4115356960

MS4 Annual Report Cover Page

MCC form for period ending March 9, 2009

SPDES ID: NYR20A180

This cover page must be completed by the report preparer.
Joint reports require only one cover page.

Choose one:

● **This report is being submitted on behalf of an individual MS4.**

Fill in SPDES ID in upper right hand corner.

Name of MS4: Suffolk County

OR

○ **This is a joint report being submitted on behalf of a coalition.**

Provide SPDES ID of each permitted MS4 included in this report. Use page 2 if needed.

Name of Coalition:

SPDES ID	SPDES ID	SPDES ID
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A

MS4 Annual Report Cover Page

MCC form for period ending March 9, 2009

Provide SPDES ID of each permitted MS4 included in this report.

SPDES ID	SPDES ID	SPDES ID
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A
NYR20A	NYR20A	NYR20A

MS4 Annual Report Cover Page

MCC form for period ending March 9, 2009

Required Forms

- > Municipal Compliance Certification
- > Water Quality Trends
- > Minimum Measure 1
- > Minimum Measure 2
- > Minimum Measure 3
- > Minimum Measure 4
- > Minimum Measure 4 and 5
- > Minimum Measure 5
- > Minimum Measure 6
- > MS4s in impaired watersheds included in GP-0-08-002 Part IX must also complete the form *Additional Watershed Improvement Strategy Best Management Practices.*

Reporting Requirements

* **Permittees submitting an annual report for an individual MS4 must complete and submit all required forms.**

* **Joint reports may be submitted by permittees with legally binding agreements as follows:**

    - > *Each* MS4 contributing to a joint report must submit a Municipal Compliance Certification (MCC) form with an original signature. The MCC forms must be attached to the report.
    - > A coalition may submit information on behalf of its members as follows:

        1. Submit one form for each of the Minimum Measures (and if required, Additional Watershed Improvement Strategy Best Management Practices) on behalf of all the MS4s in the coalition, or

        2. Complete some of the required forms on behalf of all the MS4's in the coalition and for other Minimum Measures, attach completed forms from each of the MS4s.

For example, a joint report for a coalition including four permitted MS4s may contain one form for *each* of the Minimum Measures 1-5, representing the combined work of all four participating MS4s, and *in addition*, include four separate Minimum Measure 6 forms and four separate *Additional Watershed Improvement Strategy Best Management Practices* forms provided by each of the participating permittees.

The Department will *not* accept a report form from a participating MS4 *in addition to* a combined report form submitted for the same Minimum Measure.

Instructions for completing forms

These forms may be completed on a computer or by hand. If completing the forms by hand, fill in circles completely and print clearly.

7809648394

MS4 Municipal Compliance Certification(MCC) Form

MCC form for period ending March 9, 2009

SPDES ID: NYR20A180

Name of MS4: Suffolk County

Each MS4 must submit an MCC form.

Section 1 - MCC Identification Page

Indicate whether this MCC form is being submitted to certify endorsement or acceptance of:

- [x] An Annual Report for a single MS4
- [ ] A Joint Report

Joint reports may be submitted by permittees with legally binding agreements.

If Joint Report, enter coalition name:

MS4 Municipal Compliance Certification(MCC) Form

MCC form for period ending March 9, 2009

Name of MS4: Suffolk County

SPDES ID: NYR20A180

Section 2 - Contact Information

Provide contact information for ***all*** of the following contacts:

1. The Principal Executive Officer, Chief Elected Official or other qualified individual (per GP-0-08-002 Part VI.J).
2. The Local Stormwater Public Contact (required per GP-0-08-002 Part VII.A.2.c.).
3. The Stormwater Management Program (SWMP) Coordinator (Individual responsible for coordination/implementation of SWMP).
4. Report Preparer (Consultants may provide company name in the space provided).

Submit a separate sheet for each contact.

For each contact, select all that apply:

- (●) Signatory Authority (choose one of the following)
  - ( ) Executive Officer or Ranking Elected Official
  - (●) Duly Authorized Representative
- ( ) Local Stormwater Public Contact
- ( ) Stormwater Management Program (SWMP) Coordinator
- ( ) Report Preparer

First Name: William
MI:
Last Name: Hillman

Title: Chief Engineer

Address: 335 Yaphank Avenue

City: Yaphank
State: NY
Zip: 11980 -

eMail: william.hillman@suffolkcountyny.gov

Phone: (631) 852-4002

County: Suffolk

MS4 Municipal Compliance Certification(MCC) Form

MCC form for period ending March 9, 2009

Name of MS4: Suffolk County

SPDES ID: NYR20A180

Section 2 - Contact Information

Provide contact information for ***all*** of the following contacts:

1. The Principal Executive Officer, Chief Elected Official or other qualified individual (per GP-0-08-002 Part VI.J).
2. The Local Stormwater Public Contact (required per GP-0-08-002 Part VII.A.2.c.).
3. The Stormwater Management Program (SWMP) Coordinator (Individual responsible for coordination/implementation of SWMP).
4. Report Preparer (Consultants may provide company name in the space provided).

Submit a separate sheet for each contact.

