wide Street Maintenance Projects
  NPDES Permit No. ILR10T564

B. Information Collected and Analyzed

Village staff performed stream observations and evaluations for consideration for possible inclusion in the Metropolitan Water Reclamation District of Greater Chicago's stream maintenance program.

A water quality monitoring project was also conducted in year 6. (See attachment 3)

Internal televised inspections of storm and sanitary sewers have been performed for preventive maintenance purposes, which include evaluation of videotapes for any evidence of potentially improper connections to the storm sewer system. Any questions resulting from these inspections are given further evaluation and follow-up to insure that there are no improper discharges to the storm sewer system.

The Local Planning Committee for the Buffalo Creek Watershed has been actively participated in. This Committee is providing input into a study involving the USACE and IDNR. Multi-purpose storm water facilities are proposed to be developed as a result of these studies. Buffalo Grove has actively participated in the Buffalo Creek Clean Water Partnership. See Attachment 4.

Buffalo Grove has also actively participated in the Municipal Advisory Committee (MAC) of the Lake County Stormwater Management Commission. This committee has worked to reduce pollution in waterways and water bodies in Lake County to the maximum extent practicable.

Buffalo Grove has also actively participated in the Lower Des Plaines River Watershed Planning Council of the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC). This

planning council serves as an advisory body to MWRDGC for their stormwater management program.

Buffalo Grove is a founding member of the Des Plaines River Watershed Workgroup. MS4s and POTWs within the Des Plaines River watershed in Lake County have formed a workgroup. The group is a voluntary, dues paying, membership organization that monitors and strategizes to improve water quality based on scientific data, making decisions at the local level. Membership consists of NPDES permit holders (MS4 permittees and POTWs), environmental groups, consultants, and concerned citizens. The Des Plaines River Watershed Workgroup, meets quarterly, governed by a set of bylaws and an elected executive board, and provides many benefits to the general membership including:

- Water quality improvements
- Local decision making
- Cost savings
- NPDES permit compliance: shared monitoring effort, education and outreach materials

Village staff has worked with consulting firms to implement recommendations of the following documents through the development of construction plans and projects:

1. "Restoration Opportunities along Kildeer Creek" letter report submitted by Baxter and Woodman Consulting Engineers, dated July 2, 2010. Preliminary plans have been developed for the next highest priority stream segments along Kildeer Creek. The Village has received 319 Program grant from the Lake County Stormwater Management Commission. The project is expected to be completed in May 2015.

2. The fifth year of monitoring of White Pine Ditch was conducted by Stantec Consulting Services. (See Attachment 5)

3. Preliminary plans have also been completed for a high priority segment of Aptakisic Creek. The Village has received a DCEO Grand for Channel Maintenance along a segment of that creek.

ATTACHMENT NO. 3

"2014 Water Quality Monitoring Results for NPDES Phase II Permit Requirements, Buffalo Grove, Lake & Cook Counties, Illinois (CBBEL Project No. 140488".)

MEMORANDUM

DATE: February 11, 2015

TO: Darren Monico/Mike Reynolds, Village of Buffalo Grove, Public Works

CC: Darren Olson, PE, CBBEL

FROM: Eric Japsen, CBBEL

SUBJECT: 2014 Water Quality Monitoring Results for NPDES Phase II Permit Requirements, Buffalo Grove, Lake & Cook Counties, Illinois (CBBEL Project No. 140488)

The following summarizes water quality monitoring results for the Village of Buffalo Grove (Village) to address Illinois Environmental Protection Agency (IEPA) National Pollutant Discharge Elimination System (NPDES) Phase II requirements for MS4 communities. This report summarizes the sixth consecutive year of water quality sampling for the Village under MS4 Permit ID No. ILR400303. Photographs of sampling sites are shown on the attached photo exhibit (Appendix 1). Water test results including lab results are presented in the attached spreadsheets in Appendix 2. Recommendations for 2015 are listed at the end of this document.

The NPDES permit for MS4 communities specifies that discharges shall not cause or contribute to a violation of state water quality standards (35 IAC 302). Compliance with state water quality standards is mandatory for MS4 facilities. The NPDES permit states that when a total maximum daily load (TMDL) is approved for a waterbody, MS4s must attempt to comply with Waste Load Allocations (WLAs) for those pollutants having TMDLs. TMDLs for pollutants within the impaired reach of Buffalo Creek (IL_GST), which lies within Village limits, were approved by IEPA for fecal coliform, chloride, carbonaceous biochemical oxygen demand (CBOD), and ammonia in August 2013. The IEPA recommends that Villages work together and in watershed groups in attempting to meet WLAs and TMDL goals.

TMDL Approval & Implementation

The Metropolitan Water Reclamation District (MWRD) Site WW-12 water quality data was used to develop TMDL waste load allocations for the impaired Buffalo Creek segment IL_GST for fecal coliform, chloride, CBOD & ammonia. MWRD Site WW-12 is located on Buffalo Creek north of Lake Cook Road at north Latitude 42°09'11" & west Longitude 87°58'15", approximately 200 feet north of Lake Cook Road, south of the Village golf course near Raupp Boulevard. MWRD results collected during portions of the period 1977-2009 are presented along with our 2009-2014 sampling results in Appendix 2.

The USGS stream gauge at Wheeling is close to sampling Site BC-2 located south of the Village's south boundary with Wheeling. The USGS stream gauge is located at north Latitude 42°09'07" & west Longitude 87°57'28", south of Lake Cook Road and approximately 50 feet north of Aptakisic Road (note that Aptakisic Road in this location is an

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±800' long stub between IL Route 83 and Wieland Road). Stream gauge information can be useful to correlate water quality sampling with IEPA approved TMDL flow regimes for fecal coliform and chloride.

A TMDL is the sum (plus a safety factor) of the allowable amounts of a single pollutant that a waterbody can receive from all contributing sources and still meet water quality standards or designated uses. The establishment of the TMDL sets pollution reduction goals to improve the quality of impaired waters. WLAs were allotted for each discharger based on the size of the MS4 and percent area within the Des Plaines River watershed.

The impaired reach of Buffalo Creek, Segment IL_GST, occurs within the municipal limits of Buffalo Grove and several other municipalities holding MS4 permits. Two point source dischargers (Alden Long Grove Rehabilitation and Camp Reinberg) occur within Village limits. An IL_GST listing for Total Suspended Solids (TSS) was added to State's 303(d) list, and is scheduled for low priority TMDL development. Aptakisic Creek, Indian Creek, and Kildeer Creek Tributary are not on the State's 303(d) list.

Methods

On August 28, 2014, eight water samples were collected from creeks/tributaries located upstream and downstream of MS4 discharges near Village boundaries. The eight samples were collected at the same sites and same time of year (August) as previous sampling to maintain consistency for comparison of results. Sampling sites numbered 1 (below) are located at upstream Village limits; sites numbered 2 are located at downstream Village limits. The eight sampling sites listed below are shown on the Village map in Appendix 1:

Aptakisic Creek AC-1 & AC-2	Indian Creek IC-1 & IC-2
Kildeer Creek Tributary KCT-1 & KCT-2	Buffalo Creek BC-1 & BC-2

CBBEL collected grab samples in designated bottles and placed them on ice for laboratory testing. Field observations were recorded at the time of sample collection at each site. Laboratory water testing was completed by our sub-contractor, Prairie Analytical Systems, Inc., Springfield, Illinois, under standard chain-of-custody procedures. Test results were reported in terms of reporting limits or method detection limits, and are attached in Appendix 2.

Laboratory tests and field observations provide a general description of water quality at the eight sample sites, as well as pollutants that threaten to impair water quality. In 2014, all sample sites were sampled for two additional parameters, carbonaceous biochemical oxygen demand (CBOD) and ammonia nitrogen, which the IEPA concluded were associated with the dissolved oxygen impairment within Buffalo Creek Segment IL_GST

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(2013 TMDL Report). The 2014 water sampling for all four streams consisted of the following:

Laboratory Tests	Field Observations
Fecal Coliform	Dissolved Oxygen (DO)
Anions (Chloride, Fluoride)	pH
Ammonia Nitrogen	Temperature
Carbonaceous Biochemical Oxygen Demand (CBOD)	Conductivity

Results and Discussion

The August 28, 2014 sampling date was selected in an effort to complete sampling within a day of a significant rain. In past years, sampling was completed after dry periods with creek flows near base flow. On August 28, 2014, sampling was completed in the morning under clear, calm weather conditions and temperatures in the mid-60's warming to a high of 76, as recorded at nearby Chicago Executive Airport in Wheeling (www.wunderground.com). A trace of precipitation was recorded late in the day, after sampling was complete. On August 25 & 26, a total of 0.9 inches of rain was recorded. Over 2.2 inches of rain was recorded over a rainy period on August 21-23. August rains totaled 6.96 inches versus the August average of 3.66 inches. However, August thunderstorms tend to be localized and heavy, so rains within each streams' watershed likely varied from that of the recording station.

Stream water levels appeared to be several inches above base flow conditions at the Buffalo Creek and Kildeer Creek Tributary sites. Stream water levels appeared to be near base flow conditions at the Indian Creek and Aptakisic Creek sites. At the time of sampling, water clarity was somewhat turbid, murky, or brown at all sampling sites, and was likely due to recent stormwater runoff and or fish/wildlife activity. On August 28, 2014, the USGS stream gauge on Buffalo Creek at Wheeling reported a mean flow rate of 23 cubic feet per second.

State water quality standards for General Use and typical ranges for some constituents not having standards (based on our water sampling experience) are provided for comparison to results obtained from sampling at the eight sites in each year, 2009-2014. Historic results for Buffalo Creek are also provided for some constituents.

Laboratory Test Results

The August 28, 2014 water sample results for the eight stream sampling sites were similar to most results obtained on the August sampling dates in previous years. Most of the 2014 results did not exceed Illinois General Use water quality standards, as shown on the attached spreadsheet (Appendix 2). The 2014 fecal coliform results at Sites AC-1 (<99 colonies/100ml) and BC-2 (100 colonies/100ml) were less than 200 colonies/100ml. However, the fecal coliform results for a five year period 2010-2014 exceeded the state water quality standards at seven of the eight sites.

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Discussion is presented below for water testing results of constituents having TMDLs, for those that did not meet state water quality standards, or for those exceeding typical ranges or previous years' results. Typical results, intermediate results, or those meeting state standards are not discussed at length.

Fecal Coliform

As in the previous years' sampling, the 2014 samples were collected on only one sampling date in order to compare to previous years' testing results and to address the annual MS4 water quality monitoring requirement. A minimum of 5 sampling results averaged over a maximum five-year period is required to evaluate the fecal coliform standards. Only Site BC-1 results over the 2010-2014 period did not exceed the fecal coliform standards.

The 2014 fecal coliform results ranged from <99 colonies/100ml at Site AC-1 to 2,000 colonies/100ml at Site IC-2. A definitive number (<99) was not available for the Site AC-1 sampling result due to laboratory testing methods. For comparison over all years, fecal coliform results ranged from 8 colonies/100ml at Site BC-1 in 2010 to 5,200 colonies/100ml at Site IC-1 in 2013. A summary of the August 28, 2014 fecal coliform results are presented below for each stream.

- Aptakisic Creek: The fecal coliform level was <99 colonies/100ml at Site AC-1 where Aptakisic Creek entered the west side of the Village at Aptakisic Road. The fecal coliform level was higher (600 colonies/100ml) approximately 3 miles downstream at Site AC-2 where it exited the Village's east side.

- Kildeer Creek Tributary: The fecal coliform level was 700 colonies/100ml at Site KCT-1 where the Kildeer Creek Tributary to Indian Creek entered the Village. The fecal coliform level was lower (400 colonies/100ml) approximately 3,200 feet downstream at Site KCT-2, where it exited the Village.

- Indian Creek: The fecal coliform level was 400 colonies/100ml at Site IC-1 where Indian Creek flowed adjacent to the north boundary of a portion of the Village. The fecal coliform level was higher (2,000 colonies/100ml) approximately 2,000 feet downstream at Site IC-2 where it exited the Village.

- Buffalo Creek: The fecal coliform level was 200 colonies/100ml at Site BC-1, where reservoir discharge entered the Village at Arlington Heights Road. The fecal coliform level was lower (100 colonies/100ml) approximately 1.6 miles downstream at Site BC-2, where discharge exited the Village near Route 83, south of Lake Cook Road.

The upstream and downstream fecal coliform results for each stream were opposite of those observed last year (e.g. for Aptakisic Creek: in 2014, the downstream fecal coliform result was higher than the upstream result; in 2013, the downstream fecal coliform result was lower than the upstream result, etc.). These results illustrate the dynamic nature of fecal coliform. The bacteria are localized, sporadic, and short lived. Environmental factors such as stream turbulence, weather, temperature, exposure, organic matter decomposition, and wildlife concentrations influence fecal coliform levels. A field observation of the

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watershed near sampling points was not completed, but wildlife including deer, ducks, geese, as well domestic horses and dogs that contribute fecal material directly and in runoff to creeks, golf courses, and parks, were observed in various locations. The number and locations of (failing) septic systems within each streams' sub-watershed are not known.

Even though fecal coliform levels likely vary within the Village stream reaches because of factors listed above, results from the sampling points at the upstream Village limits (Sites AC-1, BC-1, IC-1 and KCT-1) may be considered the background fecal coliform levels. This provides a basis of reference for which the water quality results at the downstream Village limits can be compared (Table 1, below). The Village should note when:

1) Fecal coliform levels exceed state water quality standards;
2) Fecal coliform levels are higher at the downstream Village limits (sites numbered 2) than at the upstream limits (sites numbered 1).

Table 1. Fecal Coliform Results (colonies/100ml) for 5 Most Recent Samples, Buffalo Grove Streams, 2010-2014

Site	2014 Result	2014 Difference (Upstream vs Downstream)	5 Year, 5 Sample Mean (vs. 200 col/100ml standard), 2010-2014	5 Year, % of 5 Samples Exceeding 400 col/100ml standard, 2010-2014
IC-1	400	-	1,258	20
IC-2	2,000	+1,600	616	40
KCT-1	700	-	339	40
KCT-2	400	-300	282	20
AC-1	<99	-	202	20
AC-2	600	+>501	264	20
BC-1	**200**	**-**	**116**	**0**
BC-2	100	-100	544	20

"During the months May through October, based on a minimum of five samples taken over not more than a 30 day period, fecal coliform shall not exceed a geometric mean of 200 colonies per 100 ml, nor shall more than 10% of the samples during any 30 day period exceed 400 colonies per 100 ml in protected waters" (Illinois Pollution Control Board (IPCB)). The applicable fecal coliform standard requires a minimum of five samples in not more than a 30-day period. However, because this number of samples is seldom available in this time frame, the criteria are also based on a minimum of five samples over the most recent five-year period (IEPA). The preceding are excerpted from the IPCB, Part 302 Water Quality Standards and the IEPA Integrated Report-2014 for fecal coliform. **Bold indicates the standard was met.**

Only Site BC-1 results met the Illinois water quality standard for fecal coliform levels over the most recent five year period. BC-1 had a five sample mean of 116 colonies/100ml, which was below the 200 colonies/100ml standard. Site BC-1 also had 0/5 exceedances of the 400 colonies/100ml standard over the five year period. Therefore, water quality sampling results obtained by CBBEL indicate Fully Supporting Degree of Use Support (good water quality) for fecal coliform at Buffalo Creek Site BC-1 over the most recent five year period (2010-2014) because the geometric mean of five samples was less than 200 colonies/100ml and no results exceeded 400 colonies/100ml. This sampling site is located below the Buffalo Creek Reservoir at Arlington Heights Road. It is possible that the Buffalo Creek Reservoir functions as a pollutant sink, with higher quality water discharging to the creek as it resumes near Arlington Heights road bridge under certain flow conditions.

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At Site BC-2 downstream, the 2010-2014 sampling results indicate Not Supporting Degree of Use Support (poor water quality) for fecal coliform because one of five (20%) exceedance of 400 colonies/100ml was observed and the mean of five samples was 544 colonies/100ml. Wildlife concentrations including resident ducks, heavy use of golf course and park areas by geese, residents' pets, and other non-point sources may have contributed to the higher fecal coliform result at Site BC-2.

Sites BC-1 and BC-2 are located within Buffalo Creek Segment IL_GST for which a TMDL for fecal coliform was approved. TMDL waste load allocations for fecal coliform were approved for five stream flow conditions (High, Moist, Mid-Range, Dry, and Low) flows. See fecal coliform WLAs for various flow conditions for Buffalo Grove MS4 in Table 12 of the Decision Document for the Approval of the Des Plaines River/Higgins Creek Watershed, IL TMDL, dated August 26, 2013 (Appendix 3, page 21).

Site AC-1 results were slightly higher than the five year mean, five sample maximum standard of 200 colonies/100ml (202 colonies/100ml). The 2014 fecal coliform result for Site AC-1 (<99 colonies/100ml) was not available in a definitive number from the lab due to the initial dilution used in the analysis; thus, the 99 colonies/100ml was used in the calculation of the 5 year mean.

It is interesting to note that fecal coliform results were higher at downstream sampling Sites AC-2 and IC-2, where stream flows appeared to be near base flow conditions. In contrast, fecal coliform results were lower at downstream Sites BC-2 and KCT-2, where creek levels/flows appeared to be higher than base flow conditions. Higher fecal coliform levels are expected under large flow events (2013 TMDL Report). For Buffalo Creek, the observed flow might be considered the Mid-Range Flows, for which the WLA is higher than for Low Flows or Dry Conditions. No WLA for fecal coliform is applicable to IL_GST under Low Flows or Dry Conditions.

Chloride

The 2014 chloride results for all eight sites did not exceed the state maximum standard of 500 mg/l, and ranged from 141 mg/l at Site AC-1 to 188 mg/l at Site AC-2. Low levels of chloride are expected during the Summer months. IEPA has identified the Winter months as being the critical condition when de-icing salts, many of which contain chloride, are present in runoff to streams. TMDL WLAs were approved for five stream flow conditions (High, Moist, Mid-Range, Dry, and Low) flows. See WLAs for various flow conditions for Buffalo Grove MS4 in Table 15 of the Decision Document cited above (Appendix 3, page 22).

Ammonia Nitrogen

Ammonia nitrogen sampling was expanded to all eight sites in 2014. The IEPA first listed ammonia as a pollutant of concern because it contributes to low DO in Buffalo Creek (Integrated Report-2012). The 2014 ammonia levels were <0.10 mg/l at all eight sites. These levels were lower than the laboratory recording limit and much lower than the state

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standard maximum of 15 mg/l. A TMDL waste load allocation of 0.70 lb./day was approved for Buffalo Grove by IEPA. See Table 18 of the Decision Document (Appendix 3, page 22).

Carbonaceous Biochemical Oxygen Demand (CBOD)
CBOD sampling was expanded to all eight sites in 2014 because high CBOD levels contribute to low DO levels. The IEPA first listed CBOD as a pollutant of concern for Buffalo Creek in the Integrated Report-2012. The 2014 CBOD levels ranged from <2.0 mg/l at Sites BC-2 and IC-1 to 4.03 mg/l at KCT-2. At this time, we are not aware of a state water quality standard for CBOD. However, a TMDL waste load allocation of 9.05 lbs./day was approved by IEPA. See Table 18 in the Decision Document (Appendix 3, page 22).

CBOD is listed as a conventional pollutant in the U.S. Clean Water Act. BOD is a composite term that describes the consumption of oxygen through the oxidation of carbon and nitrogen by bacteria in the water. The sources of nutrients and BOD include both point and nonpoint.

Field Test Results
Dissolved Oxygen (DO)
On August 28, 2014, none of the sampling sites' results were lower than the state minimum standard of 3.5 mg/l for August (range 4.84 mg/l at Site KCT-1 to 7.12 mg/l at Site BC-1). Recall that sampling was completed within two days of a moderately rainy 5 day period, so that creek levels were observed to be near base flow to several inches above base flow. Waste load alsites were provided for ammonia and CBOD to help meet their TMDLs and the state water quality standard for DO.

pH
The 2014 pH results for all eight sites were within the state standard range of 6.5-9.0.

Conductivity
In 2014, the conductivity levels for all eight sites were within the range of previous results over the 2010-2014 period.

Temperature
On August 28, 2014, water temperature readings for all sites were lower than the state maximum standard of 32.0 degrees Celsius for August. Three of the eight stream temperatures were the lowest yet recorded for August 2009-2014 sampling.

Storm Water Controls
Prior to IEPA approval of TMDLs, the Village had already implemented several successful projects within the Buffalo Creek watershed. Several water quality improvement projects are under review and several maintenance projects are listed in Buffalo Grove's 2013 NPDES Annual Report. In our opinion, additional IEPA sampling guidance for MS4s having non-point discharges is needed in order to measure their discharges against TMDL waste load allocations. Until the State issues the new ILR40, the Village should continue to comply with ILR400303 by providing annual water quality sampling and reporting. We

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recommend that the Village refer to the sampling protocol described in the Coordinated Pollutant Monitoring Program for the Buffalo Creek Clean Water Partnership (BCCWP), dated (revised) December 16, 2012.

Buffalo Grove continues to comply with NPDES MS4 monitoring requirements. Ongoing annual water quality sampling and reporting for streams within Village limits effectively demonstrates Buffalo Grove's active participation and compliance with the MS4 permit.

Recommendations for 2015

Based on the 2014 water monitoring results, approval of TMDLs for Buffalo Creek as they apply to the Village's MS4 permit, and adherence to BCCWP sampling protocol, we suggest the following for 2015:

1) Complete twice annual laboratory water quality testing on the first Monday in both May and October.

2) Test for the water quality parameters listed in the BCCWP Coordinated Pollutant Monitoring Program; however, also test for ammonia to address the approved TMDL. Alternatively, at minimum, test for those parameters for which TMDLs are approved (fecal coliform, chloride, CBOD, and ammonia) at the eight sampling sites within the four stream reaches inside Village limits;

3) Continue water quality field tests for DO, pH, conductivity, and temperature at the eight sample sites;

4) Continue to implement BMPs and upgrade efforts to address the six minimum control measures to the maximum extent practicable (MEP), that include:
   A. Public education and outreach
   B. Public participation/involvement
   C. Illicit discharge detection and elimination
   D. Construction site runoff control
   E. Post-construction runoff control
   F. Pollution prevention/good housekeeping

5) Continue to pursue and implement water quality improvement projects and cost-share opportunities for each of the four streams within Village limits that are part of the larger Des Plaines/Higgins Creek watershed.

References

Illinois Environmental Protection Agency, Bureau of Water (Final). March 2014. Illinois Integrated Water Quality Report and Section 303(d) List-2014, Clean Water Act Sections

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303(d), 305(b) and 314, Water Resource Assessment Information and Listing of Impaired Waters, Volume I: Surface Water http://www.epa.state.il.us/water/tmdl/303-appendix/2014/iwq-report-surface-water.pdf.

Illinois EPA. August 2013. Decision Document for the Approval of the Des Plaines River / Higgins Creek Watershed, IL, TMDL. http://www.epa.state.il.us/water/tmdl/report/desplains-higgins-creek/final-decision.pdf

AECOM, Inc., for the Illinois Environmental Protection Agency. May 2013. Des Plaines River / Higgins Creek Watershed TMDL Report, IEPA/BOW/12-003 http://www.epa.state.il.us/water/tmdl/report/desplains-higgins-creek/final-tmdl-report.pdf

Illinois Pollution Control Board. 2014. 35 IL. Adm. Code Part 302, IL Water Quality Standards, http://www.ipcb.state.il.us/SLR/IPCBandIEPAEnvironmentalRegulations-Title35.asp.

Weather Underground, 2014, for Buffalo Grove as recorded at nearby Chicago Executive Airport in Wheeling, Illinois. http://www.wunderground.com.