For each contact, select all that apply:

- ○ Signatory Authority (choose one of the following)
  - ○ Executive Officer or Ranking Elected Official
  - ○ Duly Authorized Representative
- ● Local Stormwater Public Contact
- ○ Stormwater Management Program (SWMP) Coordinator
- ○ Report Preparer

First Name: Jeff
MI:
Last Name: Dawson

Title: Civil Engineer

Address: 335 Yaphank Avenue

City: Yaphank
State: NY
Zip: 11980 -

eMail: jeff.dawson@suffolkcountyny.gov

Phone: (631) 852 - 5325
County: Suffolk

MS4 Municipal Compliance Certification(MCC) Form

MCC form for period ending March 9, 2009

SPDES ID: NYR20A180

Name of MS4: Suffolk County

Section 2 - Contact Information

Provide contact information for ***all*** of the following contacts:

1. The Principal Executive Officer, Chief Elected Official or other qualified individual (per GP-0-08-002 Part VI.J).
2. The Local Stormwater Public Contact (required per GP-0-08-002 Part VII.A.2.c.).
3. The Stormwater Management Program (SWMP) Coordinator (Individual responsible for coordination/implementation of SWMP).
4. Report Preparer (Consultants may provide company name in the space provided).

Submit a separate sheet for each contact.

For each contact, select all that apply:

- ○ Signatory Authority (choose one of the following)
  - ○ Executive Officer or Ranking Elected Official
  - ○ Duly Authorized Representative
- ○ Local Stormwater Public Contact
- ● Stormwater Management Program (SWMP) Coordinator
- ○ Report Preparer

First Name: Emerson
MI:
Last Name: Hasbrouck

Title: Senior Extension Educator, CCE

Address: 423 Griffing Avenue

City: Riverhead
State: NY
Zip: 11901 -

eMail: ech12@cornell.edu

Phone: (631) 727 - 7850
County: Suffolk

5559493516

MS4 Municipal Compliance Certification(MCC) Form

MCC form for period ending March 9, 2009

SPDES ID NYR20A180

Name of MS4 Suffolk County

Section 2 - Contact Information

Provide contact information for ***all*** of the following contacts:

1. The Principal Executive Officer, Chief Elected Official or other qualified individual (per GP-0-08-002 Part VI.J).
2. The Local Stormwater Public Contact (required per GP-0-08-002 Part VII.A.2.c.).
3. The Stormwater Management Program (SWMP) Coordinator (Individual responsible for coordination/implementation of SWMP).
4. Report Preparer (Consultants may provide company name in the space provided).

Submit a separate sheet for each contact.

For each contact, select all that apply:

- ○ Signatory Authority (choose one of the following)
  - ○ Executive Officer or Ranking Elected Official
  - ○ Duly Authorized Representative
- ○ Local Stormwater Public Contact
- ○ Stormwater Management Program (SWMP) Coordinator
- ● Report Preparer

First Name: Lorne
MI:
Last Name: Brousseau

Title: Senior Resource Educator, CCE

Address: PO BOX 554

City: Huntington
State: NY
Zip: 11743-

eMail: lb66@cornell.edu

Phone: (631) 239-1800
County: Suffolk

MS4 Municipal Compliance Certification (MCC) Form

MCC form for period ending March 9, 2009

Name of MS4: Suffolk County

SPDES ID: NYR20A180

Section 3 - Partner Information - Submit a separate sheet for each partner.

Did your MS4 work with partners/coalition to complete some or all permit requirements during this reporting period?

If Yes, complete information below.
If No, proceed to Section 4 - Certification Statement.

● Yes ○ No

Partner/Coalition Name: Cornell Cooperative Extension of

Partner/Coalition Name (con't.): Suffolk County

SPDES Partner ID - If applicable: NYR20

Address: 423 Griffing Avenue

City: Riverhead

State: NY

Zip: 11901 -

eMail: ech12@cornell.edu

Phone: (631) 727-7850

Legally Binding Agreement in accordance with GP-0-08-002 Part IV.G.? ○ Yes ○ No

What tasks/responsibilities are shared with this partner (e.g. MM1 School Programs or Multiple Tasks)?

- ● MM1 Multiple Tasks
- ● MM2 Multiple Tasks
- ● MM3 Multiple Tasks
- ● MM4 Multiple Tasks
- ● MM5 Multiple Tasks
- ● MM6 Multiple Tasks

Additional tasks/responsibilities

- ● *Watershed Improvement Strategy Best Management Practices* required for MS4s in impaired watersheds included in GP-0-08-002 Part IX.

Pathogen Impaired Watershed (Peconic Estuary) + Nitrogen Impaired Watershed (Peconic Estuary)

MS4 Municipal Compliance Certification(MCC) Form

MCC form for period ending March 9, 2009

Name of MS4: Suffolk County

SPDES ID: NYR20A180

Section 4 - Certification Statement

"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 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, the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

This form must be signed by either a principal executive officer or ranking elected official, or duly authorized representative of that person as described in GP-0-08-002 Part VI.J.

First Name

MI

Last Name

Title

Signature

Date __ / __ / ____

Send completed form and any attachments to the DEC Central Office at:

MS4 Permit Coordinator
Division of Water
4th Floor
625 Broadway
Albany, New York 12233-3505

1488183148

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

Water Quality Trends

The information in this section is being reported (check one):

● On behalf of an individual MS4
○ On behalf of a coalition

How many MS4s are contributed to this report? 1

1. Has this MS4/Coalition produced any reports documenting water quality trends related to stormwater? ● Yes ○ No

If Yes, choose one of the following

● Report(s) attached to the annual report

○ Web Page(s) where report(s) is/are provided below

Please provide specific address of page where report(s) can be accessed - not home page.

URL

URL

URL

URL

URL

9853357077

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

Minimum Control Measure 1. Public Education and Outreach

The information in this section is being reported (check one):

- [x] On behalf of an individual MS4
- [ ] On behalf of a coalition

How many MS4s contributed to this report? 1

1. Targeted Public Education and Outreach Best Management Practices

Check all topics that were included in Education and Outreach during this reporting period:

- [ ] Construction Sites
- [x] General Stormwater Management Information
- [x] Household Hazardous Waste Disposal
- [x] Illicit Discharge Detection and Elimination
- [ ] Infrastructure Maintenance
- [ ] Smart Growth
- [x] Storm Drain Marking
- [x] Green Infrastructure/Better Site Design/Low Impact Development
- [ ] Other:
- [x] Pesticide and Fertilizer Application
- [x] Pet Waste Management
- [x] Recycling
- [ ] Riparian Corridor Protection/Restoration
- [x] Trash Management
- [x] Vehicle Washing
- [ ] Water Conservation
- [ ] Wetland Protection
- [ ] None

2. Specific audiences targeted during this reporting period:

- [x] Agricultural
- [ ] Contractors
- [x] Residential
- [ ] Developers
- [x] Businesses
- [x] General Public
- [x] Restaurants
- [x] Industries
- [ ] Other:

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

3. What strategies did your MS4/Coalition use to achieve education and outreach goals during this reporting period? Check all that apply:

Strategy	Checked	Measure	Value
Construction Site Operators Trained	○	# Trained	
Direct Mailings	●	# Mailings	1
Kiosks or Other Displays	●	# Locations	10
List-Serves	○	# In List	
Mailing List	●	# In List	76
Newspaper Ads or Articles	○	# Days Run	
Public Events/Presentations	●	# Attendees	332
School Program	●	# Attendees	3691
TV Spot/Program	○	# Days Run	
Printed Materials:	●	Total # Distributed	7500

Locations (e.g. libraries, town offices, kiosks)

libraries
public offices
kiosks
classes

● Other:

111 Radio PSA's

● Web Page: Provide specific web addresses - not home page. Continue on next page if additional space is needed.

URL
www.co.suffolk.ny.us/stormwater/stormwater-issues.html

URL
www.co.suffolk.ny.us/stormwater/documents.html

URL
www.co.suffolk.ny.us/stormwater/ed.outreach.html

5090357076

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

3. Web Page con't.: Provide specific web addresses - not home page.

URL
www.co.suffolk.ny.us/stormwater/general-information.html

URL
www.co.suffolk.ny.us/stormwater/bmp's.html

URL
www.co.suffolk.ny.us/stormwater/contact.html

URL
www.co.suffolk.ny.us/stormwater/links.html

URL
www.co.suffolk.ny.us/stormwater/faq's.html

URL
www.co.suffolk.ny.us/stormwater/phaseII.html

URL
www.co.suffolk.ny.us/stormwater/reportpollution.html

URL
www.co.suffolk.ny.us/stormwater/bmp's-businesses.html

URL
www.co.suffolk.ny.us/stormwater/bmp's-homeowners.html

URL
www.co.suffolk.ny.us/stormwater/dpw-projects.html

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

SPDES ID: NYR20A180

Name of MS4/Coalition: Suffolk County

4. Evaluating/Measuring Progress MCM 1

What indicators do you use to evaluate the overall effectiveness of your Education and Outreach Program, how long have you been tracking them and at what frequency?

Example*:

Indicator: Public phone survey

Began Tracking: 2005 *(year)*

Frequency: Annual *(ex.: annual, monthly, biweekly)*

1000 *(ex.: samples/participants/events)*

Results: Increased awareness of issues related to use of fertilizers

**** This indicator is provided as an example only.***

Indicator: # brochures disseminated

Began Tracking: 2006 *(year)*

Frequency: Annual *(ex.: annual, monthly, biweekly)*

7,500 (Year 6) *(ex.: samples/participants/events)*

Results: Many brochures (in English and Spanish) and children's activity pages have been disseminated. They discuss the impacts and sources of stormwater runoff, and also describe what can be done to minimize the impact.

Submit additional pages as needed.

8510439673

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

4. Evaluating/Measuring Progress MCM 1

What indicators do you use to evaluate the overall effectiveness of your Education and Outreach Program, how long have you been tracking them and at what frequency?

Indicator: # attendees for school programs

Began Tracking: 2005 *(year)*

Frequency: annual *(ex.: annual, monthly, biweekly)*

3,691 (Year 6) *(ex.: samples/participants/events)*

Results: Extensive number of classes to school children were once again implemented. Classes explained what stormwater is, and described what children and their parents can do about it.

Indicator: # public service announcements (PSA's) conducted

Began Tracking: 2007 *(year)*

Frequency: annual *(ex.: annual, monthly, biweekly)*

111 (Year 6) *(ex.: samples/participants/events)*

Results: PSA's aired on 2 different radio stations. They have a combined listenership of 350,000 people. The focus of the PSA's was fecal coliforms.