EJ
N:\BuffaloGrove\140488\Env\Docs\140488 M1-summary 2014.021115.doc

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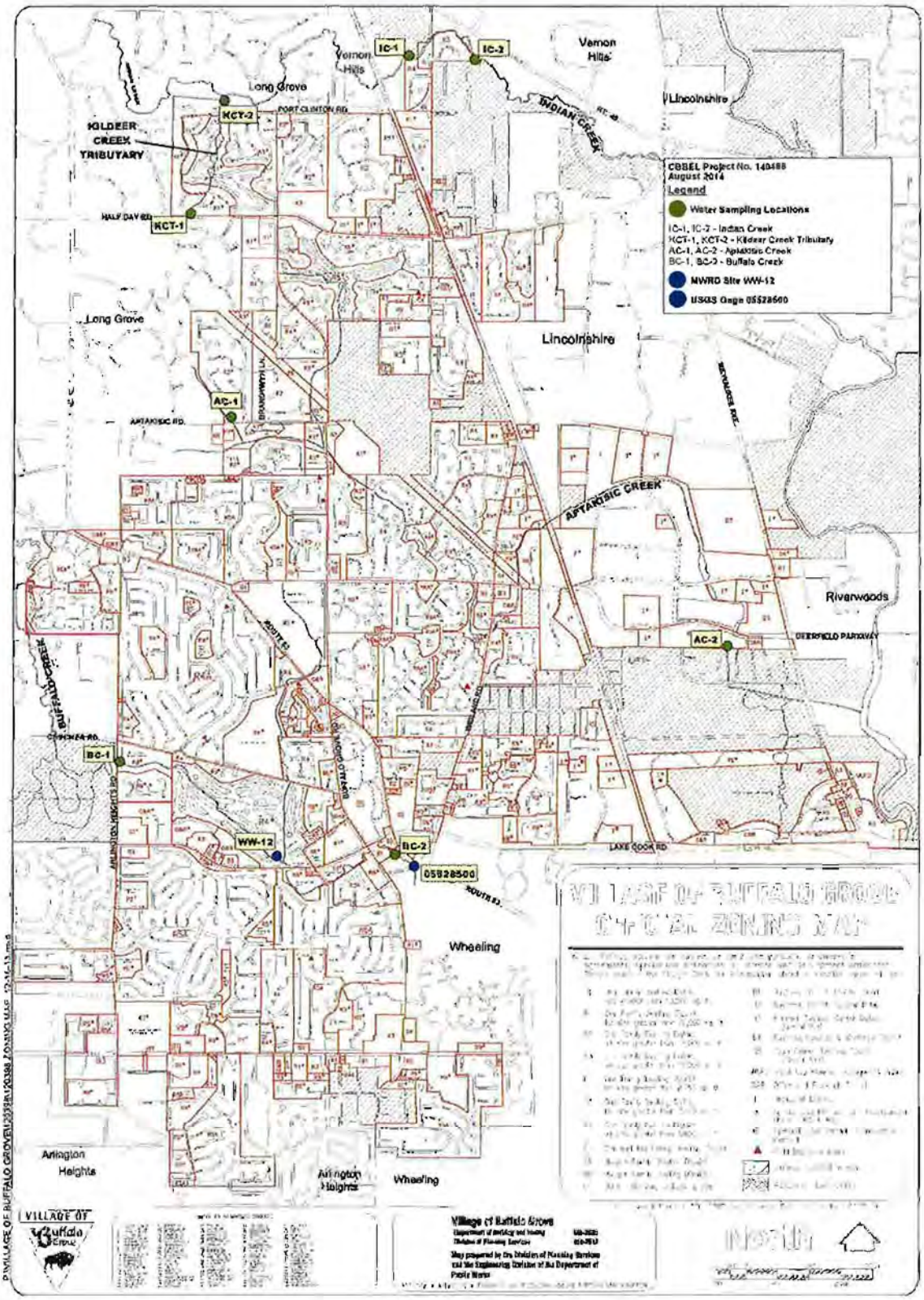
APPENDIX 1
Village Map & Photographs of Sampling Sites



CBBEL Project No. 140488
August 2014
Legend
Water Sampling Locations
IC-1, IC-2 - Indian Creek
KCT-1, KCT-2 - Kildeer Creek Tributary
AC-1, AC-2 - Aptakisic Creek
BC-1, BC-2 - Buffalo Creek
MWRD Site WW-12
USGS Gage 05528500
IC-1
IC-2
KCT-2
KCT-1
AC-1
AC-2
BC-1
BC-2
WW-12
05528500
Vernon Hills
Long Grove
Lincolnshire
Riverwoods
Wheeling
Arlington Heights
KILDEER CREEK TRIBUTARY
INDIAN CREEK
APTAKISIC CREEK
BUFFALO CREEK
PORT CLINTON RD.
HALF DAY RD.
APTAKISIC RD.
DEERFIELD PARKWAY
LAKE COOK RD.
ROUTE 83
VILLAGE OF BUFFALO GROVE
Village of Buffalo Grove
North

Sampling Location BC-1 (upstream)

Sampling Location BC-2 (downstream)

Sampling Location BC-2 (downstream)

Sampling Location AC-1 (upstream, AC-2 not pictured)

Sampling Location KCT-1 (upstream)

Sampling Location KCT-2 (downstream)

Sampling Location IC-1 (upstream)

Sampling Location IC-2 (downstream)

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Client:	Village of Buffalo Grove	Project No:	140488
Title:	**NPDES Phase II MS4 Water Sampling, 2014**	Date:	8/28/2014
		Exhibit No.:	1

APPENDIX 2
Results Spreadsheets & Prairie Analytical Systems Laboratory Test Results, 2014

Buffalo Grove 2014, 2013, 2012, 2011, 2010 & 2009 Water Quality Sampling Results
CRBEL Project No. 140488

Site Location*	IC-3						IC-2						KCT-1						KCT-2						AC-1						AC-2						BC-1						BC-2						Units	
Year	2014	2013	2012	2011	2010	2009	2014	2013	2012	2011	2010	2009	2014	2013	2012	2011	2010	2009	2014	2013	2012	2011	2010	2009	2014	2013	2012	2011	2010	2009	2014	2013	2012	2011	2010	2009	2014	2013	2012	2011	2010	2009	2014	2013	2012	2011	2010	2009		
Fecal Coliform	800	5200	240	130	200	870	2000	620	45	75	370	590	700	48	45	570	590	440	400	160	170	390	480	640	480	580	130	50	170	140	800	390	270	[illegible]	[illegible]	400	300	230	130	40	40	40	100	1,500	400	590	250	3,100	CFU/100 mL	[illegible]
Copper	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	mg/L	[illegible]
Manganese	NA	NA	NA	NA	0.0488	0.0756	NA	NA	NA	NA	0.0649	0.0394	NA	NA	NA	NA	0.143	0.297	NA	NA	NA	NA	0.178	0.220	NA	NA	NA	NA	0.382	0.302	NA	NA	NA	NA	0.0750	0.0589	NA	NA	NA	NA	0.127	0.175	NA	NA	NA	NA	0.2601	0.241	mg/L	[illegible]
Nickel	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	mg/L	[illegible]
Silver	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	mg/L	[illegible]
Zinc	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	mg/L	[illegible]
Chloride	0.152	0.166	0.727	0.753	0.124	0.249	0.166	0.162	0.727	0.314	0.158	0.245	0.103	0.171	0.213	0.265	0.172	0.256	0.191	0.156	0.189	0.258	0.154	0.202	0.134	0.425	0.242	0.241	0.192	0.241	0.134	0.076	0.226	0.244	0.188	0.255	0.121	0.152	0.223	0.231	0.147	0.326	0.143	0.166	0.213	0.254	0.172	0.238	mg/L	[illegible]
Total Suspended Solids	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	NA	NA	NA	NA	U	U	mg/L	[illegible]
Total Dissolved Solids	NA	<4.0	<4.0	6.0	11.0	16.0	NA	<4.0	54.5	11.5	18.0	15.5	NA	<4.0	[illegible]	[illegible]	[illegible]	[illegible]	NA	42.0	20.5	64.5	53.5	43.0	NA	23.0	5.0	5.5	5.0	7.5	NA	7.5	19.5	14.0	16.0	19.5	NA	25.5	31.0	20.0	20.5	23.5	NA	42.0	14.0	18.5	19.0	14.0	mg/L	[illegible]
Phosphorus (Total)	NA	0.2697	0.119	0.119	0.139	0.134	NA	0.0725	0.122	0.14	0.129	0.145	NA	0.122	0.047	[illegible]	0.163	[illegible]	NA	0.242	0.264	0.265	0.221	0.213	NA	0.0562	0.075	[illegible]	[illegible]	[illegible]	NA	[illegible]	[illegible]	[illegible]	0.0234	0.102	NA	0.124	0.0564	0.174	0.161	0.237	NA	0.0777	0.0679	0.125	0.152	0.125	mg/L	[illegible]
Chloride	178	120	221	117	101	136	127	216	218	113	188	138	151	101	130	90.1	68.3	90.0	146	125	111	[illegible]	89.8	92.6	141	108	104	101.1	106	142	109	92.7	200	166	158	202	171	205	148	126	176	225	174	229	206	196	170	254	mg/L	[illegible]
Total Hardness	NA	NA	NA	NA	225	284	NA	NA	NA	NA	232	293	NA	NA	NA	NA	264	415	NA	NA	NA	NA	281	530	NA	NA	NA	NA	298	317	NA	NA	NA	NA	232	306	NA	NA	NA	NA	347	324	NA	NA	NA	NA	253	340	mg/L	[illegible]
Ammonia Nitrogen	<0.1	NA	NA	NA	NA	NA	<0.1	NA	NA	NA	NA	NA	<0.1	NA	NA	NA	NA	NA	<0.1	NA	NA	NA	NA	NA	<0.1	NA	NA	NA	NA	NA	<0.1	NA	NA	NA	NA	NA	<0.1	0.10	NA	NA	NA	NA	<0.1	<0.10	NA	NA	NA	NA	mg/L	[illegible]
COD	<2.0	NA	NA	NA	NA	NA	7.35	NA	NA	NA	NA	NA	3.22	NA	NA	NA	NA	NA	4.03	NA	NA	NA	NA	NA	3.4	NA	NA	NA	NA	NA	3.48	NA	NA	NA	NA	NA	2.44	2.15	NA	NA	NA	NA	<2.0	<2.0	NA	NA	NA	NA	mg/L	[illegible]
Field Observation																																																		
Dissolved Oxygen	8.7	9.20	5.80	7.75	7.40	6.0	6.43	7.01	8.0	7.43	7.74	6.73	4.84	5.24	4.70	6.53	6.34	4.33	6.39	5.38	7.05	8.13	7.22	6.75	6.48	8.13	7.50	6.15	8.85	4.3	8.15	8.46	4.38	7.97	8.27	5.9	7.72	7.59	8.43	7.27	6.61	8.15	6.24	7.56	5.42	4.43	6.84	4.3	mg/L	[illegible]
pH	7.71	7.43	8.04	7.46	8.34	NA	7.37	7.8	8.15	8.03	8.32	NA	7.38	7.43	8.09	8.22	8.18	NA	7.46	7.5	8.33	8.07	8.18	NA	7.41	7.50	7.76	[illegible]	8.07	NA	7.71	7.87	8.03	8.27	8.37	8.1	7.8	8.05	8.08	8.35	8.34	NA	7.43	7.75	7.81	7.68	7.46	7.73	su	[illegible]
Conductivity	1070	1193	1150	990	800	1270	1260	1499	1172	695	819	1595	960	1400	1745	1320	850	1150	1060	1975	1130	950	862	1200	980	790	920	812	816	1320	1010	810	[illegible]	450	[illegible]	1450	830	1090	1160	910	925	1700	810	1110	1090	660	930	1420	[illegible]	[illegible]
Temperature	22.1	24.5	25.5	24.3	24.8	22.0	22.4	23.5	25.6	23.7	25.4	22.3	23.8	23.6	25.8	25.4	26.5	24.0	24.1	25.0	27.3	26.4	24.3	24.1	23.8	24.2	23.3	25.3	27.8	26.5	26.3	26.1	25.1	25.6	26.5	23.4	24.1	26.5	27.0	25.4	27.7	26.8	20.8	23.3	24.3	27.5	24.7	23.2	Degrees C	[illegible]

Note - 2014 sampling parameters and results are in bold type. Data is provided for samples collected on the following dates, August 28, 2014, August 21, 2013, August 31, 2012; August 19, 2011, August 18, 2010; August 5, 2009.

* Standard is listed for *General Use*, except as specified or not provided, per the Illinois Integrated Water Quality Report & Section 303(d) List - 2014.

** Fully Supporting Use is observed in protected waters when the mean of at least 5 samples within a 5 year period is less than 200 colonies/100 ml, or when less than 10% of samples exceed 400 colonies/100 ml within a 30 day period. May-October (or waste all samples May-October) for Primary Contact Designated Use (Buffalo Creek); waters not yet assessed to support Primary Contact (Indian Creek, Kildeer Creek Tributary & Aptakisic Creek).

*** There is no General Use Standard for Total Suspended Solids; however, the standard for *Public & Food Processing Water Supply* is 500 mg/L. Testing was not completed in 2014.

**** Not applicable for the Village sampling sites. The water quality standard particularly applies to lakes and reservoirs with a surface area of ≥20 acres, or in streams at the point of entry into these lakes and reservoirs. Testing was not completed in 2014.

Shaded cells indicate that the measurement does not meet State Water Quality Standards.

U = Undetected; less than laboratory Reporting Limit or Method Detection Limit.

NA = Not Applicable - sampling was discontinued or not completed.

Site Locations:
IC-1 at upstream Village limits; IC-2 at downstream Village limits (Indian Creek)
KCT-1 at upstream Village limits; KCT-2 at downstream Village limits (Kildeer Creek Tributary
AC-1 at upstream Village limits; AC-2 at downstream Village limits (Aptakisic Creek)
BC-1 at upstream Village limits; BC-2 at downstream Village limits (Buffalo Creek)

Buffalo Grove 2014 Water Quality Sampling Results & Historical Downstream Data for Buffalo Creek
CBBEL Project No. 140488

Site Location	BC-1						BC-2						MWRGDC	Units	State Maximum Standard *
Analyte Year	2014	2013	2012	2011	2010	2009	2014	2013	2012	2011	2010	2009	Site WW-12^		or Typical Range (NE Illinois)
Fecal Coliform	200	200	130	40	8	40	100	1800	400	170	250	3170	856	no./100 mL	** 200/100 ml; 400/100 ml
Fluoride	0.131	0.158	0.223	0.213	0.167	0.239	0.143	0.166	0.215	0.214	0.172	0.296	NA	mg/L	1.4 mg/L
Total Suspended Solids	NA	25.0	31.0	38.0	50.5	21.3	NA	<4.0	<4.0	13.5	16.0	14.0	NA	mg/L	*** Standard not provided
Phosphorus (Total)	NA	0.134	0.0914	0.174	0.181	0.237	NA	0.0777	0.0879	0.126	0.152	0.125	0.16	mg/L	**** Standard not provided
Chloride	171	206	198	126	126	225	174	221	206	126	130	254	249	mg/L	500 mg/L
CBOD	2.44	3.75	NA	NA	NA	NA	<2.0	<2.0	NA	NA	NA	NA	NA	mg/L	Standard not provided
Ammonia N	<0.1	<0.1	NA	NA	NA	NA	<0.1	<0.1	NA	NA	NA	NA	NA	mg/L	15 mg/L
Field Observation															
Dissolved Oxygen	7.12	7.99	8.47	7.27	6.81	8.15	6.24	7.56	5.42	4.82	6.84	4.30	9.9	mg/L	3.5 mg/L minimum (August)
pH	7.8	8.05	9.08	8.36	8.34	NA	7.43	7.75	7.91	7.63	8.48	7.73	NA	pH	6.5 - 9.0
Conductivity	930	1090	1100	910	920	910	910	1110	1090	840	930	1420	NA	*micro siemens*	Standard not provided. (Est. 500-2,000 *m s*)
Temperature	24.1	28.8	27.9	25.4	27	25.6	22.9	23.3	24.3	27	24.7	20.2	NA	degrees C	32 degrees C maximum

Notes

Site BC-1 is located at upstream Village limits; Site BC-2 is located at downstream Village limits of Buffalo Creek

Data is provided for BC-1 & BC-2 samples collected on the following dates: August 28, 2014; August 21, 2013; August 31, 2012; August 19, 2011; August 18, 2010; August 5, 2009.

* Standard is listed for *General Use*, except as specified or not provided, per the Illinois Integrated Water Quality Report & Section 303(d) List - 2014.

** Fully Supporting Use (Good water quality) is observed in protected waters when the mean of at least 5 samples is less than 200 colonies/100 ml, or when less than 10% of samples exceed 400 colonies/100 ml within a 30 day period May-October (or within all samples May-October), for *Primary Contact* Designated Use (Buffalo Creek).

*** There is no General Use Standard for Total Suspended Solids; however, the standard for *Public & Food Processing Water Supply* is 500 mg/L. Testing was not completed in 2014.

**** Not applicable for the Village sampling sites. The water quality standard particularly applies to lakes and reservoirs with a surface area of >20 acres, or in streams at the point of entry into these lakes and reservoirs. Testing was not completed in 2014.

Shaded cells contain results that do not meet State Water Quality Standards.

NA = Not Applicable - sampling was discontinued or not completed.

^ Historical averages of data collected 1977-2009 at Metropolitan Water Reclamation District stream gage WW-12 on Buffalo Creek.

WW-12 Ranges

Fecal coliform (colonies/100mL)		Total Phosphorous (mg/L)		Dissolved oxygen (mg/L)		Chloride (mg/L)	
60-28,000	2000-2009	0.14-0.18	1977-2007	2.1-13.4	2000-2007	94-882	2001-2007

Prairie Analytical Systems, INCORPORATED

Thursday, September 4, 2014

Mr. Eric Japsen
Christopher B. Burke Engineering, LTD
9575 West Higgins Road Suite 600
Rosemont, IL 60018

TEL: (847) 823-0500
FAX: (847) 823-0520

RE: Buffalo Grove Creeks PAS WO: 14H0599

Prairie Analytical Systems, Inc. received 8 sample(s) on 8/28/2014 for the analyses presented in the following report.

All applicable quality control procedures met method specific acceptance criteria unless otherwise noted.

This report shall not be reproduced, except in full, without the prior written consent of Prairie Analytical Systems, Inc.

If you have any questions, please feel free to contact me at (217) 753-1148.

Respectfully submitted,

Kristen A. Potter
Project Manager

Certifications: NELAP/NELAC - IL #100323

LABORATORY RESULTS

Client: Christopher B. Burke Engineering, LTD
Project: Buffalo Grove Creeks **Lab Order:** 14H0599
Client Sample ID: BC-1 **Lab ID:** 14H0599-01
Collection Date: 8/28/14 12:20 **Matrix:** Water

Analyses	Result	Limit	Qual	Units	DF	Date Prepared	Date Analyzed	Method	Analyst
Anions by Ion Chromatography									
*Chloride	171	25.0		mg/L	500	9/2/14 11:00	9/2/14 15:19	EPA 300.0	JKK
*Fluoride	0.131	0.0400		mg/L	2	9/2/14 11:00	9/3/14 10:03	EPA 300.0	JKK
Conventional Chemistry Parameters									
*Ammonia (as N)	U	0.100		mg/L	1	9/2/14 8:48	9/2/14 11:03	SM 4500-NH	JLS
*Carbonaceous BOD	2.44	2.00		mg/L	1	8/29/14 15:11	9/3/14 10:05	SM 5210B	JLS
Microbiological Parameters									
*Fecal Coliform	200	99		no./100 mL	100	8/28/14 16:05	8/29/14 15:30	SM 9222D	DAB

LABORATORY RESULTS

Client: Christopher B. Burke Engineering, LTD
Project: Buffalo Grove Creeks **Lab Order:** 14H0599
Client Sample ID: BC-2 **Lab ID:** 14H0599-02
Collection Date: 8/28/14 9:00 **Matrix:** Water

Analyses	Result	Limit	Qual	Units	DF	Date Prepared	Date Analyzed	Method	Analyst
Anions by Ion Chromatography									
*Chloride	174	25.0		mg/L	500	9/2/14 11:00	9/2/14 15:38	EPA 300.0	JKK
*Fluoride	0.143	0.0400		mg/L	2	9/2/14 11:00	9/3/14 10:22	EPA 300.0	JKK
Conventional Chemistry Parameters									
*Ammonia (as N)	U	0.100		mg/L	1	9/2/14 8:48	9/2/14 11:03	SM 4500-NH	JLS
*Carbonaceous BOD	U	2.00		mg/L	1	8/29/14 15:11	9/3/14 10:05	SM 5210B	JLS
Microbiological Parameters									
*Fecal Coliform	100	99		no./100 mL	100	8/28/14 16:05	8/29/14 15:30	SM 9222D	DAB

LABORATORY RESULTS

Client: Christopher B. Burke Engineering, LTD
Project: Buffalo Grove Creeks
Lab Order: 14H0599
Client Sample ID: IC-1
Lab ID: 14H0599-03
Collection Date: 8/28/14 10:50
Matrix: Water

Analyses	Result	Limit	Qual	Units	DF	Date Prepared	Date Analyzed	Method	Analyst
Anions by Ion Chromatography									
***Chloride**	**178**	25.0		mg/L	500	9/2/14 11:00	9/2/14 15:57	EPA 300.0	JKK
***Fluoride**	**0.152**	0.0400		mg/L	2	9/2/14 11:00	9/3/14 10:41	EPA 300.0	JKK
Conventional Chemistry Parameters									
*Ammonia (as N)	U	0.100		mg/L	1	9/2/14 8:48	9/2/14 11:03	SM 4500-NH3	JLS
*Carbonaceous BOD	U	2.00		mg/L	1	8/29/14 15:11	9/3/14 10:05	SM 5210B	JLS
Microbiological Parameters									
***Fecal Coliform**	**400**	99		no./100 mL	100	8/28/14 16:05	8/29/14 15:30	SM 9222D	DAB

LABORATORY RESULTS

Client: Christopher B. Burke Engineering, LTD
Project: Buffalo Grove Creeks
Lab Order: 14H0599
Client Sample ID: IC-2
Lab ID: 14H0599-04
Collection Date: 8/28/14 10:20
Matrix: Water

Analyses	Result	Limit	Qual	Units	DF	Date Prepared	Date Analyzed	Method	Analyst
Anions by Ion Chromatography									
*Chloride	179	25.0		mg/L	500	9/2/14 11:00	9/2/14 16:16	EPA 300.0	JKK
*Fluoride	0.159	0.0400		mg/L	2	9/2/14 11:00	9/3/14 11:00	EPA 300.0	JKK
Conventional Chemistry Parameters									
*Ammonia (as N)	U	0.100		mg/L	1	9/2/14 8:48	9/2/14 11:03	SM 4500-NH3	JLS
*Carbonaceous BOD	2.56	2.00		mg/L	1	8/29/14 15:11	9/3/14 10:05	SM 5210B	JLS
Microbiological Parameters									
*Fecal Coliform	2000	99		no./100 mL	100	8/28/14 16:05	8/29/14 15:30	SM 9222D	DAB

LABORATORY RESULTS

Client: Christopher B. Burke Engineering, LTD
Project: Buffalo Grove Creeks
Lab Order: 14H0599
Client Sample ID: AC-1
Lab ID: 14H0599-05
Collection Date: 8/28/14 11:50
Matrix: Water

Analyses	Result	Limit	Qual	Units	DF	Date Prepared	Date Analyzed	Method	Analyst
Anions by Ion Chromatography									
***Chloride**	141	25.0		mg/L	500	9/2/14 11:00	9/2/14 16:35	EPA 300.0	JKK
***Fluoride**	0.154	0.0400		mg/L	2	9/2/14 11:00	9/3/14 11:19	EPA 300.0	JKK
Conventional Chemistry Parameters									
*Ammonia (as N)	U	0.100		mg/L	1	9/2/14 8:48	9/2/14 11:03	SM 4500-NH	JLS
***Carbonaceous BOD**	3.40	2.00		mg/L	1	8/29/14 15:11	9/3/14 10:05	SM 5210B	JLS
Microbiological Parameters									
*Fecal Coliform	U	99		no./100 mL	100	8/28/14 16:05	8/29/14 15:30	SM 9222D	DAB

LABORATORY RESULTS

Client: Christopher B. Burke Engineering, LTD
Project: Buffalo Grove Creeks **Lab Order:** 14H0599
Client Sample ID: AC-2 **Lab ID:** 14H0599-06
Collection Date: 8/28/14 9:40 **Matrix:** Water

Analyses	Result	Limit	Qual	Units	DF	Date Prepared	Date Analyzed	Method	Analyst
Anions by Ion Chromatography									
***Chloride**	**188**	25.0		mg/L	500	9/2/14 11:00	9/2/14 16:54	EPA 300.0	JKK
***Fluoride**	**0.140**	0.0400		mg/L	2	9/2/14 11:00	9/3/14 11:38	EPA 300.0	JKK
Conventional Chemistry Parameters									
*Ammonia (as N)	U	0.100		mg/L	1	9/2/14 8:48	9/2/14 11:03	SM 4500-NH3	JLS
***Carbonaceous BOD**	**3.46**	2.00		mg/L	1	8/29/14 15:11	9/3/14 10:05	SM 5210B	JLS
Microbiological Parameters									
***Fecal Coliform**	**600**	99		no./100 mL	100	8/28/14 16:05	8/29/14 15:30	SM 9222D	DAB

LABORATORY RESULTS

Client: Christopher B. Burke Engineering, LTD
Project: Buffalo Grove Creeks
Lab Order: 14H0599
Client Sample ID: KCT-1
Lab ID: 14H0599-07
Collection Date: 8/28/14 11:30
Matrix: Water

Analyses	Result	Limit	Qual	Units	DF	Date Prepared	Date Analyzed	Method	Analyst
Anions by Ion Chromatography									
*Chloride	151	25.0		mg/L	500	9/2/14 11:00	9/2/14 17:13	EPA 300.0	JKK
*Fluoride	0.163	0.0400		mg/L	2	9/2/14 11:00	9/3/14 11:57	EPA 300.0	JKK
Conventional Chemistry Parameters									
*Ammonia (as N)	U	0.100		mg/L	1	9/2/14 8:48	9/2/14 11:03	SM 4500-NH3	JLS
*Carbonaceous BOD	3.22	2.00		mg/L	1	8/29/14 15:11	9/3/14 10:05	SM 5210B	JLS
Microbiological Parameters									
*Fecal Coliform	700	99		no./100 mL	100	8/28/14 16:05	8/29/14 15:30	SM 9222D	DAB

LABORATORY RESULTS

Client: Christopher B. Burke Engineering, LTD
Project: Buffalo Grove Creeks **Lab Order:** 14H0599
Client Sample ID: KCT-2 **Lab ID:** 14H0599-08
Collection Date: 8/28/14 11:10 **Matrix:** Water

Analyses	Result	Limit	Qual	Units	DF	Date Prepared	Date Analyzed	Method	Analyst
Anions by Ion Chromatography									
*Chloride	148	25.0		mg/L	500	9/2/14 11:00	9/2/14 17:32	EPA 300.0	JKK
*Fluoride	0.161	0.0400		mg/L	2	9/2/14 11:00	9/3/14 12:16	EPA 300.0	JKK
Conventional Chemistry Parameters									
*Ammonia (as N)	U	0.100		mg/L	1	9/2/14 8:48	9/2/14 11:03	SM 4500-NH3	JLS
*Carbonaceous BOD	4.03	2.00		mg/L	1	8/29/14 15:11	9/3/14 10:05	SM 5210B	JLS
Microbiological Parameters									
*Fecal Coliform	490	99		no./100 mL	100	8/28/14 16:05	8/29/14 15:30	SM 9222D	DAB

LABORATORY RESULTS

Client: Christopher B. Burke Engineering, LTD
Project: Buffalo Grove Creeks **Lab Order:** 14H0599

Anions by Ion Chromatography - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch X004891 - EPA 300.0/SW 9056A Anions										
Blank (X004891-BLK1)				Prepared & Analyzed: 09/02/2014						
Chloride	U	0.0500	mg/L							
Fluoride	U	0.0200	mg/L							
LCS (X004891-BS1)				Prepared & Analyzed: 09/02/2014						
Chloride	0.156	0.0500	mg/L	0.15000		104	90-110			
Fluoride	0.101	0.0200	mg/L	0.10000		101	90-110			
Matrix Spike (X004891-MS1)		Source: 14H0593-01		Prepared & Analyzed: 09/02/2014						
Fluoride	1.32	0.103	mg/L	0.51282	0.799	102	90-110			
Matrix Spike Dup (X004891-MSD1)		Source: 14H0593-01		Prepared & Analyzed: 09/02/2014						
Fluoride	1.32	0.103	mg/L	0.51282	0.799	102	90-110	0.08	20	

LABORATORY RESULTS

Client: Christopher B. Burke Engineering, LTD
Project: Buffalo Grove Creeks **Lab Order:** 14H0599

Conventional Chemistry Parameters - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch X004826 - EPA 405.1/SM 5210B CBOD										
Blank (X004826-BLK1)				Prepared: 08/29/2014 Analyzed: 09/03/2014						
Carbonaceous BOD	U	2.00	mg/L							
LCS (X004826-BS1)				Prepared: 08/29/2014 Analyzed: 09/03/2014						
Carbonaceous BOD	188	33.3	mg/L	198.00		95	84.6-115.4			
Batch X004847 - SM 4500-NH3 D Ammonia										
Blank (X004847-BLK1)				Prepared & Analyzed: 09/02/2014						
Ammonia (as N)	U	0.100	mg/L							
LCS (X004847-BS1)				Prepared & Analyzed: 09/02/2014						
Ammonia (as N)	5.21	0.100	mg/L	5.0000		104	80-120			
Duplicate (X004847-DUP1)		Source: 14H0613-03		Prepared & Analyzed: 09/02/2014						
Ammonia (as N)	U	0.100	mg/L		ND				20	
Matrix Spike (X004847-MS1)		Source: 14H0613-03		Prepared & Analyzed: 09/02/2014						
Ammonia (as N)	4.70	0.100	mg/L	5.0000	ND	94	80-120			
Matrix Spike Dup (X004847-MSD1)		Source: 14H0613-03		Prepared & Analyzed: 09/02/2014						
Ammonia (as N)	4.70	0.100	mg/L	5.0000	ND	94	80-120	0	20	

LABORATORY RESULTS

Client: Christopher B. Burke Engineering, LTD
Project: Buffalo Grove Creeks **Lab Order:** 14H0599

Notes and Definitions

•	NELAC certified compound.
U	Analyte not detected (i.e. less than RL or MDL).