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

4. Evaluating/Measuring Progress MCM 1

What indicators do you use to evaluate the overall effectiveness of your Education and Outreach Program, how long have you been tracking them and at what frequency?

Indicator: # visitors to stormwater website

Began Tracking: 2006 *(year)*

Frequency: annual *(ex.: annual, monthly, biweekly)*

\# 11,506 (Year 6) *(ex.: samples/participants/events)*

Results: Large numbers of people continue to learn about stormwater through the informational web site located at: www.suffolkstormwater.com

Indicator: # school teacher surveys

Began Tracking: 2007 *(year)*

Frequency: annual *(ex.: annual, monthly, biweekly)*

\# 15 (Year 6) *(ex.: samples/participants/events)*

Results: Surveys are occasionally completed by teachers of school children. The surveys indicate that the teachers feel that the classes are valuable, and that the students are learning about stormwater issues.

8510439673

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

4. Evaluating/Measuring Progress MCM 1

What indicators do you use to evaluate the overall effectiveness of your Education and Outreach Program, how long have you been tracking them and at what frequency?

Indicator: Target group BMP implementation (e.g. schools/civic groups)

Began Tracking: 2008 *(year)*

Frequency: annual *(ex.: annual, monthly, biweekly)*

\# 2 (Year 6) *(ex.: samples/participants/events)*

Results: On some occasions a group (e.g. school) will decide to implement a BMP once they learn about stormwater. For example, a school decided to install a green roof on a portion of their structure, while a different school decided to install curb markers as an activity.

Indicator: # attendees for civic group programs

Began Tracking: 2006 *(year)*

Frequency: annual *(ex.: annual, monthly, biweekly)*

\# 332 *(ex.: samples/participants/events)*

Results: Numerous lectures are conducted to educate members of civic groups/associations. Members are often homeowners, who are taught about the impacts of stormwater and what they can do to minimize the problem.

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

Minimum Control Measure 2. Public Involvement/Participation

The information in this section is being reported (check one):

- [x] On behalf of an individual MS4
- [ ] On behalf of a coalition

How many MS4s contributed to this report? 1

1. What opportunities were provided for public participation in implementation, development, evaluation and improvement of the Stormwater Management Program (SWMP) Plan during this reporting period? Check all that apply:

[ ] Cleanup Events	# Events	
[x] Comments on SWMP Received	# Comments	
[ ] Community Hotlines	Phone #	( ) -
[x] Community Meetings	# Attendees	332
[ ] Plantings	Sq. Ft.	
[x] Storm Drain Markings	# Drains	2000
[x] Stakeholder Meetings	# Attendees	10
[ ] Volunteer Monitoring	# Events	
[x] Other: community fairs		

Phone # ( ) -   Phone # ( ) -

Phone # ( ) -   Phone # ( ) -

Phone # ( ) -   Phone # ( ) -

Phone # ( ) -   Phone # ( ) -

Phone # ( ) -   Phone # ( ) -

2. Was public notice of availability of annual report and Stormwater Management Program (SWMP) Plan provided? [x] Yes [ ] No

[ ] List-Serve	# In List	
[ ] Newspaper Advertising	# Days Run	
[ ] TV/Radio Notices	# Days Run	
[x] Other: Direct mailing		

- [x] Web Page URL: Enter URL(s) on the following two pages.

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

2. URL(s) con't.:
Please provide specific address(es) where notice(s) can be accessed - not home page.

URL: www.co.suffolk.ny.us/stormwater/annualreport2009%20meeting.html

URL:

URL:

URL:

URL:

URL:

URL:

URL:

URL:

URL:

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk Coutny

SPDES ID: NYR20A180

2. URL(s) con't.:
Please provide specific address(es) where notices can be accessed - not home page.

URL

URL

URL

URL

URL

URL

URL

URL

URL

URL

0564003233

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

3. Where can the public access copies of the annual report, Stormwater Management Program SWMP) Plan and submit comments on those documents?

Enter address/contact info and select radio button to indicate which document is available and whether comments may be submitted at that location. Submit additional pages as needed.

● MS4/Coalition Office — ● Annual Report ● SWMP Plan ● Comments

Department: Department of Public Works

Address: 335 Yaphank Avenue

City: Yaphank NY Zip: 11980 -

Phone: (631) 852-5325

○ Library — ○ Annual Report ○ SWMP Plan ○ Comments

Address:

City: Zip: -

Phone: ( ) -

● Other — ○ Annual Report ○ SWMP Plan ● Comments

Address: Cornell Coop. Ext., PO BOX 554

City: Huntington NY Zip: 11743 -

Phone: (631) 213-0180

● Web Page URL: — ● Annual Report ○ SWMP Plan ○ Comments

www.co.suffolk.ny.us/stormwater/annualreport2008%20meeting.html

Please provide specific address of page where report can be accessed - not home page.

● eMail — ● Comments

jeff.dawson@suffolkcountyny.gov

lb66@cornell.edu

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

4. Were comments received during this reporting period? ● Yes ○ No

If Yes, attach comments, responses and changes made to SWMP in response to comments to this report.

If submitting a report for single MS4, answer 5.a.. If submitting a joint report, answer 5.b..

5.a. Was an Annual Report public meeting held in this reporting period? ● Yes ○ No

If Yes, what was the date of the meeting? 04/15/2009

If No, is one planned? ○ Yes ○ No

5.b. Was an Annual Report public meeting held for all MS4s contributing to this report during this reporting period? ○ Yes ○ No

If No, is one planned for each? ○ Yes ○ No

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

6. Evaluating/Measuring Progress MCM 2

What indicators do you use to evaluate the overall effectiveness of your Public Involvement/Participation Program, how long have you been tracking them and at what frequency?

Example*:

Indicator: Number of attendees at public events

Began Tracking: 2005 *(year)*

Frequency: Annual *(ex.: annual, monthly, biweekly)*

1000 *(ex.: samples/participants/events)*

Results: Attendance at public events has increased 200% since 2005.

**** This indicator is provided as an example only.***

Indicator: # of attendees at public events (e.g. fairs and festivals)

Began Tracking: 2006 *(year)*

Frequency: annual *(ex.: annual, monthly, biweekly)*

329 adults and 181 children (Year 6) *(ex.: samples/participants/events)*

Results: Attendance at public events such as fairs and festivals has remained high in the last permit year. Stormwater issues are discussed with interested members of the public, and literature is also handed out.

Submit additional pages as needed.

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: N Y R 2 0 A 1 8 0

6. Evaluating/Measuring Progress MCM 2

What indicators do you use to evaluate the overall effectiveness of your Public Involvement/Participation Program, how long have you been tracking them and at what frequency?

Indicator: # of attendees at CAC meetings

Began Tracking: 2005 *(year)*

Frequency: annual *(ex.: annual, monthly, biweekly)*

10 *(ex.: samples/participants/events)*

Results: Citizen Advisory Committee (CAC) meetings are held several times a year. Members of the committee provide valuable input into the stormwater program and assist us with proofing and disseminating outreach educational material.

Indicator: Miles of roadway in "adopt a highway" program

Began Tracking: *(year)*

Frequency: annual *(ex.: annual, monthly, biweekly)*

102 *(ex.: samples/participants/events)*

Results: A large number of County road miles have been adopted. Individuals/organizations who adopt these roads remove debris and litter, thereby reducing the potential for pollutants to enter local waterbodies.

3471305698

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

6. Evaluating/Measuring Progress MCM 2

What indicators do you use to evaluate the overall effectiveness of your Public Involvement/Participation Program, how long have you been tracking them and at what frequency?

Indicator: # citizen complaints in database

Began Tracking: 2003 *(year)*

Frequency: annual *(ex.: annual, monthly, biweekly)*

\# 225 *(ex.: samples/participants/events)*

Results: Suffolk County tracks the number and nature of citizen complaints which pertain to stormwater related problems. In some cases the County is able to solve the issue by cleaning the stormwater structures.

Indicator:

Began Tracking: *(year)*

Frequency: *(ex.: annual, monthly, biweekly)*

\# *(ex.: samples/participants/events)*

Results:

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

Minimum Control Measure 3. Illicit Discharge Detection and Elimination

The information in this section is being reported (check one):

- [x] On behalf of an individual MS4
- [ ] On behalf of a coalition

How many MS4s contributed to this report? 1

1. Enter the number and approx. percent of outfalls mapped: 344 # 100 %

2. How many of these outfalls have been screened for dry weather discharges during this reporting period (outfall reconnaissance inventory)? 143

3.a. What types of generating sites/sewersheds were targeted for inspection during this reporting period?

- [ ] Auto Recyclers
- [ ] Building Maintenance
- [ ] Churches
- [ ] Commercial Carwashes
- [ ] Commercial Laundry/Dry Cleaners
- [ ] Construction Vehicle Washouts
- [ ] Cross-Connections
- [ ] Distribution Centers
- [ ] Food Processing Facilities
- [ ] Garbage Truck Washouts
- [ ] Hospitals
- [ ] Improper RV Waste Disposal
- [ ] Industrial Process Water
- [x] Other: County roads
- [ ] Landscaping (Irrigation)
- [ ] Marinas
- [ ] Metal Plateing Operations
- [ ] Outdoor Fluid Storage
- [x] Parking Lot Maintenance
- [ ] Printing
- [ ] Residential Carwashing
- [ ] Restaurants
- [ ] Schools and Universities
- [ ] Septic Maintenance
- [ ] Swimming Pools
- [ ] Vehicle Fueling
- [ ] Vehicle Maint./Repair Shops
- [ ] None
- [x] Sewersheds: 303d and TMDL watersheds

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

3.b.What types of illicit discharges have been found during this reporting period?

- ○ Broken Lines From Sanitary Sewer
- ○ Cross Connections
- ○ Failing Septic Systems
- ○ Floor Drains Connected To Storm Sewers
- ○ Illegal Dumping
- ○ Other:
- ○ Industrial Connections
- ○ Inflow/Infiltration
- ○ Pump Station Failure
- ○ Sanitary Sewer Overflows
- ○ Straight Pipe Sewer Discharges
- ● None

4. How many illicit discharges/potential illegal connections have been detected during this reporting period? 0

5. How many illicit discharges have been confirmed during this reporting period? 0

6. How many illicit discharges/illegal connections have been eliminated during this reporting period? 0

7. Has the storm sewershed mapping been completed? ○ Yes ● No

If No, approximately what percent has been completed? 0 %

8. Is the above information available in GIS? ● Yes ○ No

Is this information available on the web? ○ Yes ● No

If Yes, provide URL(s):

Please provide specific address of page where map(s) can be accessed - not home page.