Chain of Custody Record

Central IL - 1210 Capital Airport Drive - Springfield, IL 62707-8490 - Phone (217) 753-1148 - Facsimile (217) 753-1152
Chicago IL Office - 9114 Virginia Rd., Ste 112 - Lake in the Hills, IL 60156 - Phone (847) 651-2604 - Facsimile (847) 458-9680
Central/Southern IL Office - Phone (217) 414-7762 - Facsimile (217) 223-7922

Prairie Analytical Systems, INCORPORATED
www.prairieanalytical.com

Client	Christopher Burke Engineering
Address	9575 W. Higgins Rd. Ste 600
City, State, Zip Code	Rosemont IL 60018
Phone / Facsimile	847-823-0500
Project Name / Number	Buffalo ~~Grove~~ Grove Creeks
Project Location	Buffalo Grove
P.O. # or Invoice To	Same
Contact Person	Eric Japsen

Analysis and/or Method Requested: CBOD; Ammonia N; Per Fecal; Anions; 8/27/14 Quote - Diane Billings (see attached)

Reporting: TACO ☐ Resid ☐ Ind/Comm; CALM ☐ A ☐ D ☐ B ☐ E ☐ C ☐ F; RISC ☐ Resid ☐ Indust

Sample Description	Sampling Date	Sampling Time	Matrix Code	Preserv Code	No. of Containers	Sample Type Comp	Sample Type Grab	Sampler Comments
BC-1	8/28/14	1220			3		✓	
BC-2		0900					✓	
IC-1		1050					✓	
IC-2		1020					✓	
AC-1		1150					✓	
AC-2		0940					✓	
KCT-1		1130					✓	
KCT-2		1110					✓	

Matrix Code	A - Aqueous	DW - Drinking Water	GW - Ground Water	NA - Non-Aqueous Liquid	S - Solid	O - Oil	X - Other (Specify)
Preserv Code	0 - None	1 - HCl	2 - H2SO4	3 - HNO3	4 - NaOH	5 - S035 Kit	X - Other (Specify)

Relinquished By	Date	Time	Received By	Date	Time	Method of Shipment
Eric Japsen	8/28/14	1300	[illegible]	8/28/14	1300	
[illegible]	8/28/14	1440	[illegible]	8/28/14	1440	
[illegible]	8/28/14	1700	[illegible]	8-29-14	11:00	UPS

Special Instructions:

Turnaround Time: Standard ☑ Rush ☐
Date Required:

QC Level: 1☐ 2☑ 3☐ 4☐

On wet ice? Yes No

Temperature (°C): 6.0

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APPENDIX 3
Decision Document for the Approval of the Des Plaines River/Higgins Creek Watershed, IL, TMDL
August 2013

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W Higgins Road, Suite 600 Rosemont, Illinois 60018-4920 Tel (847) 823-0500 Fax (847) 823-0520

TMDL: Des Plaines River/Higgins Creek Watershed, Illinois
Date: AUG 2 6 2013

DECISION DOCUMENT FOR THE APPROVAL OF THE DES PLAINES RIVER/HIGGINS CREEK WATERSHED, IL, TMDL

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 C.F.R. Part 130 describe the statutory and regulatory requirements for approvable TMDLs. Additional information is generally necessary for EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and EPA regulations, and should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation. Use of the term "should" below denotes information that is generally necessary for EPA to determine if a submitted TMDL is approvable. These TMDL review guidelines are not themselves regulations. They are an attempt to summarize and provide guidance regarding currently effective statutory and regulatory requirements relating to TMDLs. Any differences between these guidelines and EPA's TMDL regulations should be resolved in favor of the regulations themselves.

1. Identification of Waterbody, Pollutant of Concern, Pollutant Sources, and Priority Ranking

The TMDL submittal should identify the waterbody as it appears on the State's/Tribe's 303(d) list. The waterbody should be identified/georeferenced using the National Hydrography Dataset (NHD), and the TMDL should clearly identify the pollutant for which the TMDL is being established. In addition, the TMDL should identify the priority ranking of the waterbody and specify the link between the pollutant of concern and the water quality standard (see section 2 below).

The TMDL submittal should include an identification of the point and nonpoint sources of the pollutant of concern, including location of the source(s) and the quantity of the loading, e.g., lbs/per day. The TMDL should provide the identification numbers of the NPDES permits within the waterbody. Where it is possible to separate natural background from nonpoint sources, the TMDL should include a description of the natural background. This information is necessary for EPA's review of the load and wasteload allocations, which are required by regulation.

The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as:

(1) the spatial extent of the watershed in which the impaired waterbody is located;
(2) the assumed distribution of land use in the watershed (e.g., urban, forested, agriculture);
(3) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources;
(4) present and future growth trends, if taken into consideration in preparing the TMDL (e.g., the TMDL could include the design capacity of a wastewater treatment facility); and

(5) an explanation and analytical basis for expressing the TMDL through *surrogate measures*, if applicable. *Surrogate measures* are parameters such as percent fines and turbidity for sediment impairments; chlorophyll *a* and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

Comment:
Location Description: The Illinois Environmental Protection Agency (IEPA) developed **24** TMDLs for fecal coliform, chloride, ammonia, total phosphorus (TP) and carbonaceous biochemical oxygen demand (CBOD) substances for eighteen waterbody segments in the Des Plaines River/Higgins Creek (Des Plaines River) watershed in Lake, Cook, and DuPage Counties, Illinois. By implementing measures to reduce pollutant loadings, the TMDLs will address impairments of the Primary Contact Recreation, Aesthetic Quality, and Aquatic Life Uses. Table 1 below identifies the waterbodies addressed by the TMDLs as they appear on the partially approved Illinois 2008 303(d) list.

Table 1. TMDL waterbodies

Waterbody	Segment ID #	Pollutant*	Affected use
Albert Lake	IL_VGG	TP	Aquatic Life, Aesthetic Quality
Beck Lake	IL_RGE	TP	Aesthetic Quality
Big Bear Lake	IL_WGZU	TP	Aquatic Life, Aesthetic Quality
Big Bend Lake	IL_RGL	TP	Aesthetic Quality
Bresen Lake	IL_UGN	TP	Aesthetic Quality
Buffalo Creek Lake	IL_SGC	TP	Aquatic Life, Aesthetic Quality
Countryside Lake	IL_RGQ	TP	Aesthetic Quality
Diamond Lake	IL_RGB	TP	Aesthetic Quality
Forest Lake	IL_RGZG	TP	Aesthetic Quality
Half Day Pit	IL_UGB	TP	Aquatic Life, Aesthetic Quality
Lake Charles	IL_RGZJ	TP	Aesthetic Quality
Little Bear Lake	IL_WGZV	TP	Aesthetic Quality
Pond-A-Rudy	IL_UGP	TP	Aquatic Life, Aesthetic Quality
Salem Reed Lake	IL_WGK	TP	Aesthetic Quality
Sylvan Lake	IL_RGZF	TP, Fecal	Aesthetic Quality
Buffalo Creek	IL_GST	Chloride, Fecal, CBOD, ammonia	Aquatic Life, Recreational
Higgins Creek	IL_GOA-01	Chloride, Fecal	Aquatic Life, Recreational
Higgins Creek	IL_GOA-02	Chloride, Fecal	Aquatic Life, Recreational

* TP = total phosphorus, fecal = fecal coliform

The Des Plaines River watershed is located in northeast Illinois (HUC 0712000405). The Des Plaines River begins in Wisconsin and flows south, eventually merging with the Chicago Ship and Sanitary Canal and flowing into the Illinois River. The TMDLs address several waterbodies: fifteen lakes and two tributaries of the Des Plaines River (Figure 2-2 of the TMDL). The Illinois portion of the Des Plaines watershed covers approximately 223,000 acres. The TMDLs address nine miles of Buffalo Creek and three miles of Higgins Creek, both tributaries to the Des Plaines River. The TMDL report also addresses fifteen lakes in the watershed, ranging in size from 14 acres to 141 acres (Section 2.7 of the TMDL). Several lakes are natural, while several are the result of damming small tributaries in the area or old quarries/borrow pits from nearby road

construction. The waterbodies are listed as impaired due to the pollutants listed above. The TMDL does not address any of the impaired mainstem segments of the Des Plaines River.

Distribution of land use: The land use for the Des Plaines River watershed is mainly urban in nature, with approximately 66% urbanized, 17% forested, and 12% agricultural (Section 2.3 of the TMDL). Most of the forested lands are along the mainstem of the Des Plaines River. Table 2 below contains the specific land use data for each of the impaired waterbodies.

Table 2: Land Use Data for the Des Plaines River Watershed

Watershed	Agricultural land	Forested land	Surface water	Urban and built-up land	Wetland
Entire Des Plaines/Higgins Creek Watershed	11.8%	16.6%	2.7%	65.6%	2.1%
Albert Lake	1.6%	15.6%	1.9%	79.5%	1.2%
Beck Lake	--	56.5%	10.8%	30.7%	2.0%
Big Bear and Little Bear Lake	1.7%	5.9%	3.7%	88.1%	0.7%
Big Bend Lake	--	17.5%	6.2%	74.1%	2.2%
Bresen Lake	19.1%	11.7%	10.4%	52.4%	6.4%
Buffalo Creek	1.7%	19.4%	1.9%	74.1%	3.0%
Buffalo Creek Lake	1.9%	21.9%	2.0%	70.6%	3.3%
Countryside Lake	45.1%	18.2%	10.5%	26.4%	1.7%
Diamond Lake	32.6%	12.7%	8.5%	44.5%	1.7%
Forest Lake	5.3%	8.4%	7.6%	77.5%	1.2%
Half-day Pit	--	17.8%	41.9%	31.9%	8.3%
Higgins Creek	0.1%	7.1%	1.3%	91.0%	0.5%
Lake Charles	2.2%	6.6%	2.2%	88.5%	0.8%
Pond-a-Rudy	11.1%	35.0%	5.7%	38.2%	10.0%
Salem-Reed	11.3%	18.9%	27.8%	35.6%	6.8%
Sylvan Lake	38.0%	15.3%	5.8%	39.2%	1.6%

Population and future growth trends: The population of the watershed is approximately 915,000 people (Section 2.5 of the TMDL). Census data show the population density is highest in the southern portion of the watershed in Chicago, and more sparse in the northern portion of the watershed. IEPA noted that population growth is expected to increase significantly in the northern portions of the watershed (Section 2.6 of the TMDL).

Pollutants of concern: The TMDL submittal states the pollutants addressed in this TMDL for the watershed are fecal coliform, ammonia, chloride, CBOD, and TP (Table 1 above). One segment of Higgins Creek (IL_GOA_02) was identified as impaired due to low dissolved oxygen (DO). IEPA determined that the cause of the low DO is Sediment Oxygen Demand and the lack of re-aeration/low flow, and is not due to a pollutant. Therefore, IEPA did not develop a TMDL addressing low DO for this segment (Section 7.2.5 of the TMDL). All of the lakes have phosphorus TMDLs to either directly address exceedences of the phosphorus water quality standard or to control low dissolved oxygen (DO) levels in the lakes. Both segments of Higgins Creek are impaired due to high levels of fecal coliform and chlorides.

Buffalo Creek is impaired due to high levels of fecal coliform and chlorides, and low DO. To address the DO impairment, IEPA determined that CBOD and ammonia are the two pollutants that need to be controlled to improve the DO levels in the creek (Section 2 of the TMDL).

Organic material such as leaves, bacteria, algae and various sorts of organic debris can enter waterbodies and decay. This is particularly prevalent when flow velocities decrease. These materials can decay in the water, and the decomposition uses oxygen to break down the organic material. CBOD is defined as the carbonaceous portion of the material. The decomposition of nitrogen materials (nitrification) also utilizes oxygen as ammonia is converted to nitrites and then nitrates.

Sources:
Fecal coliform: IEPA identified several non-stormwater point sources which discharge fecal coliform to Buffalo Creek or Higgins Creek (Table 5-6 of the TMDL). Lands regulated under a Municipal Separate Storm Sewer System (MS4) cover 75% of the overall watershed, and were the largest source of fecal coliform for each TMDL (Section 7 of the TMDL). Runoff from urban lands can contain fecal coliform as a result of wildlife and pet wastes washing off during precipitation, as well as illicit connections of septic systems to the MS4 system. Figure 5-14 of the TMDL shows the MS4 entities and the watersheds in which they are located. IEPA noted that no concentrated animal feeding operations (CAFOs) are present in the watershed.

Several potential non-point sources were identified by IEPA. Agricultural lands can contribute bacteria through runoff of soils and other materials. This can be exacerbated by tile drains, which allow faster transmission of pollutant-laden runoff to waterbodies. Animal operations can contribute fecal coliform to the waterbody, via runoff from pastures located near streams.

IEPA noted that aging sewer systems could be contributing fecal coliform to the Higgins Creek and Buffalo Creek watersheds (Section 8.5.2 of the TMDL). Since almost all of the watersheds are served by sanitary sewer collection systems, failing septics are considered unlikely; however, leaks from aging infrastructure are possible.

Chlorides: The source of chlorides in Higgins Creek and Buffalo Creek is run-off due to de-icing activities (Section 7 of the TMDL). Much of the watershed for Higgins Creek and Buffalo Creek are highly urbanized, and large amounts of salt are used to de-ice roads, bridges, and parking lots. IEPA noted that exceedences of the chloride criteria occurred during the months of October to March (Appendix F of the TMDL).

CBOD and Ammonia:
Buffalo Creek was listed as impaired by IEPA due to low DO levels in the creek. Sources identified by IEPA in the TMDL as contributing to the DO impairment include stormwater runoff from the surrounding watershed, and nonpoint source runoff from forests and other non-regulated land uses (Section 8.4.2 of the TMDL).

Buffalo Creek Lake is a man-made impoundment of Buffalo Creek, and is directly upstream of the impaired portion of Buffalo Creek. IEPA noted that the lake is impaired due to low DO as well, and believe that the flow from the lake contributes to the DO impairment in the creek. IEPA believes that the high levels of ammonia and CBOD material in the creek indicate that ammonia and CBOD materials are entering the creek, and when the flow slows down in the reservoir, the ammonia and CBOD substances break down by either conversion of ammonia or the decomposition process.

Total Phosphorus: The sources of phosphorus in the Des Plaines watershed include:

MS4 discharge: Runoff from urbanized land can contain significant amounts of phosphorus. Fertilizers used on lawns and other landscaping can contain phosphorus, which are washed off during precipitation events. Pet waste and waste from other animals (i.e., geese) can also contribute phosphorus via stormwater runoff. Drainage from impervious surfaces can increase the flow rate in the MS4 system and increase streambank erosion. These soils are usually phosphorus-rich, and can contribute to the phosphorus enrichment when they enter the slower waters of a lake.

Agricultural land use practices: A few of the lakes have significant amounts of agricultural lands in the watershed (Section 5.3 of the TMDL). Runoff from agricultural lands may contain significant amounts of phosphorus from fertilizer use or from phosphorus-rich soils washed in to the lakes.

Wildlife/Natural Sources: Deer, geese, ducks, and other animals may contribute phosphorus to the lakes. Several of the lakes are surrounded by forest and parkland, and may receive phosphorus in the form of organic debris such as leaves and other plant material.

Priority Ranking: The Des Plaines River watershed was given a medium priority ranking by IEPA.

EPA finds that the TMDL document submitted by IEPA satisfies all requirements concerning this first element.

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy. (40 C.F.R. §130.7(c)(1)). EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

The TMDL submittal must identify a numeric water quality target(s) - a quantitative value used to measure whether or not the applicable water quality standard is attained. Generally, the pollutant of concern and the numeric water quality target are, respectively, the chemical causing the impairment and the numeric criteria for that chemical (e.g., chromium) contained in the water quality standard. The TMDL expresses the relationship between any necessary reduction of the pollutant of concern and the attainment of the numeric water quality target. Occasionally, the pollutant of concern is different from the pollutant that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorus and the numeric water quality target is expressed as Dissolved Oxygen (DO) criteria). In such cases, the TMDL submittal should explain the linkage between the pollutant of concern and the chosen numeric water quality target.

Comment:

Designated Use/Standards: Section 4 of the TMDL states that the waterbodies in the Des Plaines River watershed are not meeting the General Use designation. Under the General Use classification, waters are further designated as impaired for Aquatic Life Use, Aesthetic Quality

Use, and Primary Contact Recreational Use. Table 1 above shows the various waterbody segments and the associated impaired uses.

The applicable General Use water quality standards (WQS) for these waterbodies are established in Illinois Administrative Rules Title 35, Environmental Protection; Subtitle C, Water Pollution; Chapter I, Pollution Control Board; Part 302, Water Quality Standards, Subpart B. Table 2 below lists the all the parameters and the applicable citation under the Illinois Code.

Table 2 Numeric Water Quality Standards for the Des Plaines River Watershed

Parameter	units	General Use Water Quality Standard
Chloride	mg/L	500
Dissolved Oxygen	mg/L	March – July 5.0 instantaneous minimum 6.0 as daily mean averaged over 7 days August – February 3.5 instantaneous minimum 4.0 as daily mean averaged over 7 days 5.5 as daily mean averaged over 30 days
Fecal Coliform	cfu/100 mL	200(1), 400(2) May through October
Total Phosphorus	mg/L	0.05(3)

(1) Geometric mean based on a minimum of five samples taken over not more than a 30-day period.
(2) Standard shall not be exceeded by more than 10 percent of the samples collected during any 30-day period.
(3) Standard applies in particular to inland lakes and reservoirs (greater than 20 acres) and in any stream at the point where it enters any such lake or reservoir.

Target: The water quality targets for these TMDLs are the water quality criteria in Table 2 above. The TP criterion does not apply to several of the lakes in the Des Plaines watershed as they are below the minimum lake size (<20 acres). Sampling data showed that these lakes are impaired due to low DO. To address the low DO, IEPA determined that controlling the TP loads into the lakes will result in attaining the DO standard, and therefore calculated TP TMDLs for these lakes (Albert Lake, Half Day Pit, and Pond-A-Rudy).

To address the DO impairment in Buffalo Creek, IEPA determined that CBOD and ammonia were the surrogate pollutants that needed to be reduced in Buffalo Creek. Specific target concentrations were not determined; rather, IEPA used a computer model to determine the maximum loading of CBOD and ammonia that would attain the DO criterion (See Section 3 of this Decision Document).

EPA finds that the TMDL document submitted by IEPA satisfies all requirements concerning this second element.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

A TMDL must identify the loading capacity of a waterbody for the applicable pollutant. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 C.F.R. §130.2(f)).

The pollutant loadings may be expressed as either mass-per-time, toxicity or other appropriate measure (40 C.F.R. §130.2(i)). If the TMDL is expressed in terms other than a daily load, e.g., an annual load, the submittal should explain why it is appropriate to express the TMDL in the unit

of measurement chosen. The TMDL submittal should describe the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In many instances, this method will be a water quality model.

The TMDL submittal should contain documentation supporting the TMDL analysis, including the basis for any assumptions; a discussion of strengths and weaknesses in the analytical process; and results from any water quality modeling. EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

TMDLs must take into account *critical conditions* for steam flow, loading, and water quality parameters as part of the analysis of loading capacity. (40 C.F.R. §130.7(c)(1)). TMDLs should define applicable *critical conditions* and describe their approach to estimating both point and nonpoint source loadings under such *critical conditions*. In particular, the TMDL should discuss the approach used to compute and allocate nonpoint source loadings, e.g., meteorological conditions and land use distribution.

Comment:
Loading capacity: The loading capacities were calculated for each waterbody, and are found in Section 7 of the TMDL. Tables 3-11 below are a summary of the loading capacities for each of the pollutants for each impaired waterbody in the watershed.

Method for cause and effect relationship:
Fecal coliform (rivers), chlorides: The loading capacities for fecal coliform and chlorides for the impaired river segments in the Des Plaines River watershed were determined by using the load duration curve method (LDC) (Tables 3-8 below; Sections 6.2 and 6.4 of the TMDL). Pollutant concentrations were measured at water quality monitoring stations in the watershed (Appendix B of the TMDL). An explanation is provided below.

1. Flow data - First, continuous flow data are required, and are provided by U.S. Geological Survey (USGS) gages 05528500 located on Buffalo Creek just downstream of the impaired segment, and 05529500 located on McDonald Creek, approximately 5 miles north of Higgins Creek (Figure 2-11 of the TMDL). IEPA used an area-weighted calculation to calculate flows between the McDonald Creek gage and Higgins Creek, as discussed in Section 7.1.2 of the TMDL. The data reflect a range of natural occurrences from extremely high flows to extremely low flows over 55 years.
2. Water Quality data - This dataset is the monitored pollutant data for fecal coliform and chlorides (Section 7 and Appendix B of the TMDL).
3. Load Duration Curves - The plots are derived from the flow data and water quality data described above. Existing monitored water pollutant loads, represented by the points on the plot, are compared to target loads, the water quality standard line (200 cfu/100 mL). If the existing loads are below (less than) the target line, no reduction needs to occur. Conversely, if the existing loads are above (greater than) the target load, a reduction is necessary to reach the target (Appendix F of the TMDL).
4. Analysis - The final step is to link the geographic locations of load reductions needed to the flow conditions under which the exceedences occur. Specific flow regimes contributing to pollutant loads, represented by the graph, are identified to determine under what flow conditions the pollutant exceedences are occurring. The LDCs in the

TMDL show that the exceedences occur under varied flow conditions. By knowing the flow conditions under which exceedences are occurring, IEPA can focus implementation activities on those sources most likely to contribute loads.

The plots show under what flow conditions the water quality exceedences occur. Those exceedences at the right side of the graph occur during low flow conditions; exceedences on the left side of the graphs occur during higher flow events, such as storm runoff. IEPA provided analysis for each LDC, to determine under which flow conditions exceedences (or the most severe exceedences) occurred (Section 7 of the TMDL).

Review of the LDCs for fecal coliform for the two segments of Higgins Creek (IL_GOA-01 and IL_GOA-02) show that exceedences occur generally under all flow conditions, and thus likely from a variety of sources. For Buffalo Creek (IL_GST), exceedences occur generally under all flow conditions, and thus likely from a variety of sources as well.

Review of the LDCs for chlorides for the two segments of Higgins Creek (IL_GOA-01 and IL_GOA-02) show that exceedences occur generally under all flow conditions, while for Buffalo Creek (IL_GST), exceedences occur generally under higher flows conditions. IEPA conducted additional analysis to determine the seasonal changes in chloride loads. Appendix F of the TMDL contains LDCs for October through March. These LDCs show the exceedences occur much more often in the winter higher flow conditions, further evidence of the impact of de-icing activities.

Using the load duration curve approach allows IEPA to determine which implementation practices are most effective for reducing pollutant loads based on flow magnitude. For example, if loads are significant during storm events, implementation efforts can target those best management practices (BMPs) that will most effectively reduce runoff. This allows for a more efficient implementation effort. The load duration curve is a cost-effective TMDL approach, to address the reductions necessary to meet WQS for these pollutants.

Weaknesses of the TMDL analysis are that non-point source (NPS) load allocations were not assigned to specific sources within the watershed, and the identified sources of the pollutants were assumed based on the data collected in the watershed, rather than determined by detailed monitoring and sampling efforts. Moreover, specific source reductions were not quantified. However, EPA believes the strengths of the State's proposed TMDL approach outweigh the weaknesses and that this methodology is appropriate based upon the information available. In the event that the pollutant levels do not meet WQSs in response to implementation efforts described in the TMDL submittal, the TMDL implementation strategy may be amended as new information on the watershed is developed.

Fecal coliform (Sylvan Lake): The loading capacity for fecal coliform for Sylvan Lake is in Table 9 below. Sylvan Lake was the only lake in the watershed found to be impaired by pathogens. Since the LDC process does not work for lakes, IEPA used the Simple Method and a mass balance process to develop fecal coliform loads for Sylvan Lake (Section 6.2 of the TMDL). The Simple Method estimates loads from runoff in urban areas (Stormwater.net download 6/28/2013). The method utilizes drainage areas, impervious cover, precipitation rates, and runoff rates based upon land use categories. The Simple Method was used to determine the runoff load contributions to the lake. The mass balance was used to determine the loading in the

lake under current conditions. The Simple Method was then adjusted to determine the loading that would achieve the WQS (Section 7.1.4 of the TMDL). Appendix F of the TMDL contains details on the runoff rates and land use areas for Sylvan Lake.

Total phosphorus/DO (Lakes): The loading capacities for total phosphorus for the lakes in the Des Plaines River watershed are in Table 10 below. The loading capacities were determined by IEPA by use of the Lake Load Response Model (LLRM) (Section 6.1 of the TMDL).

The LLRM combines an export coefficient (runoff) model with empirical in-lake response models. Export coefficients for each of the land uses in the watershed for each lake were used to determine phosphorus loading. The loading estimates were adjusted based upon soil type, proximity to the lake, and major Best Management Practices (BMPs) in the watershed. The factors were adjusted to reflect actual sampling data in each watershed. The model also allows direct inputs for atmospheric deposition, septic systems, point sources, waterfowl, and internal loading. Once the watershed loadings were determined, the loads were then processed through several empirical models, and the average TP concentration determined. The models were calibrated to existing lake water quality data where possible. Once calibrated, the loading into the lake was adjusted until the in-lake target of 0.5 mg/L TP standard was met (Sections 6.1 and 7.3 and Appendix H of the TMDL).