URL

URL

URL

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

8. URL(s) con't.:
Please provide specific address of page where map(s) can be accessed - not home page

URL

URL

URL

URL

URL

URL

URL

9. Has an IDDE law been adopted for each traditional MS4 and/or have IDDE procedures been approved for all non-traditional MS4s contributing to this report?

● Yes ○ No

10. Has an attorney certified law(s) adopted by traditional MS4s to be equivalent to the NYS Model IDDE law?

○ Yes ● No

11. What percent of staff in relevant positions and departments has received IDDE training?

50 %

7305406195

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

12. Evaluating/Measuring Progress MCM 3

What indicators do you use to evaluate the overall effectiveness of your Illicit Discharge Elimination Program, how long have you been tracking them and at what frequency?

Example*:

Indicator: Number of illicit discharges identified/eliminated

Began Tracking: 2005 *(year)*

Frequency: Monthly inspections *(ex.: annual, monthly, biweekly)*

25 illicit discharges identified/24 eliminated *(ex.: samples/participants/events)*

Results: Since 2005, the number of annual inspections has doubled. We have developed a tracking system and illicit discharges that have been identified are being eliminated, on average, within a week of discovery.

**** This indicator is provided as an example only.***

Indicator: # new outfalls located

Began Tracking: 2006 *(year)*

Frequency: annual *(ex.: annual, monthly, biweekly)*

36 *(ex.: samples/participants/events)*

Results: Additional outfalls were located on County roads. New outfalls were geolocated, photographed, and had a number of attributes recorded (e.g. physical descriptions). The information was incorporated into the Geographic Information Systems (GIS) database.

Submit additional pages as needed.

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

12. Evaluating/Measuring Progress MCM 3

What indicators do you use to evaluate the overall effectiveness of your Illicit Discharge Elimination Program, how long have you been tracking them and at what frequency?

Indicator: # outfalls monitored for dry weather flow

Began Tracking: 2007 *(year)*

Frequency: annual *(ex.: annual, monthly, biweekly)*

\# 143 *(ex.: samples/participants/events)*

Results: These outfalls were monitored, 3 times each, for dry weather flow. The information is used to help discover illicit discharges.

Indicator: # curb markers affixed to stormwater structures

Began Tracking: 2006 *(year)*

Frequency: annual *(ex.: annual, monthly, biweekly)*

\# 2,000 *(ex.: samples/participants/events)*

Results: Many additional curb markers were affixed to catch basins. The markers contain a message such as "do not dump, drains to bay" as well as the Stormwater Program logo (Stormy the Duck!).

4416634154

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

Minimum Control Measures 4 and 5. Construction Site and Post-Construction Control

The information in this section is being reported (check one):

- [x] On behalf of an individual MS4
- [ ] On behalf of a coalition

How many MS4s contributed to this report? 1

1. **Has each Town, City and/or Village contributing to this report adopted a law, ordinance or other regulatory mechanism that provides equal protection to the NYS SPDES General Permit for Stormwater Discharges from Construction Activities?** ○ Yes ○ No

   If Yes, provide date of equivalent NYS Sample Local Law. ○ 09/2004 ○ 03/2006

2. **Does your MS4/Coalition have a SWPPP review procedure in place?** ○ Yes ○ No

3. **How many Construction Stormwater Pollution Prevention Plans (SWPPPs) have been reviewed in this reporting period?** ☐☐☐

4. **Does your MS4/Coalition have a mechanism for receipt and consideration of public comments related to construction SWPPPs?** ○ Yes ○ No

   If Yes, how many public comments were received during this reporting period? ☐☐☐

5. **Does your MS4/Coalition provide education and training for contractors about the local SWPPP process?** ○ Yes ○ No

6. **Identify which of the following types of enforcement actions you used during the reporting period for construction activities, indicate the number of actions, or note those for which you do not have authority:**

Action	#	No Authority
○ Notices of Violation		● No Authority
○ Stop Work Orders		● No Authority
○ Criminal Actions		● No Authority
○ Termination of Contracts		● No Authority
○ Administrative Fines		● No Authority
○ Civil Penalties		● No Authority
○ Administrative Orders		● No Authority
○ Other		● No Authority

NOTE: THE ABOVE SECTIONS WERE NOT FILLED IN BECAUSE THEY WERE NOT APPLICABLE. SUFFOLK IS A TRADITIONAL NON-LAND USE MS4. THEREFORE, SWPPP REVIEW AND ENFORCEMENT FALLS UNDER THE JURISDICTION AND RESPONSIBILITY OF THE APPLICABLE TOWN OR VILLAGE.