For Big Bend Lake (IL_RGL) and Half Day Pit (IL_UGB), the model was revised to account for occasional inflow from the Des Plaines River. Under normal conditions, these lakes flow into the Des Plaines River. However, under high flows, flow can be reversed, and phosphorus-rich water from the Des Plaines River can flow into the two lakes. To account for the flow, IEPA revised the LLRM model to assume 50 % of each of the lakes contained Des Plaines River water during the top 5% of river flows (Sections 7.3.4 and 7.3.10 of the TMDL).

DO (Buffalo Creek): To address the DO impairment in Buffalo Creek, IEPA used the QUAL-2K model to determine the pollutant loadings (Section 6.3 of the TMDL). QUAL-2K determines the effects of various oxygen-demanding substances (phosphorus, CBOD, nitrates, algae, etc.) and determines resulting DO concentration. QUAL-2K is a one-dimensional, steady-state model that accounts for both point and nonpoint source loading. QUAL-2K allows non-uniform reach segmentation, various forms of oxygen-demanding substances, and accounts for anoxia and sediment-water interface reactions.

The QUAL-2K model was developed by IEPA to determine the impacts of CBOD and ammonia on DO levels in the creek. The creek and related tributaries were divided into segments, and the physical characteristics of each segment estimated. Weather data, flow data, and water quality data were used in the model, as well as point source effluent data. The IEPA water quality standard for DO of 5 mg/L was used as the model target (Section 7.2.2 and Appendix G of the TMDL). The 5.0 mg/L target was chosen to meet or exceed the instantaneous DO minimum WQS of 5.0 mg/L (March to July) and 3.5 mg/L (August to February). Review of the model results indicates that the weekly and monthly average WQS for DO would be expected to be met when the instantaneous minimum is met (Figure 5-6, Figure 5-7, and Figure G-2 of the TMDL). The resulting CBOD and ammonia loads are in Table 11 below.

Higgins Creek (IL_GOA-02) is also listed as impaired by IEPA (Section 7.2.5 of the TMDL). QUAL-2K was also used to determine the impacts of CBOD and ammonia reductions on the DO

levels in the creek. IEPA determined that reductions in CBOD, ammonia, or phosphorus had little effect on DO levels in the creek. IEPA stated that the model results suggest sediment oxygen demand (SOD) is the major contributor to low DO levels in the creek. SOD is the oxygen demand caused by organic and chemical substances at the sediment-water interface at the bottom of the creek. IEPA believes that the SOD demand as well as a small dam in the segment and related low reaeration of the creek are the source of the low DO levels in Higgins Creek. Based upon the presence of these non-pollutants, IEPA did not develop a TMDL for Higgins Creek (Section 7.2.5 of the TMDL).

Critical condition:
For fecal coliform, a specific flow critical condition was difficult to identify. The load duration curves indicate exceedences are occurring under all flow regimes, and thus differing conditions may contribute to impairment. For water quality, the critical condition was identified as the primary contact recreational season (May through October). The LDC process used by IEPA allows the State to target implementation activities to those flow regimes showing the greatest loading.

For chlorides, the critical condition is winter, when the predominant source is salt used for deicing activities. The implementation activities discussed in the TMDL focus on controlling this source.

For TP, CBOD, and ammonia, the critical condition was identified as the summer low flow conditions. During the summer months, instream flows are lower, water temperatures are higher, and retention time in the lakes is greatest. Under these conditions, the three pollutants are available for uptake by algae and macrophytes, which utilize oxygen when they die and decompose.

EPA finds that the TMDL document submitted by IEPA satisfies all requirements concerning this third element.

4. Load Allocations (LAs)

EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity attributed to existing and future nonpoint sources and to natural background. Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. §130.2(g)). Where possible, load allocations should be described separately for natural background and nonpoint sources.

Comment:
Fecal coliform and chlorides: The LAs for the impaired waterbodies in the Des Plaines River watershed are found in Tables 3-11 below. The LAs are based upon the flow in the river (Section 7.1 of the TMDL). IEPA did not separate out a natural background component.

TP: The LAs for the impaired waterbodies in the Des Plaines River watershed are found in Table 10 below. IEPA did not develop LAs for various land uses. IEPA did determine a natural background concentration for the lakes. This was accomplished by setting the land uses in the LLRM model to forest/wetland, and increasing the attenuation rate by 10%. IEPA noted that for Bresen Lake, Big Bend Lake, and Half Day Pit, the natural background concentration exceeded

the WQS, suggesting that the lakes may not be able to attain the WQS. The natural background concentration for Salem Reed Lake is also very close to the WQS.

IEPA also determined an upper bound for TP concentrations by adjusting the LLRM model to convert forest and agricultural lands to low density urban land and reducing attenuation by an additional 10% (Section 7.3 of the TMDL). While no load was determined for the future scenario, the calculation showed the "worst case" scenario that might be expected if development is not better managed.

CBOD and ammonia: The LAs for the impaired waterbodies in the Des Plaines River watershed are found in Table 11 below. IEPA did not separate out a natural background component.

EPA finds that the TMDL document submitted by IEPA satisfies all requirements concerning this fourth element.

5. Wasteload Allocations (WLAs)

EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to individual existing and future point source(s) (40 C.F.R. §130.2(h), 40 C.F.R. §130.2(i)). In some cases, WLAs may cover more than one discharger, e.g., if the source is contained within a general permit.

The individual WLAs may take the form of uniform percentage reductions or individual mass based limitations for dischargers where it can be shown that this solution meets WQSs and does not result in localized impairments. These individual WLAs may be adjusted during the NPDES permitting process. If the WLAs are adjusted, the individual effluent limits for each permit issued to a discharger on the impaired water must be consistent with the assumptions and requirements of the adjusted WLAs in the TMDL. If the WLAs are not adjusted, effluent limits contained in the permit must be consistent with the individual WLAs specified in the TMDL. If a draft permit provides for a higher load for a discharger than the corresponding individual WLA in the TMDL, the State/Tribe must demonstrate that the total WLA in the TMDL will be achieved through reductions in the remaining individual WLAs and that localized impairments will not result. All permittees should be notified of any deviations from the initial individual WLAs contained in the TMDL. EPA does not require the establishment of a new TMDL to reflect these revised allocations as long as the total WLA, as expressed in the TMDL, remains the same or decreases, and there is no reallocation between the total WLA and the total LA.

Comment:
Fecal coliform: For the fecal coliform TMDLs for Higgins Creek and Buffalo Creek, IEPA identified 4 non-stormwater facilities permitted to discharge under the National Pollutant Discharge Elimination System (NPDES) that discharge into or upstream of the creeks. IEPA also identified several MS4 communities that discharge to the impaired segments (Tables 12-17 below; Section 7.1 of the TMDL).

To calculate the WLAs, IEPA used the fecal coliform standard (200 cfu/100 mL) times the design maximum flow for the high flow range, and the design average flow for the moist, mid-range, dry and low flow regimes (Section 7.1 of the TMDL). For the MS4 allocations, the

allocations are based upon the fecal coliform standard (200 cfu/100 mL) and the percentage of land area covered by the MS4 permit.

For the Sylvan Lake fecal coliform TMDL, IEPA identified two MS4 communities in the watershed. The WLAs were calculated based upon the fecal coliform standard (200 cfu/100 mL) and the percentage of land area covered by the MS4 permits (Section 7.1.4 of the TMDL, Table 9 below). IEPA did not identify any CAFOs in the watershed (WLA = 0).

Chlorides: For the chloride TMDLs for Higgins Creek and Buffalo Creek, IEPA determined that the non-stormwater dischargers in the watershed do not discharge chloride in their effluent, and therefore the WLA = 0 for these facilities (Section 7.1.2.4 of the TMDL). As discussed in Section 3 above in this decision document, the exceedences of the chloride standard occurs during the winter months due to de-icing activities. The WLA for the MS4 communities is based upon the water quality standard (500 mg/L) and the percentage of land area covered by the MS4 permit (Table 15-17 below).

The Illinois Tollway Authority is currently pursuing an expansion of the Elgin-O'Hare Expressway. Part of this expansion could occur in the Higgins Creek Watershed (Elgin O'Hare West Bypass Study Tier Two EIS, October, 2012). The WLAs approved as part of this TMDL Decision Document may change based upon the status of the expansion. IEPA is not required to reopen the TMDL as long as the revised individual WLAs do not exceed the sum of the WLA (Considerations for Revising and Withdrawing TMDLs (draft), EPA, May 2012).

CBOD and ammonia: For the CBOD and ammonia TMDLs for Buffalo Creek, IEPA identified two non-stormwater facilities permitted to discharge under the NPDES program that discharge into or upstream of the creek. IEPA also identified several MS4 communities that discharge to the impaired segments (Table 18 below; Section 7.2.2.2 of the TMDL).

To calculate the WLAs, IEPA used the maximum daily permit limit times the design maximum flow for the two facilities. No WLA for ammonia was calculated for the Alden Long Grove Rehab facility (Section 7.2.2.2 of the TMDL). For the MS4 allocations, the allocations are based upon the overall CBOD and ammonia reductions needed to achieve the DO standard (39% for CBOD, 30% for ammonia) applied to the land area for each MS4 permit.

TP: The WLAs for TP are found in Table 19 below. For the TP TMDLs for the lakes in the watershed, IEPA identified only one lake (Buffalo Creek Lake, IL_SGC) where non-stormwater-permitted sources are present. To determine the WLA for the two facilities, IEPA used the permitted effluent limit and average discharge flow in the LLRM model (Section 7.3 of the TMDL). For the MS4 allocations, the allocations are based upon the overall phosphorus reductions needed to achieve the phosphorus standard applied to the land area for each MS4 permit.

EPA finds that the TMDL document submitted by IEPA satisfies all requirements concerning this fifth element.

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)). EPA's 1991 TMDL Guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.

Comment:
Fecal coliform and chlorides: For fecal coliform and chlorides, IEPA used an explicit MOS of 10% (Table 3-11 below, Section 7.1.6 of the TMDL) for all waters except Higgins Creek (IL_GOA-01). The margin of safety is appropriate because the use of the LDC provides an accurate account of existing stream conditions (calculated by multiplying daily flows by existing pollutant levels), and an accurate account of the stream's loading capacity (calculated by multiplying daily flows by the appropriate water quality target). In other words, there is a good fit between observed (existing) data and predicted data using the LDC approach, thus providing a relatively accurate determination of the TMDL reductions needed. IEPA accounts for any uncertainty in this method by incorporating the MOS.

IEPA also included additional MOS in the TMDL because no rate of decay was used in calculations or in load duration curves for the fecal coliform. Because bacteria have a limited capability of surviving outside their hosts, a rate of decay would normally be used. Thus, it was determined by IEPA that it is more conservative to use the water quality standard of 200 cfu/100ml fecal coliform, and not to apply a rate of decay which could result in a discharge limit greater than the water quality standard.

As stated in *EPA's Protocol for Developing Pathogen TMDLs* (EPA 841-R-00-002), many different factors affect the survival of pathogens, including the physical condition of the water. These factors include, but are not limited to sunlight, temperature, salinity, and nutrient deficiencies. These factors vary depending on the environmental condition/circumstances of the water, and therefore it would be difficult to assert that the rate of decay caused by any given combination of these environmental variables was sufficient enough to meet the WQS of 200 cfu/100 ml and 400 cfu/100ml. Thus, it is more conservative to apply the State's water quality standard as the margin of safety, because this standard must be met at all times under all environmental conditions.

For Higgins Creek, IEPA did not determine an explicit MOS; the MOS is the implicit MOS as discussed above. The flow in Higgins Creek is almost entirely effluent from the Kirie WWTP. Flow records indicate that over 90% of the stream flow is effluent, and over 99% under dry to low flows. Since the facility is required to disinfect and monitor the discharge, there is less uncertainty associated with the fecal coliform loading to this segment.

Phosphorus: IEPA uses an explicit 10% MOS for phosphorus for the lakes in the Des Plaines River watershed (Table 10 below; Section 7.3.17 of the TMDL). IEPA believes the MOS is sufficient based upon the relatively small watersheds surrounding the lakes, thus limiting the

uncertainty in sources, and the LLRM model process, which took the average of 5 separate model formulas to determine the appropriate loading capacity for each lake. This process served to reduce uncertainty as well.

CBOD and ammonia: IEPA used an explicit 10% MOS for CBOD and ammonia for Buffalo Creek (Table 11 below; Section 7.2.8 of the TMDL). A simple calibration of the QUAL2K model was performed, comparing the modeled data to the actual sampling data, and the model was then adjusted to meet the actual data.

EPA finds that the TMDL document submitted by IEPA contains an appropriate MOS satisfying all requirements concerning this sixth element.

7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The TMDL must describe the method chosen for including seasonal variations. (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)).

Comment:
IEPA properly accounted for seasonality for the fecal coliform and chloride TMDLs by use of the LDC method, which inherently accounts for seasonal variation by using daily flows over a multi-year period (Section 6 of the TMDL). IEPA properly accounted for seasonality in the phosphorus TMDLs by use of monthly average precipitation records over a multi-year period in the LLRM model (Sections 2.6 and 6.1 of the TMDL). The LLRM model used the precipitation data together with the export coefficients to determine the runoff from various land uses. This would include seasonal variations in precipitation. For the DO model, the QUAL-2K model uses temperature and precipitation records to determine DO levels in Buffalo Creek. The model effort focused on the summer DO levels to account for season variations. EPA agrees that this properly accounts for seasonal variations.

EPA finds that the TMDL document submitted by IEPA satisfies all requirements concerning this seventh element.

8. Reasonable Assurances

When a TMDL is developed for waters impaired by point sources only, the issuance of a National Pollutant Discharge Elimination System (NPDES) permit(s) provides the reasonable assurance that the wasteload allocations contained in the TMDL will be achieved. This is because 40 C.F.R. 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with "the assumptions and requirements of any available wasteload allocation" in an approved TMDL.

When a TMDL is developed for waters impaired by both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur, EPA's 1991 TMDL Guidance states that the TMDL should provide reasonable assurances that nonpoint source control measures will achieve expected load reductions in order for the TMDL to be approvable. This information is necessary for EPA to determine that the TMDL, including the

load and wasteload allocations, has been established at a level necessary to implement water quality standards.

EPA's August 1997 TMDL Guidance also directs Regions to work with States to achieve TMDL load allocations in waters impaired only by nonpoint sources. However, EPA cannot disapprove a TMDL for nonpoint source-only impaired waters, which do not have a demonstration of reasonable assurance that LAs will be achieved, because such a showing is not required by current regulations.

Comment:
Point Sources (fecal coliform, phosphorus, CBOD, ammonia): Reasonable assurance that the WLAs will be implemented is provided by 40 CFR 122.44(d)(1)(vii)(B),which requires that NPDES permit effluent limits are consistent with assumptions and requirements of all WLAs in an approved TMDL. IEPA implements its storm water and NPDES permit programs and is responsible for incorporating WLAs into permits. Current NPDES permits will remain in effect until the permits are reissued, provided that IEPA receives the NPDES permit renewal application prior to the expiration date of the existing NPDES permit. Current and future facilities subject to the NPDES MS4 permits would be required to properly select, install, and maintain BMPs required under the permit to reduce pollutant loads from these sources (Section 8 of the TMDL).

Reasonable assurance that WLA will be incorporated into MS4 permits is provided by the current General NPDES MS4 Permit ILR40. Part III- Special Conditions (C) of ILR40 requires the permitted entity to review their storm water management plan and determine whether the discharges within their jurisdiction are meeting the TMDL allocation or approved watershed management plan. If they are not meeting the TMDL allocations, they must modify their storm water management program to implement the TMDL or watershed management plan within eighteen months of notification by IEPA of the TMDL or watershed management approval. The special conditions of the general permit also require the permitted entity to describe and implement a monitoring program to determine if storm water controls are meeting the WLA (General NPDES Permit No. ILR40).

Nonpoint Sources: Nonpoint source loads of pollutants are relatively low in the impaired waterbodies, as much of the land area around the creeks are regulated under MS4 permits. There are few agricultural activities in the Buffalo Creek or Higgins Creek watershed.

In Lake County, the Lake County Stormwater Management Commission (LCSMC) has developed a detailed watershed management plan for the Indian Creek watershed. This plan addresses most of the lake TMDLs, and contains information on the impairment sources in the watershed, storm water BMP inventory programs, funding sources, proposed regulatory actions, and Lake County hydrologic modeling results. This plan has been developed to address not only water quality issues, but water quantity issues in the county. A plan is under development for the Buffalo Creek Watershed. (http://www.lakecountyil.gov/Stormwater/LakeCountyWatersheds/Pages/WatershedManagementPlans.aspx). The county also holds annual training for de-icing contractors, who upon completion of the training and testing will have their names added to a "preferred provider" list maintained by the county.

Lake County also has regulatory controls for stormwater. The Lake County Watershed Development Ordinance (WDO) provides regulatory controls for county and approved municipalities. The WDO establishes minimum countywide standards for stormwater management, including floodplains, detention, soil erosion/sediment control, water quality treatment, and wetlands. (http://www.lakecountyil.gov/Stormwater/FloodplainStormwaterRegulations/WDOandTRM/Pages/default.aspx)

In Cook County, the county is in the process of developing a Stormwater Ordinance to regulate and control stormwater. The land use surrounding the impaired waters in Cook County is almost exclusively urban, and thus regulated by MS4 permits. In Cook County, the Metropolitan Water Reclamation District (MWRD) is responsible for stormwater control. The MWRD developed the "Detailed Watershed Plan for the Lower Des Plaines River Watershed: Volume 1" which includes Higgins Creek. Although this plan focuses primarily on water quantity rather than water quality, the State believes the Best Management Practices (BMPs) to reduce water quantity will also improve water quality for both fecal coliform and DO substances (Section 8.5 of the TMDL).

To address the chlorides reductions in Higgins Creek, the State and the DuPage River Salt Creek Workgroup (DRSCW) are working with the Illinois Tollway to address impacts from the proposed Elgin-O'Hare West Bypass Project (DRSCW Comments, 2013). This project involves the construction of additional road lanes and interchanges in the Higgins Creek watershed. As part of this project, the Illinois Tollway Authority and the DRSCW are working to reduce chloride use not only on the new tollway itself, but also in surrounding communities (Elgin O'Hare West Bypass Study Tier Two EIS, October, 2012). If an agreement is reached, chloride use could be significantly reduced in several watersheds in the Chicago Area.

EPA finds that this criterion has been adequately addressed.

9. Monitoring Plan to Track TMDL Effectiveness

EPA's 1991 document, *Guidance for Water Quality-Based Decisions: The TMDL Process* (EPA 440/4-91-001), recommends a monitoring plan to track the effectiveness of a TMDL, particularly when a TMDL involves both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur. Such a TMDL should provide assurances that nonpoint source controls will achieve expected load reductions and, such TMDL should include a monitoring plan that describes the additional data to be collected to determine if the load reductions provided for in the TMDL are occurring and leading to attainment of water quality standards.

Comment:
The TMDL submittal contains a discussion on future monitoring (Section 8.9 of the TMDL). Lake County maintains a Lakes Management Unit that monitors lakes and streams in the watershed. Several lakes in Lake County have designated beaches, which are monitored on a bimonthly basis. Section 8.10 of the TMDL discusses a proposed timeline for integrating various stakeholder activities in the watershed.

EPA finds that this criterion has been adequately addressed.

10. Implementation

EPA policy encourages Regions to work in partnership with States/Tribes to achieve nonpoint source load allocations established for 303(d)-listed waters impaired by nonpoint sources. Regions may assist States/Tribes in developing implementation plans that include reasonable assurances that nonpoint source LAs established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be achieved. In addition, EPA policy recognizes that other relevant watershed management processes may be used in the TMDL process. EPA is not required to and does not approve TMDL implementation plans.

Comment:
A summary of potential implementation activities is in Section 8 of the TMDL. The implementation activities are discussed in Section 8 of this Decision Document.

EPA reviews, but does not approve, implementation plans. EPA finds that this criterion has been adequately addressed.

11. Public Participation

EPA policy is that there should be full and meaningful public participation in the TMDL development process. The TMDL regulations require that each State/Tribe must subject calculations to establish TMDLs to public review consistent with its own continuing planning process (40 C.F.R. §130.7(c)(1)(ii)). In guidance, EPA has explained that final TMDLs submitted to EPA for review and approval should describe the State's/Tribe's public participation process, including a summary of significant comments and the State's/Tribe's responses to those comments. When EPA establishes a TMDL, EPA regulations require EPA to publish a notice seeking public comment (40 C.F.R. §130.7(d)(2)).

Provision of inadequate public participation may be a basis for disapproving a TMDL. If EPA determines that a State/Tribe has not provided adequate public participation, EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by EPA.

Comment:
On May 19, 2009, IEPA held a public meeting to present the Stage 1 preliminary TMDL findings in Des Plaines, Illinois. A second public meeting was held in Des Plaines, Illinois, on August 11, 2010, to discuss the wasteload allocations with the stakeholders. The public comment period for the draft TMDL opened on August 28, 2012, and closed September 27, 2012. A public meeting was held on August 28, 2012, in Des Plaines, Illinois. The public notice for the meeting was made available to the public. Interested individuals and organizations also received copies of the public notice. A copy of the TMDL was made available to the public for comment upon request, as well as at the Des Plaines City Hall, Buffalo Grove City Hall, and the Vernon Hills City Hall. The draft TMDL was also available on IEPA's web page at http://www.epa.state.il.us/water/tmdl. The public meeting started at 2:00 p.m. on August 28, 2012. There were approximately 20 attendees at the meeting and the meeting record remaining open until midnight, September 27, 2012. There were no public comments.

EPA finds that the TMDL document submitted by IEPA satisfies all requirements concerning this eleventh element.

12. Submittal Letter

A submittal letter should be included with the TMDL submittal, and should specify whether the TMDL is being submitted for a *technical review* or *final review and approval.* Each final TMDL submitted to EPA should be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final review and approval, should contain such identifying information as the name and location of the waterbody, and the pollutant(s) of concern.

Comment:
On May 30, 2013, EPA received the Des Plaines River Higgins Creek watershed TMDL, and a submittal letter. In the submittal letter, IEPA stated "Please find enclosed Illinois EPA's submittal of the Des Plaines River Higgins Creek Watershed TMDL report for USEPA final approval". The submittal letter included the names and locations of the waterbodies and the pollutants of concern.

EPA finds that the TMDL document submitted by IEPA satisfies all requirements concerning this twelfth element.

Conclusion
After a full and complete review, EPA finds that the TMDLs for the Des Plaines River Higgins Creek watershed satisfy all of the elements of approvable TMDLs. This approval is for **24** TMDLs, in 18 waterbody segments.

EPA's approval of this TMDL does not extend to those waters that are within Indian Country, as defined in 18 U.S.C. Section 1151. EPA is taking no action to approve or disapprove TMDLs for those waters at this time. EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under the CWA Section 303(d) for those waters.

Table 3 TMDL Summary for fecal coliform for Buffalo Creek (IL_GST) (org/day)

	High Flows (0-10)	Moist Flows (10-40)	Mid-Range Flows (40-60)	Dry Flows (60-90)	Low Flows (90-100)
Current load	1.98E+12	7.93E+11	5.53E+10	1.23E+11	2.06E+10
Reduction	77%	85%	12%	85%	80%
WLA – MS4	2.85E+11	7.74E+10	3.09E+10	0	0
WLA - WWTP	3.56E+08	1.44E+08	1.44E+08	1.44E+08	1.44E+08
LA	9.74E+10	2.65E+10	1.06E+10	1.52E+10	3.35E+09
Reserve Capacity	2.25E+10	6.12E+09	2.45E+09	9.05E+08	2.06E+08
MOS	4.50E+10	1.22E+10	4.89E+09	1.81E+09	4.11E+08
TMDL	**4.50E+11**	**1.22E+11**	**4.89E+10**	**1.81E+10**	**4.11E+09**

Table 4 TMDL Summary for chloride for Buffalo Creek (IL_GST)(lbs/day)

	High Flows (0-10)	Moist Flows (10-40)	Mid-Range Flows (40-60)	Dry Flows (60-90)	Low Flows (90-100)
Current load	190,807	124,227	21,546	11,215	796
Reduction	0	46%	0	11%	0
WLA – MS4	166,286	45,186	18,075	0	0
WLA - WWTP	0	0	0	0	0
LA	56,857	15,450	6,180	8,974	2,037
MOS	24,794	6,737	2,695	997	226
TMDL	**247,936**	**67,374**	**26,950**	**9,971**	**2,264**

Table 5 TMDL Summary for fecal coliform for Higgins Creek (IL_GOA-01) (org/day)

	High Flows (0-10)	Moist Flows (10-40)	Mid-Range Flows (40-60)	Dry Flows (60-90)	Low Flows (90-100)
Current load	9.49E+11	3.89E+11	1.24E+12	1.09E+11	3.05E+11
Reduction	0	0	50%	0	0
WLA – MS4	9.09E+10	2.10E+10	8.93E+09	0	0
WLA - WWTP	8.34E+11	6.06E+11	6.06E+11	6.06E+11	6.06E+11
LA	3.50E+10	8.10E+09	3.44E+09	5.67E+09	2.06E+09
MOS	implicit	implicit	implicit	implicit	implicit
TMDL	**9.60E+11**	**6.35E+11**	**6.19E+11**	**6.12E+11**	**6.08E+11**

Table 6 TMDL Summary for chloride for Higgins Creek (IL_GOA-01) (lbs/day)

	High Flows (0-10)	Moist Flows (10-40)	Mid-Range Flows (40-60)	Dry Flows (60-90)	Low Flows (90-100)
Current load	441,567	591,224	338,885	254,302	409,771
Reduction	0	57%	33%	13%	47%
WLA – MS4	575,438	159,007	140,547	0	0
WLA - WWTP	0	0	0	0	0
LA	258,530	71,438	63,144	199,750	196,515
MOS	92,663	25,605	22,632	22,194	21,835
TMDL	**926,631**	**256,050**	**226,323**	**221,945**	**218,350**

Table 7 TMDL Summary for fecal coliform for Higgins Creek (IL_GOA-02) (org/day)

	High Flows (0-10)	Moist Flows (10-40)	Mid-Range Flows (40-60)	Dry Flows (60-90)	Low Flows (90-100)
Current load	1.90E+12	2.00E+11	1.19E+12	4.60E+10	5.59E+10
Reduction	94%	75%	97%	31%	95%
WLA – MS4	7.41E+10	3.02E+10	2.26E+10	0	0
WLA - WWTP	0	0	0	0	0
LA	2.85E+10	1.16E+10	8.70E+09	2.71E+10	2.48E+10
MOS	1.21E+10	4.92E+09	3.68E+09	3.19E+09	2.92E+09
Reserve Capacity	6.03E+09	2.46E+09	1.84E+09	1.59E+09	1.46E+09
TMDL	**1.21E+11**	**4.92E+10**	**3.68E+10**	**3.19E+10**	**2.92E+10**