3674357184

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

Minimum Control Measure 4. Construction Site Stormwater Runoff Control

The information in this section is being reported (check one):

● On behalf of an individual MS4
○ On behalf of a coalition

How many MS4s contributed to this report? 1

1. **How many construction projects have been authorized for disturbances of one acre or more during this reporting period?**

2. **How many construction projects disturbing at least one acre were active in your jurisdiction during this reporting period?**

3. **What percent of active construction sites were inspected during this reporting period?** %

4. **What percent of active construction sites were inspected more than once?** %

5. **Do all inspectors working on behalf of the MS4s contributing to this report use the NYS Construction Stormwater Inspection Manual?** ● Yes ○ No

6. **Does your MS4/Coalition provide public access to Stormwater Pollution Prevention Plans (SWPPPs) of construction projects that are subject to MS4 review and approval?** ● Yes ○ No

If Yes, use the following page to identify location(s) where SWPPPs can be accessed.

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

6. con't.:

Submit additional pages as needed.

● MS4/Coalition Office

Department: Department of Public Works

Address: 335 Yaphank Avenue

City: Yaphank NY Zip: 11980 -

Phone: (631) 852-4011

○ Library

Address:

City: Zip: -

Phone: ( ) -

○ Other

Address:

City: Zip: -

Phone: ( ) -

○ Web Page URL(s): Please provide specific address where SWPPPs can be accessed - not home page.

URL:

URL:

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

7. Evaluating/Measuring Progress MCM 4

What indicators do you use to evaluate the overall effectiveness of your Construction Site Stormwater Management Program, how long have you been tracking them and at what frequency?

Example*:

Indicator: Percent SWPPPs reviewed

Began Tracking: 2005 *(year)*

Frequency: Upon submission *(ex.: annual, monthly, biweekly)*

50 SWPPPs *(ex.: samples/participants/events)*

Results: 100% of SWPPPs were reviewed. 50% of the SWPPPs reviewed were returned with comments. All of these were returned with modifications reflecting NYS Standards.

**** This indicator is provided as an example only.***

Indicator:

Began Tracking: *(year)*

Frequency: *(ex.: annual, monthly, biweekly)*

*(ex.: samples/participants/events)*

Results: gv

Submit additional pages as needed.

7992379781

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

Minimum Control Measure 5. Post-Construction Stormwater Management

The information in this section is being reported (check one):

- ● On behalf of an individual MS4
- ○ On behalf of a coalition

How many MS4s contributed to this report? 1

1. How many and what type of post-construction stormwater management practices has your MS4/Coalition inventoried, inspected and maintained in this reporting period?

	# Inventoried	# Inspections	# Times Maintained
● Alternative Practices	225	439	428
○ Filter Systems			
● Infiltration Basins	36	7	2
● Open Channels	2	2	0
● Ponds	201	40	5
● Wetlands	3	3	0
● Other	2150	4280	1070

2. Do you use an electronic tool (e.g. GIS, database, spreadsheet) to track post-construction BMPs, inspections and maintanance?

● Yes ○ No

3. What types of non-structural practices have been used to implement Low Impact Development/Better Site Design/Green Infrastructure principles?

- ● Building Codes
- ● Comprehensive Planning
- ○ Overlay Districts
- ○ Zoning
- ○ None
- ○ Other:

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

4. Evaluating/Measuring Progress MCM 5

What indicators do you use to evaluate the overall effectiveness of your Post-Construction Stormwater Management Program, how long have you been tracking them and at what frequency?

Example*:

Indicator: Number of reports of flooding during storm events from business district

Began Tracking: 2005 *(year)*

Frequency: Annual Summary *(ex.: annual, monthly, biweekly)*

18 *(ex.: samples/participants/events)*

Results: During this reporting period, we experienced average rainfall, but DPW records show that the number of incidences of flooding in the business district fell 25%. This is attributable to increased inspection and maintenance of post construction BMPs.

**** This indicator is provided as an example only.***

Indicator: # remediation efforts with post-construction BMP's (planned or underway).

Began Tracking: 1980 *(year)*

Frequency: as needed *(ex.: annual, monthly, biweekly)*

46 projects completed; 40 projects funded and in design phase; approximately 20 additional projects planned for future funding. *(ex.: samples/participants/events)*

Results: Suffolk County invests extensive resources into implementing remediation efforts (which incorporate post-construction BMP's). The remediation efforts utilize various technologies such as leaching basins, detention ponds, and alternative BMP's. Some of the efforts are large scale, including the insertion or 214 catch basin inserts in stormwater hotspots, and installing stormwater treatment units at 16 direct discharges.

Submit additional pages as needed.

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

4. Evaluating/Measuring Progress MCM 5

What indicators do you use to evaluate the overall effectiveness of your Post-Construction Stormwater Management Program, how long have you been tracking them and at what frequency?

Indicator: # of structures inspected and maintained

Began Tracking: 2009 *(year)*

Frequency: annual *(ex.: annual, monthly, biweekly)*

\# 4,771 structures inspected and 1,505 structures maintained *(ex.: samples/participants/events)*

Results: Suffolk County expends a significant amount of effort and resources towards inspecting and maintaining stormwater structures.