Table 8 TMDL Summary for chloride for Higgins Creek (IL_GOA-02) (lbs/day)

	High Flows (0-10)	Moist Flows (10-40)	Mid-Range Flows (40-60)	Dry Flows (60-90)	Low Flows (90-100)
Current load	112,793	107,977	27,665	76,327	39,380
Reduction	41%	75%	26%	77%	59%
WLA – MS4	41,208	16,903	12,676	0	0
WLA - WWTP	0	0	0	0	0
LA	18,514	7,594	5,695	15,768	14,443
MOS	6,636	2,722	2,041	1,752	1,605
TMDL	**66,358**	**27,220**	**20,413**	**17,520**	**16,048**

Table 9 TMDL summary for Sylvan Lake (IL_RGZF) (MM org/day)

	Fecal Coliform Load
Current Load	2,960,887
Reduction	80%
Hawthorn Woods MS4	100,670
Long Grove MS4	592
Load Allocation	402,088
Reserve Capacity	29,609
MOS	59,218
TMDL	**592,177**

Table 10 TMDL Summary for TP TMDLs for Lakes (lbs/day)

Lake	Current Load	% reduction	WLA	MOS	LA	TMDL
Albert Lake	13.07	89	1.32	0.15	0.01	**1.48**
Beck Lake	0.45	10	0.12	0.04	0.25	**0.40**
Big Bear Lake	3.19	33	1.85	0.21	0.07	**2.13**
Big Bend Lake	6.51	74	1.40*	0.17	0.10	**1.66**
Bresen Lake	0.84	59	0.20	0.03	0.11	**0.35**
Buffalo Creek Lake	25.96	65	5.89	0.91	2.26	**9.06**
Countryside Lake	4.17	51	0.44	0.20	1.38	**2.03**
Diamond Lake	1.93	9	0.66	0.18	0.92	**1.75**
Forest Lake	1.52	63	0.34	0.06	0.17	**0.57**
Half Day Pit	11.73	80	0.55**	0.23	1.56	**2.34**
Lake Charles	2.36	13	1.75	.021	0.09	**2.05**
Little Bear Lake	2.23	7	1.81	.021	0.06	**2.08**
Pond-A-Rudy	0.42	67	0.07	0.01	0.05	**0.14**
Salem Reed Lake	0.70	69	0.19	0.02	0.001	**0.22**
Sylvan Lake	0.80	35	0.17	0.05	0.29	**0.51**

* includes 1.376 lb/day from the Des Plaines River

** includes 0.340 lbs/day from the Des Plaines River

Table 11 TMDL Summary for CBOD and NH3 for Buffalo Creek (IL_GST)(lb/day)

	CBOD	NH3
Current Load	158.96	8.92
Reduction	39%	30%
LA	8.59	0.24
MS4	65.04	4.18
WLA	13.7	1.2
MOS	9.70	0.62
TMDL	**97.03**	**6.24**

Table 12 WLAs for fecal coliform for Buffalo Creek (IL_GST) (MM org/day)

	NPDES permit #	High Flows (0-10)	Moist Flows (10-40)	Mid-Range Flows (40-60)	Dry Flows (60-90)	Low Flows (90-100)
Alden Long Grove Rehab	IL0051934	281	114	114	114	114
Camp Reinberg STP	IL0048542	75	30	30	30	30
Arlington Heights MS4	ILR400282	60,637	16,447	6,574	0	0
Barrington MS4	ILR400285	17,910	4,858	1,941	0	0
Buffalo Grove MS4	ILR400303	34,551	9,372	3,746	0	0
Deer Park MS4	ILR400359	13,551	3,675	1,469	0	0
Inverness MS4	ILR400359	25,321	6,868	2,745	0	0
Kildeer MS4	ILR400215	13,813	3,747	1,498	0	0
Lake Zurich MS4	ILR400370	25,834	7,007	2,801	0	0
Long Grove MS4	ILR400219	46,658	12,656	5,059	0	0
Palatine MS4	ILR400416	48,280	13,096	5,235	0	0

Table 13 WLAs for fecal coliform for Higgins Creek (IL_GOA-01) (MM org/day)

	NPDES Permit #	High Flows (0-10)	Moist Flows (10-40)	Mid-Range Flows (40-60)	Dry Flows (60-90)	Low Flows (90-100)
Des Plaines MHP	IL0054160	1,340	522	522	522	522
MWRDGC Kirie WRP	IL0047741	832,841	605,702	605	702	605
Arlington Hts MS4	ILR400282	8,172	1,890	803	0	0
Chicago MS4	ILR400173	442	102	43	0	0
Des Plaines MS4	ILR400325	15,160	3,507	1,489	0	0
Elk Grove MS4	ILR400334	32,567	7,534	3,199	0	0
Mt Prospect MS4	ILR400393	9,143	2,115	898	0	0
Rolling Meadows MS4	ILR400435	174	40	17	0	0

Table 14 WLAs for fecal coliform for Higgins Creek (IL_GOA-02) (MM org/day)

	NPDES Permit #	High Flows (0-10)	Moist Flows (10-40)	Mid-Range Flows (40-60)	Dry Flows (60-90)	Low Flows (90-100)
Arlington Hts MS4	ILR400282	12,530	5,107	3,822	0	0
Des Plaines MS4	ILR400325	1,835	748	560	0	0
Elk Grove MS4	ILR400334	45,540	18,564	13,892	0	0
Mt Prospect MS4	ILR400393	13,989	5,702	4,267	0	0
Rolling Meadows MS4	ILR400435	272	111	83	0	0

Table 15 WLAs for chloride for Buffalo Creek (IL_GST) (lbs/day)

	NPDES Permit #	High Flows (0-10)	Moist Flows (10-40)	Mid-Range Flows (40-60)	Dry Flows (60-90)	Low Flows (90-100)
Arlington Heights MS4	ILR400282	35,187	9,562	3,825	0	0
Barrington MS4	ILR400285	10,393	2,824	1,130	0	0
Buffalo Grove MS4	ILR400303	20,050	5,448	2,179	0	0
Deer Park MS4	ILR400359	7,864	2,137	855	0	0
Inverness MS4	ILR400359	14,693	3,993	1,597	0	0
Kildeer MS4	ILR400215	8,015	2,178	871	0	0
Lake Zurich MS4	ILR400370	14,991	4,074	1,629	0	0
Long Grove MS4	ILR400219	27,075	7,357	2,943	0	0
Palatine MS4	ILR400416	28,017	7,613	3,045	0	0

Table 16 WLAs for chloride for Higgins Creek (IL_GOA-01) (lbs/day)

	NPDES Permit #	High Flows (0-10)	Moist Flows (10-40)	Mid-Range Flows (40-60)	Dry Flows (60-90)	Low Flows (90-100)
Arlington Hts MS4	ILR400282	71,402	19,731	17,440	0	0
Chicago MS4	ILR400173	3,866	1,069	944	0	0
Des Plaines MS4	ILR400325	132,461	36,602	32,353	0	0
Elk Grove MS4	ILR400334	284,461	78,633	69,504	0	0
Illinois Tollway MS4	ILR400494	1,727	477	421	0	0
Mt Prospect MS4	ILR400393	79,894	22,077	19,513	0	0
Rolling Meadows MS4	ILR400435	1,502	420	372	0	0

Table 17 WLAs for chloride for Higgins Creek (IL_GOA-02) (lbs/day)

	NPDES Permit #	High Flows (0-10)	Moist Flows (10-40)	Mid-Range Flows (40-60)	Dry Flows (60-90)	Low Flows (90-100)
Arlington Hts MS4	ILR400282	6,950	2,850	2,138	0	0
Des Plaines MS4	ILR400325	1,018	418	313	0	0
Elk Grove MS4	ILR400334	25,207	10,340	7,755	0	0
Illinois Tollway MS4	ILR400494	124	51	38	0	0
Mt Prospect MS4	ILR400393	7,760	3,182	2,387	0	0
Rolling Meadows MS4	ILR400435	150	61.8	45.8	0	0

Table 18 WLAs for CBOD and NH3 for Buffalo Creek (IL_GST)(lb/day)

	NPDES Permit #	CBOD	NH3
Alden Long Grove Rehab	IL0051934	12.0	0
Camp Reinberg	IL0048542	1.7	1.2
Arlington Heights MS4	ILR400282	3.18	0.25
Barrington MS4	ILR400285	0.05	0.004
Buffalo Grove MS4	ILR400303	9.05	0.70
Deer Park MS4	ILR400359	6.67	0.51
Inverness MS4	ILR400359	0.004	0.0003
Kildeer MS4	ILR400215	9.74	0.75
Lake Zurich MS4	ILR400370	5.40	0.42
Long Grove MS4	ILR400219	14.72	1.14
Palatine MS4	ILR400416	7.70	0.59

Table 19 WLAs for TP for Lakes (lbs/day)

Lake	MS4/Facility	NPDES ID #	% Area of Watershed	WLA (lb/day)
Albert Lake	Lake Zurich	ILR400370	47	0.620
	Long Grove	ILR400219	17	0.226
	Kildeer	ILR400215	36	0.475
Beck Lake	Glenview	ILR400343	32	0.117
Big Bear Lake	Libertyville	ILR400374	14	0.260
	Mundelein	ILR400395	54	1.030
	Vernon Hills	ILR400252	29	0.559
Big Bend Lake	Glenview	ILR400343	8	0.009
	Des Plaines	ILR400325	13	0.015
Bresen Lake	Hawthorn Woods	ILR400209	64	0.199
Buffalo Creek Lake	Alden Long Grove Rehab	IL0051934	Non-MS4	0.448
	Camp Reinberg STP	IL0048542	Non-MS4	0.117
	Arlington Heights	ILR400282	5	0.357
	Barrington	ILR400285	0.1	0.003
	Buffalo Grove	ILR400303	1	0.075
	Deer Park	ILR400359	10	0.745
	Inverness	ILR400359	<0.1	0.0005
	Kildeer	ILR400215	14	1.090
	Lake Zurich	ILR400370	8	0.602
	Long Grove	ILR400219	21	1.600
	Palatine	ILR400416	11	0.864
Countryside Lake	Hawthorn Woods	ILR400209	14	0.261
	Long Grove	ILR400219	<0.1	0.0005
	Mundelein	ILR400395	18	0.183
Diamond Lake	Mundelein	ILR400395	35	0.556
	Long Grove	ILR400219	7	0.108
Forest Lake	Hawthorn Woods	ILR400209	37	0.189
	Lake Zurich	ILR400370	29	0.150
Half Day Pit	Lincolnshire	ILR400375	12	0.205
Lake Charles	Libertyville	ILR400374	16	0.300
	Mundelein	ILR400395	63	1.171
	Vernon Hills	ILR400252	15	0.282
Little Bear Lake	Libertyville	ILR400374	12	0.231
	Mundelein	ILR400395	49	0.915
	Vernon Hills	ILR400252	35	0.661
Pond-A-Rudy	Hawthorn Woods	ILR400209	58	0.072
Salem Reed Lake	Long Grove	ILR400219	99	0.193
Sylvan Lake	Hawthorn Woods	ILR400209	17	0.172
	Long Grove	ILR400219	0.1	0.0004

ATTACHMENT NO. 4

Related Activities for Buffalo Grove:

- Buffalo Creek Clean Water Partnership
    - Coordinated Pollutant Monitoring Program
    - Buffalo Creek Watershed Information Flyer
    - Various Meeting Agendas
- Center for Watershed Protection's Webcast Series Schedule
- Public Works NPDES Training Agenda

Coordinated Pollutant Monitoring Program

Prepared by: Marcy R. Knysz, Watershed Coordinator & Jeff Weiss, Founder
Buffalo Creek Clean Water Partnership
November 11, 2012 (rev. December 16, 2012)

Purpose

The proposed project will develop Buffalo Creek Clean Water Partnership's (BCCWP) capacity through engagement of local communities, partner agencies and volunteers in an efficient and Coordinated Pollutant Monitoring Program for the Buffalo Creek sub-watershed. At present, infrequent and uncoordinated water quality monitoring efforts result in limited usefulness of the water quality data to identify sources or assess trends in watershed water quality. For example, there is currently no monitoring at key points in the watershed. There is also a lack of frequent monitoring to identify seasonal trends and pollutants at different flow rates. There is no analysis available for lake sediments, which contribute to problems of eutrophication, suspended solids and low dissolved oxygen. Finally, current monitoring is conducted using inconsistent testing regimes, at different times by MS4 communities, making it impossible to compare these data across the watershed.

The proposed Coordinated Pollutant Monitoring Program will enable experts to pinpoint sources of pollutants and support cleanup initiatives and Best Management Practices. The outcome of this project will be a coordinated, efficient monitoring program that makes the most of community and agency investment in assessing water quality trends over time, sufficient to be used to optimize Best Management Practice locations and address water quality impairments across the Buffalo Creek watershed. This program will enable water quality issues to be addressed across community and county borders, and build the spirit of cooperation needed to address other watershed issues, such as flooding, erosion and habitat quality.

Protocol

I. Sediment Sampling (funded with Watershed Management Assistance Grant)

Sediment sampling is proposed at three locations:

1. Lake Albert
2. Buffalo Grove Reservoir – Upper Basin
3. Buffalo Grove Reservoir – Lower Basin

One sediment analysis will be run for each basin. Each test sample will be comprised of multiple soil samples collected throughout each basin (inflow, outflow, deeper spots, etc.). Sediment will be tested for the following parameters:

- Volatile Organic Compounds
- Semi-Volatile Organic Compounds (includes PNAs)
- Organochlorine Pesticides
- Polychlorinated Biphenyls (PCBs)
- Metals- Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Silver, Zinc
- Total Kjeldahl Nitrogen
- Total Phosphorus
- Cyanide
- Herbicides (2,4, D, 2,4,5 TP)

II. Water Quality Monitoring

There are three components to the Water Quality Monitoring portion of the Coordinated Pollutant Monitoring Program as follows:

1. **Upstream Reservoir Monitoring** - Water quality testing at two locations located immediately upstream of the reservoir (funded by Watershed Management Assistance Grant)
2. **Downstream Reservoir Monitoring - MWRD** - Water quality testing at one downstream location (to be conducted by the Metropolitan Water Reclamation District of Greater Chicago (MWRD)). This portion of the program is not included for funding by the Watershed Management Assistance Grant.
3. **MS4 Water Quality Monitoring** - Water quality testing conducted by MS4 communities. This portion of the program is not included for funding by the Watershed Management Assistance Grant.

1. Upstream Reservoir Monitoring

Upstream reservoir monitoring will consist of both dry weather and wet weather water quality sampling at two locations. BCCWP will collect and analyze the samples for the parameters outlined below. The dry weather sampling will be conducted using grab samples while the wet weather sampling will be conducted using two continuous samplers (6700 series). The two samplers will be on loan to the BCCWP by the Lake County Health Department – Lakes Management Division for the duration of the project. Both upstream reservoir monitoring locations will be upstream of the Buffalo Creek Reservoir. One will be located near Checker Road ("Upstream North") and the second will be located near Lake Cook Road ("Upstream South"). The exact locations will be determined in the field in coordination with the Lake County Health Department. A watershed map showing the locations of existing MS4 test sites and these two additional proposed test sites is attached. Sampling at these two locations will give us the best information as to the types of pollutants that are entering the reservoir via storm water from the two main tributaries that make up Buffalo Creek.

2. Downstream Reservoir Monitoring – MWRD

The BCCWP plans to utilize the MWRD's existing test site (WW-12) as the downstream sampling point for this project. The use of the data collected by MWRD at this downstream test site is imperative to the success of the water quality monitoring program. MWRD staff will collect and analyze the samples for the parameters outlined below. The combined results of this monitoring will be used to develop a more intensive monitoring and surveillance program to identify and target specific sources of pollutants entering Buffalo Creek. If the monitoring program can be established for the long term, it can be used to determine the post-construction effectiveness of green infrastructure projects and restoration efforts in the watershed.

3. MS4 Water Quality Monitoring

The BCCWP is trying to engage each MS4 in the watershed to coordinate the timing of their annual water quality testing with the BCCWP Coordinated Pollutant Monitoring Program. We are proposing that each MS4 test their sites twice per year, once in May and once in October (on the first Monday of those months – to coincide with the MWRD and BCCWP testing dates). The BCCWP can assist communities in determining which locations they can share with their neighbors to minimize the cost of the water quality sampling. The attached map shows all the locations that have been submitted to the BCCWP for inclusion in the analysis. If MS4's can share some of their sites that are on the edge of their communities, it may allow for the second test to be completed each year with minimal additional cost.

Water Quality Monitoring Schedule

The Coordinated Pollutant Monitoring Program proposes multiple water quality samples to be collected during dry and wet weather events from April through October over a two year period (see table below).

Water Quality Testing Schedule 2013-2014				
1st Monday of Each Month April-October	**BCCWP Upstream North**	**BCCWP Upstream North**	**MWRD Downstream (WW-12)**	**MS4 Communities (various sites)**
April 1, 2013	1	1	1	
May 6, 2013	1	1	1	x
June 3, 2013	1	1	1	
July 1, 2013	1	1	1	
August 5, 2013	1	1	1	
September 2, 2013	1	1	1	
October 7, 2013	1	1	1	x
April 7, 2014	1	1	1	
May 5, 2014	1	1	1	x
June 2, 2014	1	1	1	
July 7, 2014	1	1	1	
August 4, 2014	1	1	1	
September 1, 2014	1	1	1	
October 6, 2014	1	1	1	x
Unscheduled Wet Weather Events	6	6	N/A	N/A
Total Number of Samples	**20**	**20**	**14**	
	40 samples total for BCCWP		**14 Samples total for MWRD**	**Sampling twice per year**

Water Quality Monitoring Parameters

All water quality monitoring samples will be tested for the following parameters:

Parameter	Estimated Lab Fee
Fecal Coliform	$16.00
Chloride	$11.00
Dissolved Oxygen	$15.00
Total Kjeldahl Nitrogen	$23.00
Calcium	$12.00
Conductivity	$12.00
Biochemical Oxygen Demand	$21.00
Total Phosphorus	$16.00
Total Suspended Solids	$15.00
Total Volatile Solids	$11.00
Temperature (will be taken on-site)	N/A
pH (will be taken on-site)	N/A
Estimated Total Per Sample Cost (Lab fee only)	**$152.00**

BUFFALO CREEK WATERSHED

BUFFALO CREEK CLEAN WATER PARTNERSHIP

DO YOU KNOW YOUR WATERSHED?

WHAT IS A WATERSHED?

A watershed is a region of land that drains to a particular body of water such as a river or a lake. Rain or snow that falls anywhere in that watershed eventually flows to that water body. It may travel overland as surface water or flow underground as groundwater.

WHY ARE WATERSHEDS IMPORTANT?

Watersheds are the source of all the water we use. Water enters the watershed as rain or snowmelt. It soaks into the ground to replenish aquifers and gathers in ponds and creeks that feed larger streams and rivers. A healthy watershed acts like a sponge, absorbing, storing, and slowly releasing water.

WHAT IS NON-POINT SOURCE POLLUTION?

As water from rainfall and snowmelt flows over and through the landscape, it picks up and carries contaminants from many different sources. This is called Non-Point Source Pollution. This polluted water ends up in streams, lakes and the ocean by flowing directly in or by going through untreated storm drains.

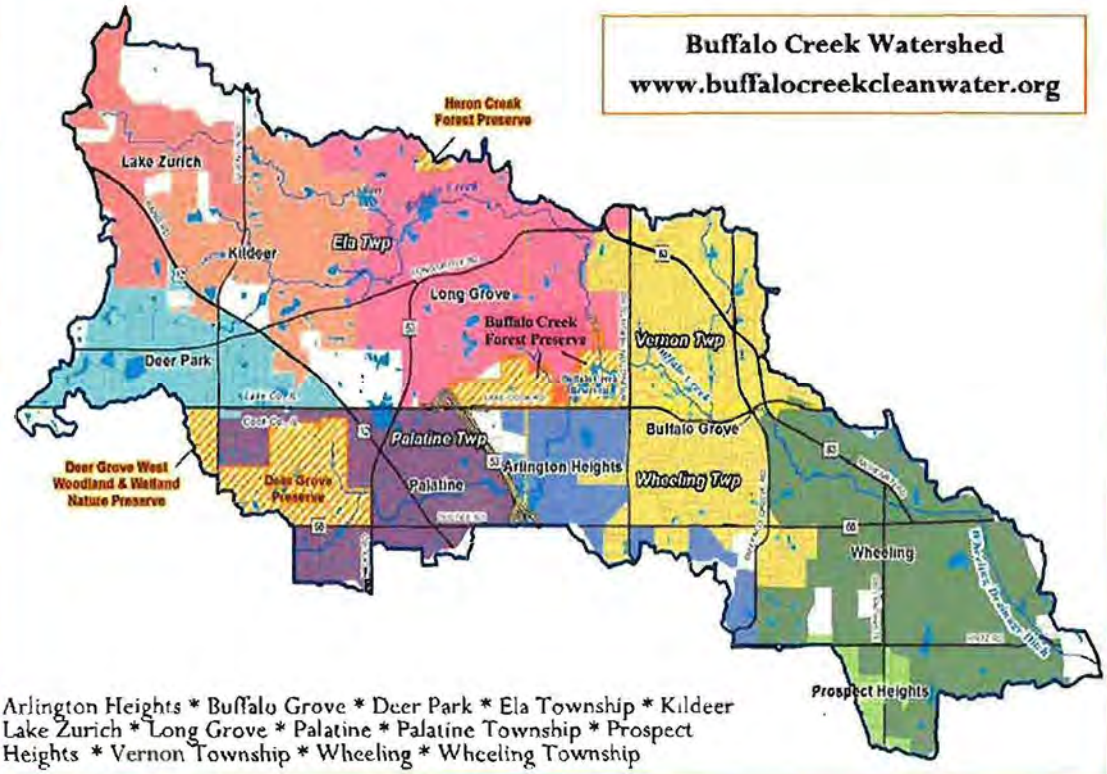
WHAT CAN I DO TO HELP TAKE CARE OF MY WATERSHED?

Since watersheds are simply areas of land, you take care of your watershed by being a good land steward. There are many ways you can help.

WHAT IS THE BUFFALO CREEK CLEAN WATER PARTNERSHIP?

A working group of watershed residents; commercial property owners; municipal, township and park district staff; county and state agency representatives; and scientists working together to identify watershed issues and create solutions!

Buffalo Creek Watershed
www.buffalocreekcleanwater.org



Arlington Heights * Buffalo Grove * Deer Park * Ela Township * Kildeer Lake Zurich * Long Grove * Palatine * Palatine Township * Prospect Heights * Vernon Township * Wheeling * Wheeling Township

BUFFALO CREEK CLEAN WATER PARTNERSHIP

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Buffalo Creek Clean Water Partnership

Macro invertebrate sampling during RiverWatch.

FACTS ABOUT OUR WATERSHED

* Buffalo Creek is home to 80,000 residents. It drains twenty seven square miles, with headwaters in Lake Zurich, Deer Park and Palatine.
* Tributaries flow through Long Grove, Kildeer and Arlington Heights before collecting in the reservoir in Buffalo Creek Forest Preserve.
* Buffalo Creek continues through Buffalo Grove before discharging into the Des Plaines River near Wheeling and Prospect Heights.
* Local communities, stormwater management and other agencies are working together to reduce the risk of flooding and erosion damage along the creek.
* Our stakeholders voted water quality the top issue! Pollutants include chloride, phosphorus, low dissolved oxygen, suspended solids and fecal coliform.

10 WAYS YOU CAN HELP

1. Cover piles of soil, sand or mulch to stop them from being transported in storm-water. Plant grass where soil is exposed.
2. Sweep your sidewalks and driveways rather than hosing them down.
3. Put leaves/grass clippings in the compost, on the garden as mulch, or mow back into the lawn to recycle nutrients.
4. Divert roof water to lawns and gardens where it can safely soak in.
5. Keep pesticides, oil, leaves and other pollutants off streets and out of storm drains.
6. Keep cars tuned up and repair leaks.
7. Wash your vehicle on grass or over gravel.
8. Dispose of household hazardous waste according to the label directions.
9. Clean up pet waste.
10. Never dump anything down storm drains!

Citizens and communities can make a difference in the health of Buffalo Creek!
www.buffalocreekcleanwater.org

WATERSHED PLAN UNDERWAY

We are preparing a detailed watershed plan and working with partners to promote solutions to address the top issues facing the watershed.

Flooding - New flood mitigation projects are nearing completion at Heritage Park in Wheeling and in planning stage at Buffalo Creek Forest Preserve.

Erosion - Severe erosion problems are documented in a stream study by Lake County Stormwater Management Commission.

Degraded Stream and Wetland Habitats - Our Partnership co-sponsored an Earth Day event that attracted more than 200 volunteers at Deer Grove Forest Preserve.

Water Quality - We are partnering with 8 villages, Lake County Health Department and the Metropolitan Water Reclamation District of Greater Chicago to monitor pollutants across the watershed. Visit our website to view the annual water quality report.

To learn more, visit www.buffalocreekcleanwater.org and join us at our next meeting or volunteer event!

MEETING NOTICE

Buffalo Creek Clean Water Partnership
Stakeholder Meeting #6

Thursday February 27, 2014
7:00 PM – 9:00 PM

Location:
Arlington Heights Public Works Center
222 N Ridge Ave
Arlington Heights, IL 60005

Meeting Agenda

1. Introductions
2. Watershed Planning Process – Where are we?
3. Coordinated Pollutant Monitoring Program Results
4. Water Quality Presentation by Dean Maraldo, USEPA Region 5
5. Goals and Objectives Review

RSVP: Marcy Knysz (marcy.knysz@cardno.com)

Feel free to contact Jeff Weiss (Founder) at 847-224-0965 (marjeff@aol.com) or Marcy Knysz (Watershed Coordinator) at 847-732-5172 (marcy.knysz@cardno.com) for further information. You can also follow the planning process at www.buffalocreekcleanwater.org.

DRAFT

Goals & Objectives for the Buffalo Creek Watershed-Based Plan

Buffalo Creek Clean Water Partnership

Goal 1: Improve and protect water quality (physical, biological, and chemical health), eliminate impairments and non-point source pollution, and implement land development and management practices to prevent pollution.

Outcome: Water bodies are not impaired (fully support designated uses) and future pollution is prevented, have healthy lakes, streams, and wetlands.

Objectives:

- Reduce the quantity of road salt (sodium chloride) needed for safe and cost effective winter maintenance to reverse the current trend of rising chloride levels in lakes. Target public and private plowing operators.
- Reduce actions that cause phosphorous to be released into the waterways such as erosion and fertilizers with phosphorus. Watershed municipalities and counties pass ordinances banning the use of fertilizers with phosphorus unless a soil test indicates it is needed.
- Identify and eliminate sources of fecal coliform.
- Maintain, expand and restore high quality riparian buffers where needed along and around streams, lakes and wetlands to protect/improve water quality and biological heath of waters.
- Reduce pollution caused by dissolved and suspended solids and sediment accumulation in surface waters and wetlands by:
  - addressing all areas designated as "very severe erosion" in the Stream and Basin Inventory within 5 years.
  - addressing all areas designated as "moderate erosion" in the Stream and Basin Inventory within 10 years, and
  - preventing land development-related erosion using construction and post-construction best management practices.
- Perform a complete stream and basin inventory every 5 years.
- Reform permitting requirements, provide incentives/cost share program, and promote pollution and stormwater runoff reduction programs (such as Conservation @Home) to result in retrofitting/implementing best management practices that reduce pollution and infiltrate stormwater.
- Restore stream channels to geomorphology and in stream habitat that supports good aquatic biological quality.
- Develop standards and guidelines for Green Infrastructure.
- Partner with individuals and agencies to promote use of rain barrels, rain gardens and bioswales on public and private land.

Goal 2: Reduce flooding and runoff through increased storage and infiltration of stormwater.

Outcome: Stormwater flooding and runoff is reduced.

Objectives:

- Identify and pursue opportunities to create stormwater storage areas on upstream floodplain areas and increase floodplain connectivity.
- Create flood storage by increasing water retention/infiltration areas in new and existing developed areas and at regional flood storage sites to reduce flooding and prevent downstream erosion.
- Watershed municipalities and counties pass ordinances that prohibit building in the 100-year floodplain.
- Watershed municipalities and counties pass ordinances and standards that require sump pump and downspout discharges be directed to lawn or rain gardens and infiltrated.
- Secure conservation easements for stormwater storage.
- Increase the number of buyouts of properties with continuous structure damage caused by flooding.
- Determine how many structures are located in the floodplain and how many claims were filed during recent flood events. Reduce the number of claims each year by 5%.
- Retrofit 2 turf or impervious bottom detention basins with native vegetation each year.
- Create storm water utilities based on impervious surface with off-setting credits for best management practices that reduce runoff.
- Revise ordinances in watershed municipalities and counties to implement land management practices that will reduce runoff and pollution.
- Encourage municipal and commercial projects to implement (or retrofit with) bioswales, streambank restoration and green infrastructure into their design.

Goal 3: Protect, enhance & restore natural resources (soil, water, plant communities, fish and wildlife) through the expansion of green infrastructure reserves and environmental corridors, maintaining hydrology and buffers for high quality areas, and employing good natural resource management practices.

Outcome: Natural resources are protected, enhanced, or restored.

Objectives:

- Permanently preserve more natural lands as conservation areas through purchase by forest preserve or by conservation easement.
- Watershed municipalities and counties adopt development standards that protect natural resources on development sites and provide buffers for high quality areas.
- Identify high quality aquatic resources through assessment.
- Develop a specific action plan for each impaired lake.
- Identify and protect environmental corridors through subdivisions, institutions, office parks, transportation, utility and stream corridors.
- Restore forest preserve owned lands to natural communities and control invasive species.
- Watershed municipalities and counties adopt policies and standards and management practices that keep invasive species out.

- Extend riparian areas and no mow zones.
- Develop 10% more riparian area per stream reach.
- Reduce and remove buckthorn, common reed, reed canary grass and cattails.
- Identify the source and reduce the volume of stormwater causing scouring in forest preserves.
- Replant landscape trees lost to Emerald ash borers with a diversity of tree species, in order to increase interception of rain and infiltration into the ground, and to reduce the likelihood of future pests or disease outbreaks wiping out vast numbers of urban trees.

Goal 4: Use a system of both site level stormwater green infrastructure practices and regional greenways and trails to protect and connect natural resource areas and to provide recreational opportunities.

Outcome: Site level and regional green infrastructure system is established.

Objectives:

- Distinguish between high, medium and low quality natural resources to guide green infrastructure planning efforts to preserve high quality areas while directing recreation toward lower quality resources.
- Expand the universe of allowable stormwater management best management practices to include non-structural options such as allowing stormwater credit for undisturbed natural areas, vegetated buffers and native landscaping in yards rather than turf.
- Implement green street retrofits and install stormwater and natural resource best management practices for new road projects to provide green infrastructure benefits.
- Implement green infrastructure best management practices including porous pavement in parking lots to increase infiltration and reduce runoff volumes as retrofits in existing developed areas and in new developments. Establish cost-sharing retrofit programs as an incentive.
- Watershed municipalities, counties and natural resource agencies adopt and use the watershed Green Infrastructure Plan and other regional green infrastructure/greenway plans in local land use plans and policies.
- Integrate green infrastructure approach into local stormwater and capital improvement/maintenance budgets.

Goal 5: Guide new development design and practices to protect or enhance existing water resources, natural resources and open space.

Outcome: New development occurs without impairing water resources, natural resources, and open space.

Objectives:

- Develop use standards/guidelines for applying the green infrastructure approach to site planning and design and stormwater management including building networks that strategically connect to off-site green infrastructure.
- Review and revise existing development codes to allow or require the green infrastructure approach to site planning and design and stormwater management by right.
- Cluster development while still meeting overall minimum zoning and reduce footprint of homes and buildings (reduce allowable minimum size of homes in zoning category).

- Reduce the stormwater maintenance burden on deed restricted homeowner association common areas by designing stormwater practices/systems that are easy/low maintenance.
- Reduce/eliminate centralized detention ponds and replace with decentralized wetlands, rain gardens of meaningful or effective size relative to impervious area, and drainage swale stormwater system that includes lots that do not back up to one another but allow open space views.

Goal 6: Provide watershed stakeholders with knowledge, skills and motivation needed to implement the watershed plan. Watershed stakeholders include (but are not limited to) residents, property owners, property owner associations, government agencies and jurisdictions, and developers.

Outcome: Stakeholders have adequate information and knowledge of resources to implement the watershed plan.

Objectives:

- All watershed residents will know "what a watershed is" and what watershed they live in.
- Educate Home Owner Associations and others on proper maintenance of detention basins and other stormwater/drainage features they are responsible for.
- Collaborate with educational institutions such as CLC to provide training on property management best management practices for targeted stakeholders.
- Provide training on practices related to good lake management including aquatic plant management and water quality.
- Minimize phosphorous use thru education about yard landscaping.
- Educate developers, plan commissions, Park Districts and Village Boards on the green infrastructure approach to site planning and design, best management practices and stormwater management.
- Educate property owners and associations on the need for green infrastructure and on the proper maintenance of green infrastructure practices.
- General public education on flood mitigation and prevention.
- Provide training for riparian landowners on best practices for stream restoration and maintenance that will restore the conveyance of Buffalo Creek to its intended capacity.
- Conduct workshops on best practices to minimize the use of road salt for public and private snow removal providers.
- Educate the general public on the importance of watershed health (water quality, flood prevention, green infrastructure) are to the economy of the communities in the watershed.
- Develop a pipeline of watershed projects and secure funding sources for them.

Michael J. Reynolds

From:	Marcy Knysz <Marcy.Knysz@cardno.com>
Sent:	Tuesday, May 27, 2014 12:46 PM
To:	Marcy Knysz
Cc:	'marjeff1@aol.com'
Subject:	REMINDER - BCCWP Stakeholder Meeting this Thursday
Importance:	High

MEETING AGENDA

Buffalo Creek Clean Water Partnership
Stakeholder Meeting #7

Thursday May 29, 2014
9:00 AM – 11:00 AM

Location: Wheeling Public Works
77 W. Hintz Road
Wheeling, IL

1. Introductions
2. Watershed Plan Schedule
3. Buffalo Creek Clean Water Partnership Updates
    a. Deer Grove East
    b. IEPA Section 319 Project Proposals
    c. Buffalo Creek Forest Preserve Expansion
    d. Earth Day
    e. 2014 WQ Monitoring
    f. RiverWatch
    4. Virtual Watershed Demo
    5. Stream and Basin Inventory Demo
    6. Green Infrastructure Plan
7. Stakeholder Engagement Discussion
    a. Brochure
    b. Survey
    c. Other ideas
    8. Wrap up

Hope to see you there!
Marcy

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Michael J. Reynolds

From:	Marcy Knysz <Marcy.Knysz@cardno.com>
Sent:	Monday, September 01, 2014 1:55 PM
To:	Marcy Knysz; 'marjeff1@aol.com'
Subject:	Buffalo Creek Stakeholder Meeting #8 Reminder

BUFFALO CREEK CLEAN WATER PARTNERSHIP STAKEHOLDER MEETING #8

Wednesday September 3, 2014
7:00 PM – 9:00 PM

Location: Alcott Community Center
530 Bernard Drive, Room 10
Buffalo Grove, IL

MEETING AGENDA

1. Introductions
2. Watershed Plan Schedule
3. Buffalo Creek Clean Water Partnership Updates
    a. Deer Grove East
    b. Buffalo Creek Forest Preserve Basin Expansion and Wetland Mitigation
    c. 2014 WQ Monitoring
    d. Stream and Basin Inventory
4. Flood Survey Results – Lake County Stormwater Management Commission
5. Floodplains and Flooding – Lake County Stormwater Management Commission
6. Programs to Address Flooding – Metropolitan Water Reclamation District
7. Group Discussion
8. Wrap-up

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Michael J. Reynolds

From:	Marcy Knysz <Marcy.Knysz@cardno.com>
Sent:	Monday, November 10, 2014 9:52 AM
To:	Marcy Knysz; marjeff1@aol.com
Subject:	Buffalo Creek Clean Water Partnership - 11/19/14 Stakeholder Meeting Agenda

Buffalo Creek Clean Water Partnership
Stakeholder Meeting #9 Agenda
November 19, 2014 7:00 – 9:00 PM

Location: Kildeer Village Hall
21911 Quentin Road
Kildeer, Illinois 60047

The purpose of this meeting is to bring stakeholders in the Buffalo Creek watershed together to update them on the status of watershed plan development and projects, and to discuss the Green Infrastructure inventory and the Education and Outreach plan. With winter coming, we will also learn about ways to manage chloride from deicing operations. Chloride is one of the pollutants that caused Buffalo Creek and its lakes to be listed as impaired waters by the Illinois Environmental Protection Agency.

1. Introductions
2. Watershed Group Updates
    a. Watershed-based plan status
    b. Lake and stream monitoring
    c. Project status
    d. Volunteer activities
3. Presentation by Marcy Knysz
    a. Green Infrastructure Inventory
    b. Discussion of draft criteria for identification and prioritization of sites
4. Presentation by Patty Werner – winter road salt application and chloride pollution
5. Presentation by Jeff Weiss
    a. Review of watershed Goals and Objectives
    b. Outreach and Education plan to support Goal and Objectives and to "change social behaviors"
6. Open Discussion
7. Next Meeting
    a. February 2014
    b. Location TBD

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Mark your calendar to attend the Center for Watershed Protection's 2014 Watershed & Stormwater Management Webcast Series

- **FREE!!!**
- **Brown bag – bring your own lunch**
- **RSVP to Susan Vancil**

svancil@lakecountyil.gov

1 CEC/2 PDH per webcast

The series will explore all the elements that promote successful implementation of stormwater management best management practices (BMPs), and how regional and local TMDLs are increasingly driving the selection and implementation of BMPs at the local level.

Sponsored by Lake County Stormwater Management Commission

Webcasts run 12 – 2 p.m. See next page for webcast descriptions.

Wednesday, February 12, 2014: Reimagining the Parking Lot & Roadway as a Stormwater Practice
Lake County Division of Transportation, 600 W. Winchester, 1st FL Conference Room, Libertyville

Wednesday, March 12, 2014: The Life of a Stormwater Practice: The Role of Local Codes
Lake County Division of Transportation, 600 W. Winchester, 1st FL Conference Room, Libertyville

Wednesday, April 9, 2014: The Life of a Stormwater Practice: Design & Construction of BMPs
Lake County Division of Transportation, 600 W. Winchester, 1st FL Conference Room, Libertyville

Wednesday, May 21, 2014: The Life of a Stormwater Practice: BMP Maintenance
Lake County Division of Transportation, 600 W. Winchester, 1st FL Conference Room, Libertyville

Wednesday, June 11, 2014: How to Pick The Right Vegetation for Bioretention & Its Cousins
Lake County Central Permit Facility, 500 W. Winchester Road, 2nd FL Conference Room, Libertyville

Wednesday, September 10, 2014: Stream Restoration as a Pollutant Reduction Strategy
Lake County Central Permit Facility, 500 W. Winchester Road, 2nd FL Conference Room, Libertyville

Wednesday, October 8, 2014: Implementing TMDLs: Local TMDLs & Regional/River Basin TMDLs: A Happy Engagement or a Shotgun Wedding?
Gurnee Police Facility, 100 N. O'Plaine Road, Gurnee

Wednesday, November 12, 2014: Implementing TMDLs: Retrofitting Existing Stormwater Ponds & Basins
Lake County Division of Transportation, 600 W. Winchester, 1st FL Conference Room, Libertyville

Program Agenda

Annual Fiscal Year Start-up Employee meeting

January 14, 2015

7:00 - Coffee/Refreshments

7:15 - Welcome and Overview – Mike Reynolds

7:30 - Management Theme/Core Values – Mike Reynolds

Public Works Department Goals for 2015 – Mike Reynolds

Fiscal Year Budget Provisions – Mike Reynolds

New Annexations/Development Status – Darren Monico

CIP Projects (Engineering) – Darren Monico

CIP Projects (PW) – Mike Skibbe

Awards – Mike Skibbe

Employee Recognition Committee – Mike Fontanez

Employee Wellness Committee – Mike Fontanez

Safety Program – Scott Tuccori

9:00 - Break

9:15 – SPCC Plan Training – Chris Gunn, P.E. TRC Consulting Engineers

10:00 – NPDES Training – Darren Olsen, P.E., Christopher B. Burk Engineering

11:00 – Closing Remarks, Questions, Comments

ATTACHMENT NO. 5

2014 Monitoring Report
White Pine Channel restoration
Stantec Consulting Services

ATTACHMENT NO. 5

2014 Monitoring Report
White Pine Channel restoration
Stantec Consulting Services

ATTACHMENT NO. 5

2014 Monitoring Report
White Pine Channel restoration
Stantec Consulting Services

2014 Monitoring Report

White Pine Channel Restoration
Village of Buffalo Grove
Cook County, Illinois
USACE Permit: LRC-2006-1266
Stantec Project #: 193703069

Stantec

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January 29, 2015

Stantec

This document entitled 2014 Monitoring Report was prepared by Stantec Consulting Services Inc. (Stantec) for the Village of Buffalo Grove. The material in it reflects Stantec's best judgment in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Stantec Consulting Services Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Prepared by _____

Joshua Sulman, Environmental Scientist

Reviewed by _____
(signature)

Sarah Kraszewski, WPIT, Environmental Scientist

Stantec

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1.0 INTRODUCTION

The Village of Buffalo Grove ("the Village") completed streambank restoration improvements to 2,200 linear feet of the White Pine Drainage Channel ("the Site") in 2008. The Site is located south of Bernard Drive and north of Sycamore Road in the Village of Buffalo Grove, Cook County, Illinois (Figure 1). Specifically, the Site is located in southeast ¼ of Section 5, Township 42 North, Range 11East.
The project involved streambank stabilization, native habitat restoration, and promoted native vegetation of the White Pine Drainage Channel, an area of approximately 2.8 acres. A portion of the channel was realigned to closely follow the meandering path of the existing stream with the purpose of stabilizing the channel, banks, and outlets. Unstable slopes were re-graded and stabilized with erosion control blanket, turf reinforcement mat, and boulder toe. Stormwater inputs (such as sump pump discharge lines and culverts) were altered and armored to decrease the potential for localized scour. Native plant plugs and seed were installed throughout the corridor with approved native species and seed mixes. Stone tree wells were utilized to protect trees in close proximity of the channel.
This report documents the 2014 management and monitoring activities, which were conducted during the sixth full growing season following streambank restoration at the Site. The monitoring fieldwork was completed by David Bart of Stantec on July 2, 2014, and September 9, 2014.

2.0 PROJECT BACKGROUND

The Site consists of the White Pine Drainage Channel and adjacent slopes located within an area managed by the Village (Figure 2). The channel, which was constructed for stormwater drainage, flows into Buffalo Creek and is typically flashy due to stormwater runoff from the urban watershed. Before restoration, the flashy nature of the channel resulted in severe bank erosion, down-cutting, and flow line sedimentation which contributed to non-point source pollution.

A wetland delineation of the parcel was completed in May 2008. Wetlands, totaling 0.94 acres, were identified adjacent to the drainage channel. The plant community was composed mainly of disturbed shallow marsh and fresh wet meadow with some shrubs. The dominant plant species in the area adjacent to the channel consisted of reed canary grass (*Phalaris arundinacea*), Kentucky bluegrass (*Poa pratensis*), eastern cottonwood (*Populus deltoides*), silver maple (*Acer saccharinum*), and weeping willow (*Salix babylonica*).

The project plans for the White Pine Drainage Channel were approved by the U.S. Army Corps of Engineers (USACE) under Regional Permit 10, LRC-2006-1266. The streambank restoration improvements were constructed in the summer and fall of 2008. The Site was seeded with the designated native species and cover crop. Fall of 2014 marked the end of the sixth full growing season since initial restoration work was completed; 2014 constitutes the fifth year of monitoring.

3.0 MONITORING AND MANAGEMENT PLAN

The following Monitoring and Management (M&M) Plan was made part of the Category I Regional Permit 10, approved by the USACE.

The Village will check the project limits on an annual basis in the spring (March/April) to check for fallen debris (branches, logs, etc), newly eroded banks, bare areas in need of reseeding (with the specified seed mix), substrate conditions, and any debris in the channel blocking flow. Erosion shall be repaired as soon as practical, including the backfill of any eroded areas along with the application of erosion control blanket and seeding. Project maintenance will be the responsibility of the Village.

Over the length of the project limits, those areas restored with native seeding shall be burned or mowed (to a height of 6 inches) in late May of 2009, 2011, 2013 (etc.). Burning the eastern portion of the Site is not practical given the proximity to nearby residences. Other than during these times, mowing is not to be performed or permitted. Care shall be taken to protect existing trees and shrubs during mowing or burning operations.

Physical removal and spot herbicide treatments shall be performed to control invasive plant species, specifically: common reed, crown vetch, sandbar willow, garlic mustard, thistle, buckthorn, tree of heaven, barnyard grass, reed canary grass, and purple loosestrife. Foliar herbicide treatment of invasive plants will be conducted in early June, as they are usually taller and more identifiable during this period. At this time, most of the native species will not be developed, making the removal and treatment of invasive plants more effective.

3.1 MONITORING AND REPORTING

As part of project requirements, site inspections (May and September) are to be conducted over five (5) full growing seasons to determine dominant vegetative cover (using estimated cover in ten (10), one (1) square-meter square plots) on the streambanks within the project limits, including documentation of the percent occurrence of the seeded species. Photos will document the condition of streambanks and stabilization structures.

Annual inspection results are required to be documented in an annual memorandum report submitted by the Village to the USACE. Vegetative observations, condition and function of the rock toe, maintenance conducted during the year, and the overall summary of landscape development will be documented by the project ecologist. Problem areas and related management recommendations will be developed by a qualified ecologist and also be included in annual reports. If acceptance standards are not met by the end of the required monitoring period, the USACE may require further management and annual monitoring until project performance standards are met.

The performance standards are based on vegetation coverage and erosion rates. At the end of the first year the project site should show 50% vegetative coverage on the streambanks; 60% at the end of the second year; 70% at the end of the third year; 80% at the end of the fourth year with minimal evidence of erosion. By the end of the fifth year, the banks should have 90% vegetative coverage, show no evidence of erosion, and rock toe will remain in place with no signs of erosion.

Acceptance standards for the wetland enhancement will be based on the percent cover of native vegetation and the Floristic Quality Index (FQI). The standard for percent cover of native vegetation is

80% and the target FQI is 20, indicating good vegetative quality. The FQI of the Site prior to initiation of restoration work in 2008 was 15, indicating moderate vegetative quality. Initial FQI was determined during the design phase wetland delineation.

4.0 MANAGEMENT

The Village conducts annual and ongoing maintenance of the restored area. Grow-in maintenance activities conducted to-date include the treatment of invasive plant species through selective weeding (mostly in the early years), herbicide treatment, mowing, and prescribed burning. Management activities have also included repositioning displaced boulders and reseeding areas exhibiting poor early establishment of desirable native species. Below is a summary of management actions completed to date.

4.1.1 2010 Management activities

In June 2010 physical removal and spot herbicide treatment were implemented to control undesirable species; targeted species include reed canary grass, purple loosestrife (*Lythrum salicaria*), garlic mustard (*Alliaria petiolata*), winter cress (*Barbaria vulgaris*), sweet clover (*Melilotus officinalis*),Canada thistle (*Cirsium arvense*), and crown vetch (*Securigera varia*). Dislodged boulders were repositioned near the upstream project limits. In Fall 2010 the Site was mowed to a height of no less than 6 inches.

4.1.2 2011 Management activities

In Spring 2011 physical removal and spot treatment with glyphosate was implemented to control undesirable species; targeted species include reed canary grass, purple loosestrife, garlic mustard, ragweeds (*Ambrosia artemisiifolia, A. trifida*), teasel (*Dipsacus sylvestris*), winter cress, Canada thistle, and crown vetch.

Live plants, including St. John's wort (*Hypericum punctatum*), were installed along the streambank to promote native vegetation establishment and diversity. In September 2011 approximately a dozen dislodged boulders were repositioned near the upstream project limits. In Fall 2011 the Site was mowed to a height of no less than 6-inches. In November 2011 undesirable woody plants were cut at the base and treated with herbicide; targeted species include buckthorn (*Rhamnus cathartica*), willow (*Salix* sp.), and rose (*Rosa* sp.). Local volunteers reseeded bare areas throughout the Site in November 2011.

4.1.3 2012 Management activities

In May 2012, banks were reseeded to address erosion and slope slumping along the channel, and dislodged boulders were replaced. In July, spot herbicide (glyphosate) treatment was implemented to control Canada thistle, reed canary grass, teasel and crown vetch.

Throughout the year, volunteers hand-pulled invasive plants and gathered and hand-broadcast native seed.

4.1.4 2013 Management activities

A visual inspection of the channel slopes was completed to verify vegetation cover, and the area was inspected for dislodged and missing boulders.

4.1.5 2014 Management activities

In September 2014, Stantec staff conducted spot herbicide treatment of undesirable woody and herbaceous species on the Site. Approximately 20—30 trees and shrubs ranging from 5—15 ft. in height were cut and the stumps were treated with triclopyr. Cut material was then chipped by Village Public Works staff. The woody species removed were primarily silver maple, box elder (*Acer negundo*), and common buckthorn. Selective foliar herbicides were applied to control target herbaceous species; reed canary grass was treated with clethodim and crown vetch, birdsfoot trefoil (*Lotus corniculatus*), Canada thistle, and cut-leaf teasel (*Dipsacus laciniatus*) were treated with aminopyralid. In December, two native seed mixes were hand-broadcasted over appropriate habitats at the Site. A dry-mesic prairie mix composed of eight species of grasses and sedges was spread over 0.5 acre of dry ground and a wet prairie mix composed of 11 species of grasses, sedges and rushes was applied on 0.5 acre of the wetter portions of the Site. Only graminoids were seeded in order to allow for follow-up herbicide application with broad-leaf specific herbicides to target crown vetch and other broad-leaved invasives.

5.0 MONITORING

5.1 METHODS

Vegetation was monitored by Stantec Restoration Specialist David Bart, on July 2 and September 9 during the 2014 growing season. Ten one-square meter sample plots evenly spaced along the length of the Site were sampled in July and September. Within each sample plot, all vascular plant species and their estimated percent cover were recorded. Sample plots were marked with pin flags so that the same plot locations could be sampled on each site visit. Approximate sample plot locations were recorded with GPS and are depicted on Figure 2. A meander survey was conducted throughout the extent of the Site, in July and September, and all vascular plant species identified within the Site were recorded. Plants were identified by scientific name, to species level. Plant specimens were collected as necessary for later identification and verification.

A Floristic Quality Assessment (FQA) was performed using the assessment technique developed by Swink and Wilhelm (1994). The FQA calculation was conducted in the Universal FQA Calculator (Freyman & Masters 2013), using the Coefficient of Conservatism value (C) assigned to each plant species in the Chicago Region USACE FQA Database (Herman et al. 2014). Species Relative Importance Values (RIV) were used to identify the most dominant species within the sample plots. RIV is calculated by averaging the relative frequency and relative coverage of a species within the sample plots.

FQI provides an indication of native vegetation quality for an area and categorizes plant communities as low, moderate, good, high, or "natural area" vegetative quality (see Table 1).

Table 1: Categorization of Plant Communities by FQI Value.

FQI Value	Vegetative Quality
<15	Low
15-25	Moderate
25-30	Good
30-35	High
>35	Natural Area

5.2 RESULTS

5.2.1 Bank and Channel Inspection

During the 2014 field survey, the banks of the channel generally appeared to be in stable condition. No signs of stream bank boulder movement or slope slumping were noted. Previous bank and channel inspection results are shown in Table 2.

Table 2. Bank and Channel Inspection Results, 2010—2012.

Monitoring Year	Slumping of Bank	Dislodged Boulders	Corrective Actions
2010	None noted	Yes	Boulders repositioned near upstream project limit
2011	Yes	Yes	Approx. 12 boulders repositioned near upstream limit
2012	None noted	None noted	None required
2013	None noted	None noted	None required

5.2.2 Vegetation Monitoring

Maps depicting the Project Location and Topography (Figure 1) and Environmental Features (Figure 2), including the vegetation monitoring site boundary and approximate quadrat locations, are presented in Appendix A. Representative color photographs of each sample quadrat are provided in Appendix B. Vegetation data collected during the meander survey and transect survey and FQA results are presented in Appendix C. Native seed mixes applied to the Site in 2014 are included in Appendix D. Table 3 summarizes the findings of the 2014 vegetation assessment.

The July 2014 monitoring results identified 11 of the 58 seeded species (29.3%) in the streambank restoration area. Based on vegetation monitoring, the streambank area had an average of 84.3% total vegetative cover. The five most dominant plant species (based on Relative Importance Value) recorded in quadrats were crown vetch, reed canary grass, Dudley's rush (*Juncus dudleyi*), Canada goldenrod (*Solidago canadensis*), and Canada thistle.

The September 2014 monitoring results identified 15 of the 58 seeded species (32.7%) in the streambank restoration area. Based on vegetation monitoring, the streambank area had an average of 96% total vegetative cover. The five most dominant species (Relative Importance Value) recorded in quadrats were: reed canary grass, crown vetch, Kentucky bluegrass, Dudley's rush, and Canada goldenrod.

Table 3. Summary of Vegetation Statistics for 2014.

	Total Species (meander)	Native Species (meander)	Planted Species (meander)	Floristic Quality Index (meander)	Total Average Cover (quadrat)	Average Native Cover (quadrat)
July 2014	80	53	11 (14%)	15.2	84.3%	45.8%
September 2014	89	63	15 (17%)	17.9	96.0%	55.2%

Table 4 shows the change in key vegetation statistics over the monitoring period, 2010—2014, based on data presented in Monitoring and Management Reports for monitoring years 2010, 2011 and 2012.

Table 4. Change in Vegetation Statistics for White Pine Channel, 2010—2014

Vegetation Statistics	2010 (June/September)	2011 (June/October)	2012 (May/October)	2014 (July/September)
Total Species	77/94	99/84	133/111	80/89
Native Species	46/56	62/53	84/73	53/63
% Planted Species	32.7/34.5	29.3/32.7	NA*	14/17
Total Average Cover	92.5/91.5	91.5/92.0	NA*	84.3/96.0

*data not available

5.3 DISCUSSION

The White Pine Channel restoration is in its fifth year of required monitoring and management, and 2014 constitutes the sixth year since the initiation of the streambank restoration project. The vegetation statistics for 2014 indicate a reduction in total species, native species, percentage of planted species, and FQI when compared to the results of previous monitoring. Species richness (total species), which had improved from 2010 to 2012, decreased in 2014 to near 2010 levels. The trends in dominant species between 2012 and 2014 show increased coverage by non-natives and aggressive, colonial natives; particularly reed canary grass, crown vetch, Kentucky bluegrass, and Canada goldenrod. Total vegetation cover observed in the fall continues to exceed 90%, similar to past years, but summer vegetation cover is lower than in previous years. The reductions in vegetation metrics observed in 2014 may be resultant in part from reduced vegetation management during 2013.

In 2014, the project's performance standard of 90% vegetative cover was exceeded in September but not in June. The acceptance standards for FQI (20) and native vegetation cover (80%) were not achieved in 2014. Additional management actions and monitoring will be necessary in order to meet the performance and acceptance standards. Active vegetation management strategies including spot treatment of invasives, spring burning, and interseeding of native plant species are recommended.

6.0 RECOMMENDATIONS

Management and monitoring should continue in 2015, emphasizing invasive species control and enhancement of native vegetation in order to meet the performance metrics specified within the M&M Plan. Spot herbicide treatment will continue to be important to control invasive, non-native plant cover. In particular, the treatment timing and herbicide/tool should be species-specific.

Target species for herbicide treatment, ranked in order of density from highest to lowest are:
1) crown vetch
2) reed canary grass
3) purple loosestrife
4) burdock (*Arctium minus)*
5) Canada thistle
6) common buckthorn
7) birdsfoot trefoil
8) cut-leaved teasel
9) wild parsnip (*Pastinaca sativa)*
10) sweet clover

A spring prescribed burn may be an effective management tool to stimulate native vegetation, deter growth of woody species, and enable efficient spot treatment of invasive weeds for this Site, though implementation may be impractical on portions of the Site in close proximity to residences. In these areas, early spring mowing may be an effective strategy. Prescribed burning should be considered for periodic application (once every 3-5 years) over the long-term to maintain a healthy native plant community.

Reseeding of native herbaceous plants should be considered following herbicide application and prescribed burning. Reed canary grass control will continue to be a challenge requiring spring 2015 herbicide application. When substantial control of reed canary grass has been achieved, likely in one to two years, these areas may be reseeded with native species. Additional spot-spraying for invasives may continue as needed.

7.0 REFERENCES

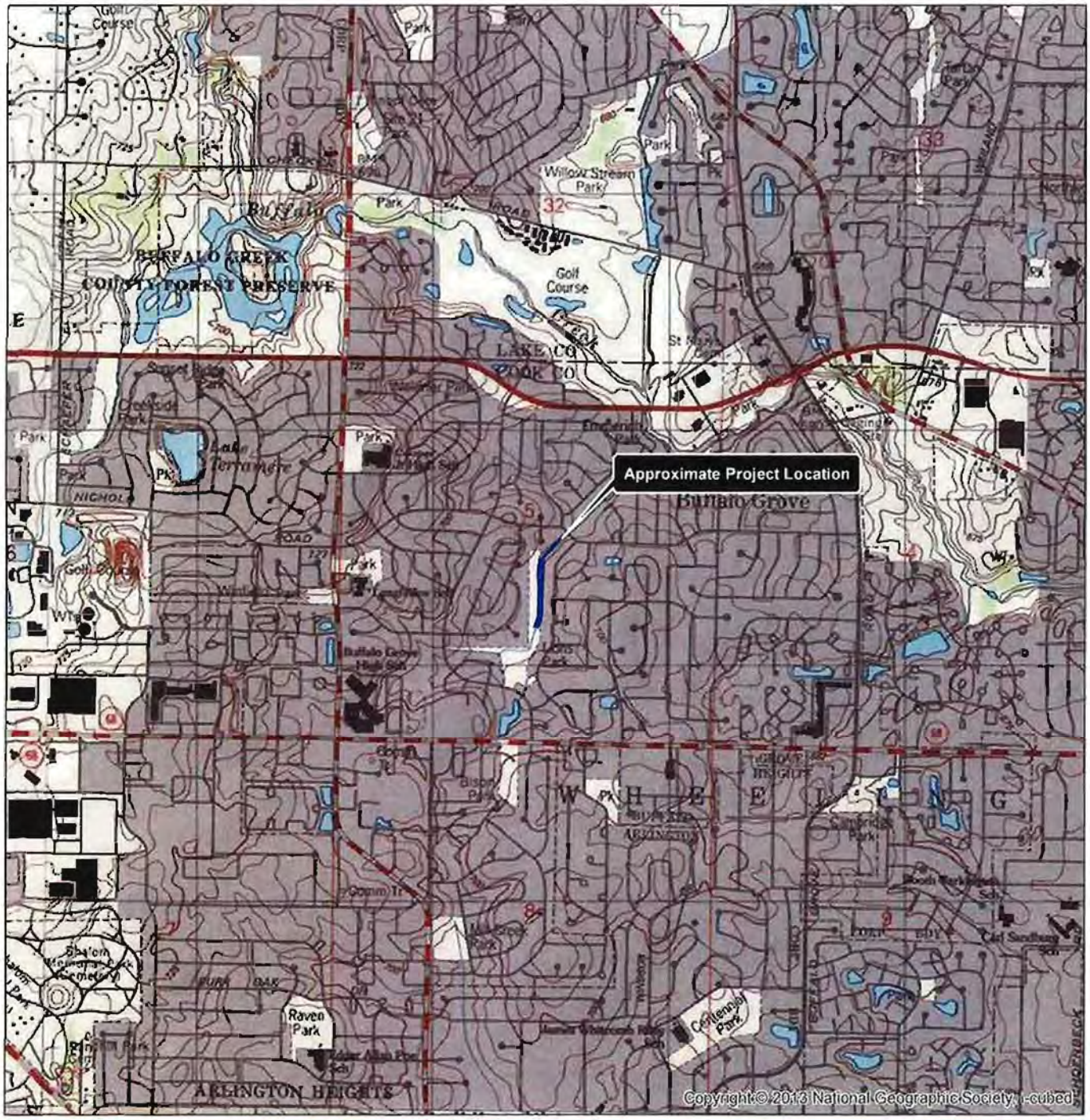
Freyman, W.A. and L.A. Masters. 2013. *The Universal Floristic Quality Assessment (FQA) Calculator* [Computer program]. Available at http://universalFQA.org (Accessed: September 17, 2014)

Herman, B., Sliwinski, R. and S. Whitaker. 2014. Chicago Region FQA (Floristic Quality Assessment) Calculator. U.S. Army Corps of Engineers, Chicago, IL. [Version 1.16.14]

Swink, F. and G. Wilhelm. 1994. *Plants of the Chicago Region.* 4th ed. Indiana Academy of Science, Indianapolis. 921 pp.

Appendix A – Figures

Figure 1. Project Location and Topography
Figure 2. Environmental Features



Legend

Approximate Project Boundary

Figure No.
1

Title
Project Location and Topography

Client/Project
Village of Buffalo Grove
White Pine Vegetation Monitoring

Project Location
142N, R11E, S05
V. of Buffalo Grove
Cook Co., IL

193703069
Prepared by KAS on 2013-11-18
Technical Review by JD on 2014-11-18
Independent Review by JS on 2014-11-18

0 1,000 2,000 Feet
1:24,000 (at original document size of 8.5x11)

Notes
1. Coordinate System: NAD 1983 UTM Zone 16N
2. Data Sources Include: Stantec
3. Orthophotography: USGS 7.5' Topographic Quadrangles

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format; the recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its offices, employees, consultants and agents from any and all claims arising in any way from the content or provision of the data.

Stantec

Page

Legend

- Approximate Quadrat Location
- Approximate Project Boundary
- National Wetlands Inventory*

NRCS Soil Survey Data

- Predominantly Hydric Soils
- Partially Hydric Soils
- Non-Hydric Soils

National Hydrography Data

- Perennial Stream
- Intermittent Stream
- Waterbody

Figure No.
2

Title
Environmental Features

Client/Project
Village of Buffalo Grove
White Pine Vegetation Monitoring

Project Location
M2N, R11E, 30S
V. of Buffalo Grove
Cook Co., IL

193703069
Prepared by KAS on 2014-11-10
Technical Review by JD on 2014-11-10
Independent Review by JS on 2014-11-10

0 50 100 Feet
1:1,200 (at original document size of A Sheet)

Stantec

Notes
1. Coordinate System: NAD 1983 UTM Zone 16N
2. Data Source: Include: Stantec, USGS, and ESRI
3. Orthophotography: World Imagery

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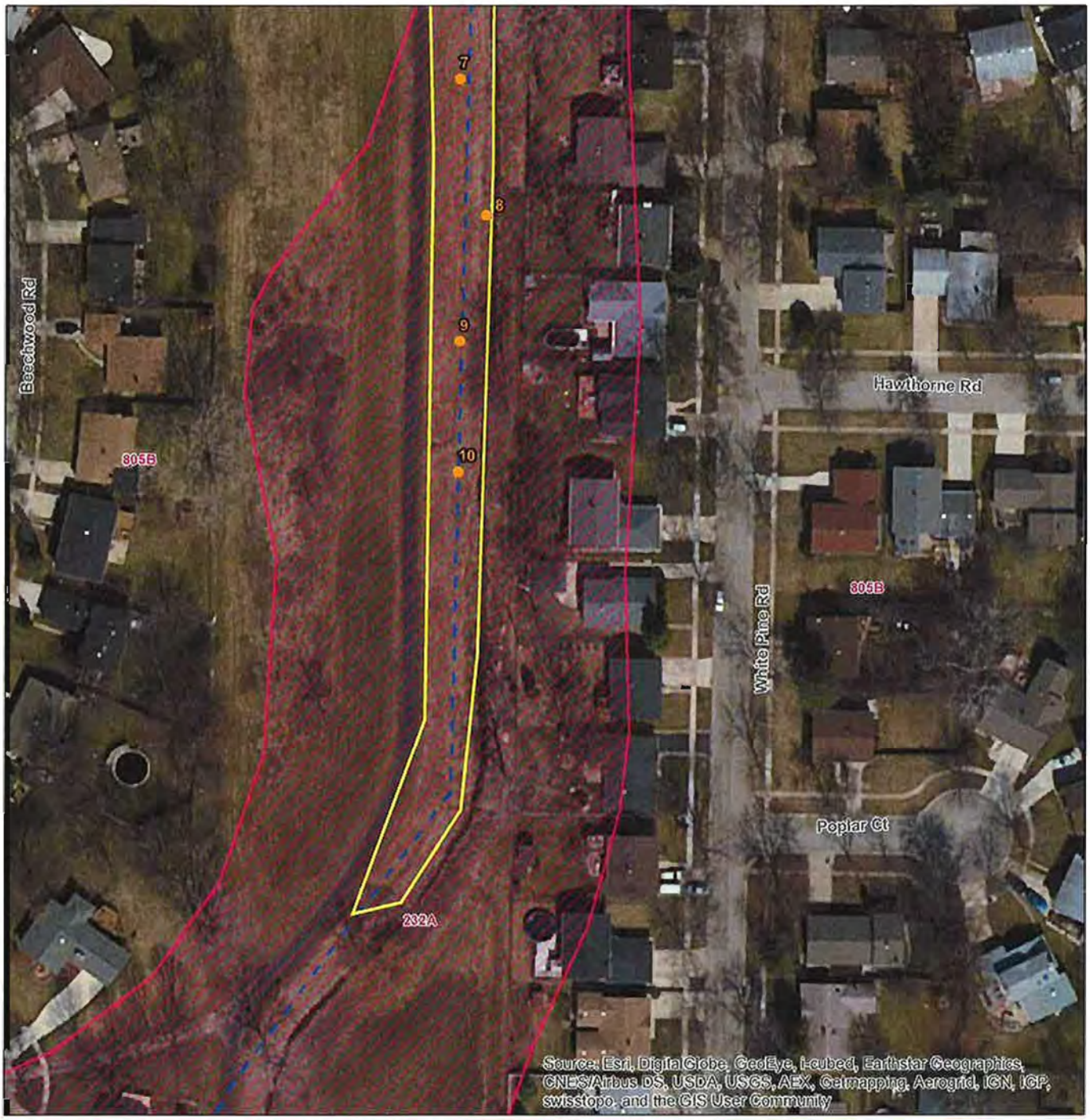
*No recorded wetland data within current extent



Notes
1. Coordinate System: NAD 1983 UTM Zone 16N
2. Data Sources Include: Stantec, USGS, and ESRI
3. Orthophotography: World Imagery

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

Legend

- Approximate Quadrat Location
- Approximate Project Boundary
- National Wetlands Inventory*

NRCS Soil Survey Data

- Predominantly Hydric Soils
- Partially Hydric Soils
- Non-Hydric Soils

National Hydrography Data

- Perennial Stream
- Intermittent Stream
- Waterbody

*No recorded wetland data within current extent

Figure No.
2

Title
Environmental Features

Client/Project
Village of Buffalo Grove
White Pine Vegetation Monitoring

Project Location
T42N, R13E, 3rd P.M.
V. of Buffalo Grove
Cook Co., IL

193703369
Prepared by KAS on 2014-11-10
Technical Review by JD on 2014-11-10
Independent Review by JS on 2014-11-10

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1:1,200 (at original document size of 8.5x11)

Stantec

Appendix B – Site Photographs

Photo 1. View north along channel, July 2014.

Photo 2. View north along channel, July 2014.

Photo 3. View south along southern portion of channel, July 2014.

Photo 4. View south from north end of channel, July 2014.

Photo 5. View north along channel, Sept. 2014.

Photo 6. Dense Crown vetch east of channel, Sept. 2014.

Photo 7. View north along channel, Sept. 2014.

Photo 8. View north along channel, showing willow (left) and green-headed coneflower (right), Sept. 2014.

Quadrat 1. July 2014.

Quadrat 1. Sept. 2014.

Quadrat 2. July 2014.

Quadrat 2. Sept. 2014.

Quadrat 3. July 2014.

Quadrat 3. Sept. 2014.

Quadrat 4. July 2014.

Quadrat 4. Sept. 2014.

Quadrat 5. July 2014.

Quadrat 5. Sept. 2014.

Quadrat 6. July 2014.

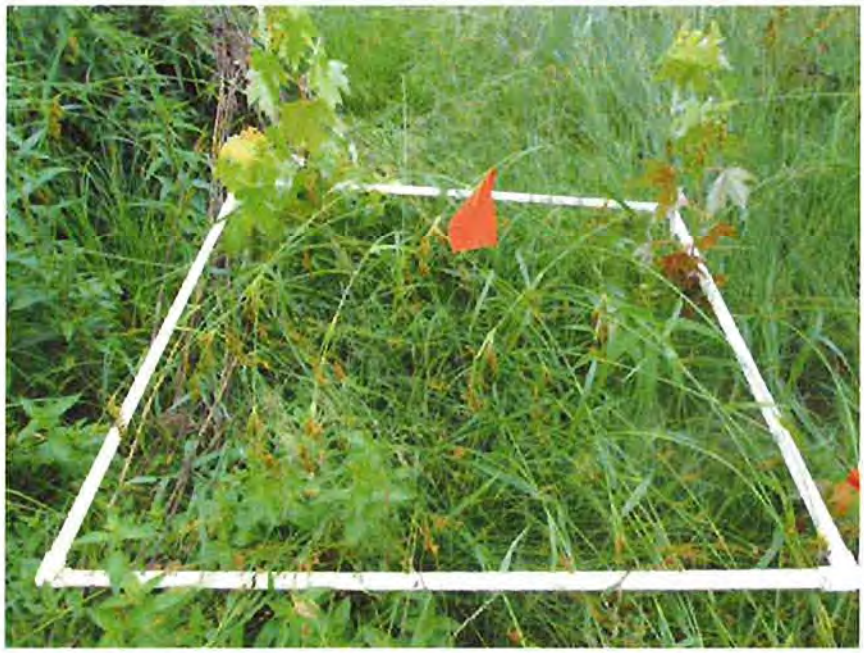
Quadrat 6. Sept. 2014.

Quadrat 7. July 2014.

Quadrat 7. Sept. 2014.

Quadrat 8. July 2014.

Quadrat 8. Sept. 2014.



Quadrat 9. July 2014.

Quadrat 9. Sept. 2014.

Quadrat 10. Sept. 2014.

Appendix C – Floristic Quality Assessment

Appendix C - Floristic Quality Assessment
White Pine Channel - Summer 2014 Meander Data

Conservatism-Based Metrics:

Total Mean C:	1.7
Native Mean C:	2.5
Total FQI:	15.2
Native FQI:	18.2
Adjusted FQI:	20.3
% C value 0:	51.3
% C value 1-3:	20
% C value 4-6:	26.3
% C value 7-10:	2.5
Native Tree Mean C:	1.2
Native Shrub Mean C:	1
Native Herbaceous Mean C:	2.8

Species Richness:

Total Species:	80	
Native Species:	53	66.30%
Non-native Species:	27	33.80%

Species Wetness:

Mean Wetness:	0.2
Native Mean Wetness:	-0.2

Physiognomy Metrics:

Tree:	6	7.50%
Shrub:	2	2.50%
Vine:	1	1.30%
Forb:	53	66.30%
Grass:	9	11.30%
Sedge:	5	6.30%
Rush:	3	3.80%
Fern:	1	1.30%
Bryophyte:	0	0%

Duration Metrics:

Annual:	6	7.50%
Perennial:	66	82.50%
Biennial:	8	10%
Native Annual:	5	6.30%
Native Perennial:	46	57.50%
Native Biennial:	2	2.50%

Appendix C - Floristic Quality Assessment
White Pine Channel - Summer 2014 Meander Data

Species:

Scientific Name	Common Name	Native?	Duration	planted?
Acer negundo	box elder	native	perennial	no
Acer saccharinum	silver maple	native	perennial	no
Ambrosia artemisiifolia	annual ragweed	native	annual	no
Ambrosia trifida	giant ragweed	native	annual	no
Andropogon gerardii	big bluestem	native	perennial	no
Arctium minus	common burdock	non-native	biennial	no
Asclepias incarnata	swamp milkweed	native	perennial	no
Asclepias syriaca	common milkweed	native	perennial	no
Bidens frondosa	common beggars ticks	native	annual	no
Calystegia sepium	hedge bindweed	native	perennial	no
Carex comosa	bristly sedge	native	perennial	no
Carex vulpinoidea	brown fox sedge	native	perennial	yes
Chenopodium album	lambs quarters	non-native	annual	no
Cichorium intybus	chicory	non-native	perennial	no
Cirsium arvense	canadian thistle	non-native	perennial	no
Convolvulus arvensis	field bindweed	non-native	perennial	no
Coreopsis tripteris	tall coreopsis	native	perennial	no
Cornus racemosa	gray dogwood	native	perennial	no
Daucus carota	queen annes lace	non-native	biennial	no
Dipsacus laciniatus	cut-leaved teasel	non-native	biennial	no
Echinacea purpurea	purple coneflower	native	perennial	yes
Eleocharis palustris	common spike-rush	native	perennial	no
Elymus repens	quack grass	non-native	perennial	no
Equisetum arvense	field horsetail	native	perennial	no
Erigeron annuus	annual fleabane	native	biennial	no
Eupatorium altissimum	tall boneset	native	perennial	no
Euthamia graminifolia	common grass-leaved goldenrod	native	perennial	no
Fraxinus pennsylvanica	green ash	native	perennial	no
Geum canadense	white avens	native	perennial	no
Glechoma hederacea	creeping charlie	non-native	perennial	no
Helianthus grosseserratus	saw-tooth sunflower	native	perennial	no
Heliopsis helianthoides	false sunflower	native	perennial	yes
Iris virginica var. shrevei	blue flag	native	perennial	no
Juncus canadensis	canadian rush	native	perennial	no
Juncus dudleyi	dudleys rush	native	perennial	no
Juncus tenuis	path rush	native	perennial	no
Lotus corniculatus	birds foot trefoil	non-native	perennial	no
Lycopus americanus	common water horehound	native	perennial	no
Lythrum salicaria	purple loosestrife	non-native	perennial	no
Melilotus albus	white sweet-clover	non-native	biennial	no
Melilotus officinalis	yellow sweet-clover	non-native	biennial	no
Mentha arvensis	wild mint	native	perennial	no
Monarda fistulosa	wild bergamot	native	perennial	yes
Oenothera biennis	common evening primrose	native	biennial	no

Appendix C - Floristic Quality Assessment
White Pine Channel - Summer 2014 Meander Data

Scientific Name	Common Name	Native?	Duration	planted?
Oxalis stricta	common wood sorrel	native	perennial	no
Panicum virgatum	switch grass	native	perennial	yes
Pastinaca sativa	wild parsnip	non-native	biennial	no
Penstemon digitalis	foxglove beard tongue	native	perennial	yes
Persicaria amphibia	water smartweedknotweed	native	perennial	no
Phalaris arundinacea	reed canary grass	non-native	perennial	no
Phleum pratense	timothy	non-native	perennial	no
Plantago rugelii	red-stalked plantain	native	annual	no
Poa compressa	canada blue grass	non-native	perennial	no
Poa pratensis	kentucky blue grass	non-native	perennial	no
Populus deltoides	eastern cottonwood	native	perennial	no
Potentilla recta	sulfur cinquefoil	non-native	perennial	no
Ratibida pinnata	yellow coneflower	native	perennial	yes
Rhamnus cathartica	common buckthorn	non-native	perennial	no
Rhus hirta; rhus typhina	staghorn sumac	native	perennial	no
Rudbeckia hirta	black-eyed susan	native	perennial	yes
Rumex crispus	curly dock	non-native	perennial	no
Scirpus atrovirens	dark-green bulrush	native	perennial	yes
Scirpus cyperinus	wool grass	native	perennial	no
Securigera varia	crown vetch	non-native	perennial	no
Sinapis arvensis	charlock	native	annual	no
Solanum dulcamara	bittersweet nightshade	non-native	perennial	no
Solidago canadensis	canada goldenrod	native	perennial	no
Sonchus arvensis	field sow thistle	non-native	perennial	no
Sorghastrum nutans	indian grass	native	perennial	no
Spartina pectinata	prairie cord grass	native	perennial	no
Symphyotrichum lanceolotum	panicled aster	native	perennial	no
Symphyotrichum novae-angliae	new england aster	native	perennial	yes
Symphyotrichum pilosum	hairy aster	native	perennial	no
Taraxacum officinale	common dandelion	non-native	perennial	no
Trifolium pratense	red clover	non-native	perennial	no
Typha angustifolia	narrow-leaved cattail	non-native	perennial	no
Typha latifolia	broad-leaved cattail	native	perennial	no
Ulmus americana	american elm	native	perennial	no
Verbena hastata	blue vervain	native	perennial	yes
Vicia americana	american vetch	native	perennial	no

Appendix C - Floristic Quality Assessment
White Pine Channel - Summer 2014 Transect Data
7/2/2014

Conservatism-Based Metrics

Total Mean C:	1.8
Native Mean C:	2.5
Total FQI:	11.5
Native FQI:	13.5
Cover-weighted FQI:	11.5
Cover-weighted Native FQI:	14.5
Adjusted FQI:	71
% C value 0:	48.8
% C value 1-3:	19.5
% C value 4-6:	29.3
% C value 7-10:	2.4

Species Richness:

Total Species:	41	
Native Species:	29	70.70%
Non-native Species:	12	29.30%

Duration Metrics:

Annual:	3	7.30%
Perennial:	33	80.50%
Biennial:	5	12.20%
Native Annual:	2	4.90%
Native Perennial:	25	61%
Native Biennial:	2	4.90%

Appendix C - Floristic Quality Assessment
White Pine Channel - Summer 2014 Transect Data
7/2/2014

Species Relative Importance Values:

Species	Nativity	C	W	Physiognomy	Duration	Frequency	Coverage	Relative Importance Value
Securigera varia	non-native	0	2	forb	perennial	3	160	10.3
Phalaris arundinacea	non-native	0	-3	grass	perennial	8	102	10.2
Juncus dudleyi	native	4	-1	rush	perennial	3	95	6.9
Solidago canadensis	native	1	1	forb	perennial	5	67	6.6
Cirsium arvense	non-native	0	1	forb	perennial	5	35	4.9
Poa pratensis	non-native	0	0	grass	perennial	4	29	4
Carex vulpinoidea	native	2	-3	sedge	perennial	3	35	3.7
Acer saccharinum	native	0	-3	tree	perennial	4	24	3.7
Symphyotrichum novae-angliae	native	4	-3	forb	perennial	4	15	3.3
Oenothera biennis	native	0	1	forb	biennial	4	12	3.1
Glechoma hederacea	non-native	0	1	forb	perennial	3	25	3.1
Equisetum arvense	native	0	0	fern	perennial	1	40	2.7
Scirpus cyperinus	native	6	-2	sedge	perennial	2	25	2.5
Verbena hastata	native	4	-3	forb	perennial	3	9	2.3
Taraxacum officinale	non-native	0	1	forb	perennial	3	4	2
Carex hystericina	native	5	-2	sedge	perennial	1	25	1.9
Symphyotrichum lateriflorum	native	4	-3	forb	perennial	1	25	1.9
Eleocharis palustris	native	2	-2	sedge	perennial	1	20	1.7
Lycopus americanus	native	5	-2	forb	perennial	2	7	1.6
Daucus carota	non-native	0	2	forb	biennial	2	3	1.4
Mentha arvensis	native	5	-1	forb	perennial	1	15	1.4
Schedonorus pratensis	non-native	0	1	grass	perennial	1	10	1.2
Sonchus asper	non-native	0	1	forb	annual	1	10	1.2
Calystegia sepium	native	1	0	forb	perennial	1	5	0.9
Alliaria petiolata	non-native	0	0	forb	biennial	1	5	0.9
Ratibida pinnata	native	4	2	forb	perennial	1	5	0.9
Bidens frondosa	native	1	-1	forb	annual	1	5	0.9
Asclepias syriaca	native	0	1	forb	perennial	1	5	0.9
Scirpus atrovirens	native	4	-2	sedge	perennial	1	5	0.9
Juncus canadensis	native	7	-2	rush	perennial	1	2	0.7
Helianthus grosseserratus	native	2	-1	forb	perennial	1	2	0.7
Heliopsis helianthoides	native	5	1	forb	perennial	1	1	0.7
Elymus repens	non-native	0	1	grass	perennial	1	1	0.7
Elymus virginicus	native	4	-1	grass	perennial	1	2	0.7
Erigeron annuus	native	0	1	forb	biennial	1	2	0.7
Melilotus alba	non-native	0	2	forb	biennial	1	1	0.7
Geum canadense	native	1	0	forb	perennial	1	2	0.7
Symphyotrichum pilosum	native	0	1	forb	perennial	1	2	0.7
Ambrosia artemisiifolia	native	0	1	forb	annual	1	2	0.7
Fraxinus pennsylvanica	native	1	1	tree	perennial	1	2	0.7
Eupatorium altissimum	native	0	2	forb	perennial	1	2	0.7
Bare ground						10	10.7	11.4

Appendix C - Floristic Quality Assessment
White Pine Channel - Summer 2014 Transect Data
7/2/2014

Quadrat Level Metrics:

Quadrat	Species Richness	Native Species Richness	Total Mean C	Native Mean C	Total FQI	Native FQI
Q1	4	2	0.3	0.5	0.6	0.7
Q10	8	7	3.3	3.7	9.3	9.8
Q2	6	3	0.8	1.7	2	2.9
Q3	10	6	0.9	1.5	2.8	3.7
Q4	11	8	1.7	2.4	5.6	6.8
Q5	6	4	2.5	3.8	6.1	7.6
Q6	10	7	2.4	3.4	7.6	9
Q7	7	2	0.1	0.5	0.3	0.7
Q8	11	8	1.5	2	5	5.7
Q9	10	3	0.3	1	0.9	1.7
Average	8.3	5	1.4	2.1	4	4.9
Standard Deviation	2.3	2.3	1	1.2	3	3.2

Quadrat 1 Species:

Scientific Name	Common Name	% Cover	C
Asclepias syriaca	common milkweed	5	0
Bidens frondosa	common beggars ticks	5	1
Glechoma hederacea	creeping charlie	10	0
Phalaris arundinacea	reed canary grass	60	0

Quadrat 2 Species:

Scientific Name	Common Name	% Cover	C
Acer saccharinum	silver maple	10	0
Calystegia sepium	hedge bindweed	5	1
Cirsium arvense	field thistle	5	0
Glechoma hederacea	creeping charlie	5	0
Phalaris arundinacea	reed canary grass	10	0
Symphyotrichum lateriflorum	side-flowering aster	25	4

Quadrat 3 Species:

Scientific Name	Common Name	% Cover	C
Ambrosia artemisiifolia	common ragweed	2	0
Cirsium arvense	field thistle	5	0
Eupatorium altissimum	tall boneset	2	0
Glechoma hederacea	creeping charlie	10	0
Oenothera biennis	common evening primrose	5	0
Phalaris arundinacea	reed canary grass	5	0
Securigera varia	crown vetch	50	0
Solidago canadensis	canada goldenrod	5	1
Symphyotrichum novae-angliae	new england aster	2	4
Verbena hastata	blue vervain	2	4

Quadrat 4 Species:

Scientific Name	Common Name	% Cover	C
Acer saccharinum	silver maple	2	0
Carex vulpinoidea	brown fox sedge	20	2
Elymus virginicus	virginia wild rye	2	4
Equisetum arvense	field horsetail	40	0
Phalaris arundinacea	reed canary grass	2	0
Poa pratensis	kentucky blue grass	2	0
Ratibida pinnata	yellow coneflower	5	4
Solidago canadensis	canada goldenrod	10	1
Symphyotrichum novae-angliae	new england aster	3	4
Taraxacum officinale	common dandelion	1	0
Verbena hastata	blue vervain	2	4

Appendix C - Floristic Quality Assessment
White Pine Channel - Summer 2014 Transect Data
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Quadrat 5 Species:

Scientific Name	Common Name	% Cover	C
Acer saccharinum	silver maple	2	0
Juncus dudleyi	dudleys rush	30	4
Lycopus americanus	common water horehound	2	5
Poa pratensis	kentucky blue grass	20	0
Schedonorus pratensis	tall fescue	10	0
Scirpus cyperinus	wool grass	5	6

Quadrat 6 Species:

Scientific Name	Common Name	% Cover	C
Carex hystericina	porcupine sedge	25	5
Daucus carota	queen annes lace	2	0
Fraxinus pennsylvanica	green ash	2	3
Juncus dudleyi	dudleys rush	15	4
Lycopus americanus	common water horehound	5	5
Phalaris arundinacea	reed canary grass	3	0
Poa pratensis	kentucky blue grass	2	0
Scirpus atrovirens	dark-green bulrush	5	4
Solidago canadensis	canada goldenrod	10	3
Symphyotrichum novae-angliae	new england aster	5	4

Quadrat 7 Species:

Scientific Name	Common Name	% Cover	C
Cirsium arvense	field thistle	10	0
Daucus carota	queen annes lace	1	0
Melilotus albus	white sweet-clover	1	0
Oenothera biennis	common evening primrose	1	0
Securigera varia	crown vetch	50	0
Solidago canadensis	canada goldenrod	40	1
Taraxacum officinale	common dandelion	2	0

Quadrat 8 Species:

Scientific Name	Common Name	% Cover	C
Carex vulpinoidea	brown fox sedge	10	2
Cirsium arvense	field thistle	5	0
Erigeron annuus	annual fleabane	2	0
Geum canadense	white avens	2	1
Heliopsis helianthoides	false sunflower	1	5
Oenothera biennis	common evening primrose	1	0
Phalaris arundinacea	reed canary grass	15	0
Poa pratensis	kentucky blue grass	5	0
Symphyotrichum novae-angliae	new england aster	5	4
Symphyotrichum pilosum	hairy aster	2	0
Verbena hastata	blue vervain	5	4

Quadrat 9 Species:

Scientific Name	Common Name	% Cover	C
Alliaria petiolata	garlic mustard	5	0
Cirsium arvense	field thistle	10	0
Eleocharis palustris	common spike-rush	20	2
Elymus repens	quack grass	1	0
Oenothera biennis	common evening primrose	5	0
Phalaris arundinacea	reed canary grass	2	0
Securigera varia; coronilla varia	crown vetch	60	0
Solidago canadensis	canada goldenrod	2	1
Sonchus asper	spiny sow thistle	10	0
Taraxacum officinale	common dandelion	1	0

Quadrat 10 Species:

Scientific Name	Common Name	% Cover	C
Acer saccharinum	silver maple	10	0
Carex vulpinoidea	brown fox sedge	5	2
Helianthus grosseserratus	sawtooth sunflower	2	2
Juncus canadensis	canadian rush	2	7
Juncus dudleyi	dudleys rush	50	4
Mentha arvensis	wild mint	15	5
Phalaris arundinacea	reed canary grass	5	0
Scirpus cyperinus	wool grass	20	6

Appendix C - Floristic Quality Assessment
White Pine Channel - Fall 2014 Meander Data

Conservatism-Based Metrics:	
Total Mean C:	1.9
Native Mean C:	2.7
Total FQI:	17.9
Native FQI:	21.4
Adjusted FQI:	22.7
% C value 0:	43.8
% C value 1-3:	24.7
% C value 4-6:	28.1
% C value 7-10:	3.4
Native Tree Mean C:	1.2
Native Shrub Mean C:	1.3
Native Herbaceous Mean C:	3

Species Richness:		
Total Species:	89	
Native Species:	63	70.80%
Non-native Species:	26	29.20%

Species Wetness:	
Mean Wetness:	0.1
Native Mean Wetness:	-0.1

Physiognomy Metrics:

Tree:	7	7.90%
Shrub:	4	4.50%
Vine:	1	1.10%
Forb:	55	61.80%
Grass:	12	13.50%
Sedge:	6	6.70%
Rush:	3	3.40%
Fern:	1	1.10%
Bryophyte:	0	0%

Duration Metrics:

Annual:	6	6.70%
Perennial:	75	84.30%
Biennial:	8	9%
Native Annual:	5	5.60%
Native Perennial:	56	62.90%
Native Biennial:	2	2.20%

Appendix C - Floristic Quality Assessment
White Pine Channel - Fall 2014 Meander Data

Species:

Scientific Name	Common Name	Native?	C	planted?
Acer negundo	box elder	native	0	no
Acer saccharinum	silver maple	native	0	no
Alliaria petiolata	garlic-mustard	non-native	0	no
Ambrosia artemisiifolia	common ragweed	native	0	no
Ambrosia trifida	giant ragweed	native	0	no
Andropogon gerardii	big bluestem	native	5	no
Arctium minus	common burdock	non-native	0	no
Asclepias incarnata	swamp milkweed	native	4	no
Asclepias syriaca	common milkweed	native	0	no
Bidens frondosa	common beggars ticks	native	1	no
Calystegia sepium	hedge bindweed	native	1	no
Carex hystericina	porcupine sedge	native	5	no
Chenopodium album	lambs-quarters	non-native	0	no
Cichorium intybus	chicory	non-native	0	no
Circaea canadensis	enchanters nightshade	native	1	no
Cirsium arvense	field thistle	non-native	0	no
Cirsium vulgare	bull thistle	non-native	0	no
Coreopsis tripteris	tall coreopsis	native	5	no
Cornus racemosa	gray dogwood	native	1	no
Daucus carota	queen annes lace	non-native	0	no
Dipsacus laciniatus	cut-leaved teasel	non-native	0	no
Eleocharis palustris	common spike-rush	native	2	no
Elymus repens	quack grass	non-native	0	no
Epilobium coloratum	cinnamon willow herb	native	3	no
Equisetum arvense	field horsetail	native	0	no
Eupatorium altissimum	tall boneset	native	0	no
Euthamia graminifolia	common grass-leaved goldenrod	native	4	no
Fraxinus pennsylvanica	green ash	native	1	no
Geum canadense	white avens	native	1	no
Helianthus grosseserratus	sawtooth sunflower	native	2	no
Iris virginica var. shrevei	blue flag	native	5	no
Juncus canadensis	canadian rush	native	7	no
Juncus dudleyi	dudleys rush	native	4	no
Juncus torreyi	torreys rush	native	4	no
Lactuca canadensis	wild lettuce	native	2	no
Lotus corniculatus	birds foot trefoil	non-native	0	no
Lycopus americanus	cut-leaf water-horehound	native	5	no
Lythrum salicaria	purple loosestrife	non-native	0	no
Melilotus albus	white sweet-clover	non-native	0	no
Mentha arvensis	wild mint	native	5	no
Morus alba	white mulberry	non-native	0	no
Oenothera biennis	common evening primrose	native	0	no
Oxalis stricta	common wood sorrel	native	0	no
Persicaria lapathifolia	dock-leaf smartweed	native	0	no
Phalaris arundinacea	reed canary grass	non-native	0	no
Phleum pratense	timothy	non-native	0	no

Appendix C - Floristic Quality Assessment
White Pine Channel - Fall 2014 Meander Data

Scientific Name	Common Name	Native?	C	planted?
Plantago major	common plantain	non-native	0	no
Poa compressa	canada blue grass	non-native	0	no
Poa pratensis	kentucky blue grass	non-native	0	no
Populus deltoides	eastern cottonwood	native	2	no
Potentilla recta	sulfur cinquefoil	non-native	0	no
Prunella vulgaris ssp. lanceolata	self heal	native	0	no
Rhamnus cathartica	common buckthorn	non-native	0	no
Rhus hirta; rhus typhina	staghorn sumac	native	1	no
Rubus occidentalis	black raspberry	native	2	no
Rumex crispus	curly dock	non-native	0	no
Salix interior	sandbar willow	native	1	no
Schedonorus pratensis	meadow fescue	non-native	0	no
Scirpus cyperinus	wool grass	native	6	no
Securigera varia	crown vetch	non-native	0	no
Sinapis arvensis	charlock	native	0	no
Solanum dulcamara	bittersweet nightshade	non-native	0	no
Solidago canadensis	canada goldenrod	native	1	no
Sonchus arvensis	field sow-thistle	non-native	0	no
Sorghastrum nutans	indian grass	native	5	no
Symphyotrichum ericoides	heath aster	native	5	no
Symphyotrichum lateriflorum	side-flowering aster	native	4	no
Symphyotrichum oolentangiense	sky-blue aster	native	8	no
Symphyotrichum pilosum	hairy aster	native	0	no
Typha angustifolia	narrow-leaved cattail	non-native	0	no
Typha latifolia	broad-leaved cattail	native	1	no
Ulmus americana	american elm	native	3	no
Urtica dioica ssp. gracilis	tall nettle	native	2	no
Viola sororia	common blue violet	native	3	no
Bouteloua curtipendula	side-oats grama	native	8	yes
Carex vulpinoidea	brown fox sedge	native	2	yes
Echinacea purpurea	purple coneflower	native	3	yes
Elymus canadensis	canada wild rye	native	4	yes
Elymus virginicus	virginia wild rye	native	4	yes
Heliopsis helianthoides	false sunflower	native	5	yes
Monarda fistulosa	wild bergamot	native	4	yes
Panicum virgatum	switch grass	native	5	yes
Penstemon digitalis	foxglove beardtongue	native	4	yes
Ratibida pinnata	yellow coneflower	native	4	yes
Rudbeckia hirta	black-eyed-susan	native	1	yes
Schoenoplectus tabernaemontani	great bulrush	native	5	yes
Scirpus atrovirens	dark-green bulrush	native	4	yes
Symphyotrichum novae-angliae	new england aster	native	4	yes
Verbena hastata	blue vervain	native	4	yes

Appendix C - Floristic Quality Assessment
White Pine Channel - Fall 2014 Transect Data
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Conservatism-Based Metrics:	
Total Mean C:	1.8
Native Mean C:	2.6
Total FQI:	11.9
Native FQI:	14.5
Cover-weighted FQI:	13.3
Cover-weighted Native FQI:	16.1
Adjusted FQI:	21.8
% C value 0:	47.7
% C value 1-3:	18.2
% C value 4-6:	31.8
% C value 7-10:	2.3

Species Richness:		
Total Species:	44	
Native Species:	31	70.50%
Nonnative Species:	13	29.50%

Duration Metrics:		
Annual:	3	6.80%
Perennial:	37	84.10%
Biennial:	4	9.10%
Native Annual:	2	4.50%
Native Perennial:	28	63.60%
Native Biennial:	1	2.30%

Appendix C - Floristic Quality Assessment
White Pine Channel - Fall 2014 Transect Data
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Species Relative Importance Values:

Species	Nativity	C	W	Physiognomy	Duration	Frequency	Coverage	Relative Importance Value
Phalaris arundinacea	non-native	0	-1	grass	perennial	8	76	8.1
Solanum dulcamara	non-native	0	0	forb	perennial	3	109	7
Poa pratensis	non-native	0	0	grass	perennial	6	65	6.5
Juncus dudleyi	native	4	-1	rush	perennial	4	80	6.2
Solidago canadensis	native	1	1	forb	perennial	6	44	5.1
Euthamia graminifolia	native	4	-1	forb	perennial	2	65	4.5
Onoclea sensibilis	non-native	0	1	forb	perennial	5	26	4
Symphyotrichum novae-angliae	native	4	-1	forb	perennial	4	14	3.8
Oenothera biennis	native	0	1	forb	biennial	4	31	3.7
Acer saccharinum	native	0	-1	tree	perennial	4	20	3.3
Carex vulpinoidea	native	3	-1	sedge	perennial	3	30	3.1
Verbena hastata	native	4	-1	forb	perennial	4	13	2.8
Glechoma hederacea	non-native	0	1	forb	perennial	3	23	2.8
Eupatorium altissimum	native	0	2	forb	perennial	2	30	2.6
Symphyotrichum lateriflorum	native	4	-1	forb	perennial	2	25	2.4
Geum canadense	native	1	0	forb	perennial	3	12	2.2
Equisetum arvense	native	0	0	fern	perennial	1	30	2.1
Schedonorus pratensis	non-native	0	1	grass	perennial	1	30	2.1
Scirpus cyperinus	native	6	-2	sedge	perennial	2	15	1.9
Dipsacus laciniatus	non-native	0	-2	forb	biennial	3	5	1.8
Symphyotrichum ericoides	native	3	1	forb	perennial	1	20	1.6
Carex hystericina	native	5	-2	sedge	perennial	1	20	1.6
Mentha arvensis	native	5	-1	forb	perennial	1	20	1.6
Symphyotrichum pilosum	native	0	1	forb	perennial	2	7	1.4
Lythrum salicaria	non-native	0	-2	forb	perennial	2	5	1.1
Sonchus asper	non-native	0	1	forb	annual	1	15	1.1
Taraxacum officinale	non-native	0	1	forb	perennial	2	3	1.2
Scirpus atrovirens	native	4	-2	sedge	perennial	1	10	1
Elymus canadensis	native	4	1	grass	perennial	1	7	0.9
Asclepias syriaca	native	0	1	forb	perennial	1	5	0.8
Calystegia sepium	native	1	0	forb	perennial	1	5	0.8
Bidens frondosa	native	1	-1	forb	annual	1	5	0.8
Rudbeckia alnnata	native	4	2	forb	perennial	1	5	0.8
Elymus repens	non-native	0	1	grass	perennial	1	5	0.8
Circaea canadensis	native	3	1	forb	perennial	1	5	0.8
Prunella vulgaris ssp. lanceolata	native	0	0	forb	perennial	1	5	0.8
Lycopus americanus	native	5	-2	forb	perennial	1	5	0.8
Elymus virginicus	native	4	-1	grass	perennial	1	5	0.8
Epilobium coloratum	native	3	-3	forb	perennial	1	3	0.7
Ambrosia artemisiifolia	native	0	1	forb	annual	1	2	0.6
Alliaria petiolata	non-native	0	0	forb	biennial	1	2	0.6
Fraxinus pennsylvanica	native	1	-1	tree	perennial	1	2	0.6
Melilotus alba	non-native	0	2	forb	biennial	1	1	0.6
Juncus canadensis	native	7	-2	rush	perennial	1	2	0.6
Bare ground						10	47	7.6

Appendix C - Floristic Quality Assessment
White Pine Channel - Fall 2014 Transect Data
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Quadrat Level Metrics:

Quadrat	Species Richness	Native Species Richness	Total Mean C	Native Mean C	Total FQI	Native FQI
Q1	5	3	1	1.7	2.2	2.9
Q10	8	5	2.1	3.4	5.9	7.6
Q2	7	4	1.4	2.5	3.7	5
Q3	11	6	0.5	0.8	1.7	2
Q4	11	9	1.8	2.2	6	6.6
Q5	7	4	2	3.5	5.3	7
Q6	12	8	2.3	3.4	8	9.6
Q7	12	6	1.4	2.8	4.8	6.9
Q8	12	11	1.8	3.9	6.2	6.3
Q9	12	4	0.4	1.3	1.4	2.6
Average	9.7	6	1.5	2.4	4.5	5.7
Standard Deviation	2.5	2.4	0.6	0.9	2.1	2.1

Quadrat 1 Species:

Scientific Name	% Cover	C	Common Name
Asclepias syriaca	5	0	common milkweed
Bidens frondosa	5	1	common beggars ticks
Elymus canadensis	7	4	canada wild rye
Glechoma hederacea	15	0	creeping charlie
Phalaris arundinacea	50	0	reed canary grass

Quadrat 2 Species:

Scientific Name	% Cover	C	Common Name
Acer saccharinum	10	0	silver maple
Calystegia sepium	5	1	hedge bindweed
Cirsium arvense	3	0	field thistle
Glechoma hederacea	5	0	creeping charlie
Phalaris arundinacea	10	0	reed canary grass
Symphyotrichum ericoides	20	5	heath aster
Symphyotrichum lateriflorum	15	4	side-flowering aster

Quadrat 3 Species:

Scientific Name	% Cover	C	Common Name
Ambrosia artemisiifolia	2	0	common ragweed
Cirsium arvense	7	0	field thistle
Daucus carota	1	0	queen anne's lace
Eupatorium altissimum	15	0	tall boneset
Glechoma hederacea	3	0	creeping charlie
Oenothera biennis	7	0	common evening primrose
Phalaris arundinacea	5	0	reed canary grass
Securigera varia	50	0	crown vetch
Solidago canadensis	5	1	canada goldenrod
Symphyotrichum pilosum	2	0	hairy aster
Verbena hastata	1	4	blue vervain

Quadrat 4 Species:

Scientific Name	% Cover	C	Common Name
Acer saccharinum	2	0	silver maple
Carex vulpinoidea	15	2	brown fox sedge
Elymus virginicus	5	4	virginia wild rye
Equisetum arvense	30	0	field horsetail
Geum canadense	5	1	white avens
Phalaris arundinacea	7	0	reed canary grass
Poa pratensis	5	0	kentucky blue grass
Ratibida pinnata	5	4	yellow cone flower
Solidago canadensis	15	1	canada goldenrod
Symphyotrichum novae-angliae	15	4	new england aster
Verbena hastata	5	4	blue vervain

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Quadrat 5 Species:

Scientific Name	% Cover	C	Common Name
Acer saccharinum	1	0	silver maple
Juncus dudleyi	25	4	dudleys rush
Lythrum salicaria	5	0	purple loosestrife
Poa pratensis	15	0	kentucky blue grass
Schedonorus pratensis	30	0	tall fescue
Scirpus cyperinus	10	0	wool grass
Verbena hastata	2	4	blue vervain

Quadrat 6 Species:

Scientific Name	% Cover	C	Common Name
Carex hystericina	20	5	porcupine sedge
Daucus carota	7	0	queen annes lace
Euthamia graminifolia	15	4	common grass leaved goldenrod
Juncus dudleyi	10	4	dudleys rush
Lycopus americanus	5	5	common water horehound
Lythrum salicaria	2	0	purple loosestrife
Oenothera biennis	2	0	common evening primrose
Phalaris arundinacea	3	0	reed canary grass
Poa pratensis	5	0	kentucky blue grass
Scirpus atrovirens	10	4	dark-green bulrush
Solidago canadensis	1	1	canada goldenrod
Symphyotrichum novae-angliae	2	4	new england aster

Quadrat 7 Species:

Scientific Name	% Cover	C	Common Name
Cirsium arvense	5	0	field thistle
Daucus carota	2	0	queen annes lace
Euthamia graminifolia	30	4	common grass-leaved goldenrod
Geum canadense	5	1	white avens
Juncus canadensis	2	7	canadian rush
Melilotus alba	1	0	white sweet-clover
Oenothera biennis	3	0	common evening primrose
Phalaris arundinacea	7	0	reed canary grass
Securigera varia	30	0	crown vetch
Solidago canadensis	2	1	canada goldenrod
Symphyotrichum novae-angliae	2	4	new england aster
Taraxacum officinale	1	0	common dandelion

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Quadrat 6 Species:

Scientific Name	% Cover	C	Common Name
Carex vulpinoidea	5	2	brown fox sedge
Eupatorium altissimum	15	0	tall boneset
Fraxinus pennsylvanica	2	1	green ash
Geum canadense	2	1	white avens
Juncus dudleyi	5	4	dudleys rush
Poa pratensis	10	0	kentucky blue grass
Prunella vulgaris ssp. lanceolata	5	0	self heal
Solidago canadensis	10	1	canada goldenrod
Symphyotrichum lateriflorum	10	4	side-flowering aster
Symphyotrichum novae-angliae	35	4	new england aster
Symphyotrichum pilosum	5	0	hairy aster
Verbena hastata	5	4	blue vervain

Quadrat 8 Species:

Scientific Name	% Cover	C	Common Name
Alliaria petiolata	2	0	garlic mustard
Circaea canadensis	5	3	enchanters nightshade
Cirsium arvense	15	0	field thistle
Elymus repens	5	0	quack grass
Epilobium coloratum	3	3	cinnamon willow herb
Oenothera biennis	10	0	common evening primrose
Phalaris arundinacea	2	0	reed canary grass
Poa pratensis	75	0	kentucky blue grass
Securigera varia	25	0	crown vetch
Solidago canadensis	5	1	canada goldenrod
Sonchus asper	15	0	spiny sow thistle
Taraxacum officinale	2	0	common dandelion

Quadrat 0,5d Species:

Scientific Name	% Cover	C	Common Name
Acer saccharinum	7	0	silver maple
Carex vulpinoidea	10	2	brown fox sedge
Cirsium arvense	2	0	field thistle
Juncus dudleyi	40	4	dudleys rush
Mentha arvensis	20	5	wild mint
Phalaris arundinacea	2	0	reed canary grass
Poa pratensis	5	0	kentucky blue grass
Scirpus cyperinus	5	0	wool grass

Appendix D –Seed Mixes

Dry-Mesic Prairie		
Scientific Name	**Common Name**	**oz/acre**
Andropogon gerardii	Big Bluestem	4
Andropogon scoparius	Little Bluestem	20
Bouteloua curtipendula	Side-oats Grama	15
Bromus kalmii	Prairie Brome	15
Elymus canadensis	Canada Wild Rye	15
Panicum virgatum	Switch Grass	1
Sorghastrum nutans	Indian Grass	4
Carex bicknellii	Bicknell's Sedge	3

Wet Prairie		
Scientific Name	**Common Name**	**oz/acre**
Elymus riparius	Riverbank Wild Rye	5
Elymus virginicus	Virginia Wild Rye	25
Glyceria striata	Fowl Manna Grass	1
Carex comosa	Longhair Sedge	1.5
Carex scoparia	Broom Sedge	1.5
Carex vulpinoidea	Brown Fox Sedge	2
Juncus canadensis	Canada Rush	0.25
Juncus dudleyi	Dudley's Rush	0.125
Juncus effusus	Common Rush	0.125
Scirpus atrovirens	Dark-green Bulrush	1
Scirpus cyperinus	Wool Grass	0.5