Indicator:

Began Tracking: *(year)*

Frequency: *(ex.: annual, monthly, biweekly)*

\# *(ex.: samples/participants/events)*

Results:

3624001703

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

Minimum Control Measure 6. Stormwater Management for Municipal Operations

The information in this section is being reported (check one):

- ● On behalf of an individual MS4
- ○ On behalf of a coalition

How many MS4s contributed to this report? 1

1. Choose/list each municipal operation/facility that contributes or may potentially contribute Pollutants of Concern to the MS4 system. For each operation/facility indicate whether the operation/facility has been addressed in the MS4's/Coalition's Stormwater Management Program(SWMP) Plan and whether a self-assessment has been performed during the reporting period. A self-assessment is performed to: 1) determine the sources of pollutants potentially generated by the permittee's operations and facilities; 2) evaluate the effectiveness of existing programs and 3) identify the municipal operations and facilities that will be addressed by the pollution prevention and good housekeeping program, if it's not done already.

Operation/Activity/Facility	Addressed in SWMP?	Self-Assessment Operation/Activity/Facility performed within the past 3 years?
Street Maintenance	● Yes ○ No	● Yes ○ No
Bridge Maintenance	● Yes ○ No	● Yes ○ No
Winter Road Maintenance	● Yes ○ No	● Yes ○ No
Salt Storage	● Yes ○ No	● Yes ○ No
Solid Waste Management	● Yes ○ No	● Yes ○ No
New Municipal Construction and Land Disturbance	● Yes ○ No	● Yes ○ No
Winter Road Maintenance	● Yes ○ No	● Yes ○ No
Right of Way Maintenance	● Yes ○ No	● Yes ○ No
Marine Operations	● Yes ○ No	● Yes ○ No
Hydrologic Habitat Modification	○ Yes ● No	○ Yes ● No
Parks and Open Space	● Yes ○ No	● Yes ○ No
Municipal Building	● Yes ○ No	● Yes ○ No
Stormwater System Maintenance	● Yes ○ No	● Yes ○ No
Vehicle and Fleet Maintenance	● Yes ○ No	● Yes ○ No
Other	○ Yes ○ No	○ Yes ○ No

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

2. Provide the following information about municipal operations good housekeeping programs:

Parking Lots Swept	# Acres	301
Streets Swept	# Miles	1500
Catch Basins Inspected and Cleaned Where Necessary	#	116
Post Construction Control Stormwater Management Practices Inspected and Cleaned Where Necessary	#	1505
Phosphorus Applied In Chemical Fertilizer	# Lbs.	237
Nitrogen Applied In Chemical Fertilizer	# Lbs.	22470
Pesticide/Herbicide Applied As Pure Product	# Lbs.	11500

3. How many stormwater management trainings have been provided to municipal employees during this reporting period? 6

4. What was the date of the last training? 01/22/2009

5. How many municipal employees have been trained in this reporting period? 90

6. What percent of municipal employees in relevant positions and departments receive stormwater management training? 50 %

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

7. Evaluating/Measuring Progress MCM 6

What indicators do you use to evaluate the overall effectiveness of your Municipal Stormwater Management and Good Housekeeping Program, how long have you been tracking them and at what frequency?

Example*:

Indicator: Catch basins inspected and cleaned

Began Tracking: 2005 *(year)*

Frequency: monthly *(ex.: annual, monthly, biweekly)*

40 catch basins cleaned *(ex.: samples/participants/events)*

Results: In this reporting period scheduled inspections were increased by 50%. Maintenance was performed 50% more often than last year. This resulted in a 40% decrease in deployment of personnel during storm events to perform emergency maintenance.

**** This indicator is provided as an example only.***

Indicator: # cubic yards debris removed from roads or parking lots

Began Tracking: 2007 *(year)*

Frequency: annual *(ex.: annual, monthly, biweekly)*

3,000 cubic yards *(ex.: samples/participants/events)*

Results: An extensive amount of debris is removed from County roadways and parking lots each year.

Submit additional pages as needed.

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

7. Evaluating/Measuring Progress MCM 6

What indicators do you use to evaluate the overall effectiveness of your Municipal Stormwater Management and Good Housekeeping Program, how long have you been tracking them and at what frequency?

Indicator: # cubic yards debris removed from stormwater structures

Began Tracking: 2008 *(year)*

Frequency: annual *(ex.: annual, monthly, biweekly)*

400 cubic yards *(ex.: samples/participants/events)*

Results: An extensive amount of debris is removed from stormwater structures each year.

Indicator: # new Vactors

Began Tracking: 2008 *(year)*

Frequency: annual *(ex.: annual, monthly, biweekly)*

3 *(ex.: samples/participants/events)*

Results: 3 additional "Vactors" (vacuum trucks) were purchased in the previous permit year. This will assist with the cleaning of stormwater structures.

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

7. Evaluating/Measuring Progress MCM 6

What indicators do you use to evaluate the overall effectiveness of your Municipal Stormwater Management and Good Housekeeping Program, how long have you been tracking them and at what frequency?

Indicator: # new salt spreading vehicles

Began Tracking: 2007 *(year)*

Frequency: annual *(ex.: annual, monthly, biweekly)*

\# 6 *(ex.: samples/participants/events)*

Results: New salt spreading vehicles were purchased to replace older units. This will help minimize the chances of over-applying or spilling salts.

Indicator: # new fertilizer laws

Began Tracking: 2007 *(year)*

Frequency: annual *(ex.: annual, monthly, biweekly)*

\# 1 *(ex.: samples/participants/events)*

Results: A new fertilizer law prohibits the use of fertilizer on County properties (with a few exceptions). The County pesticide phase-out law also continues.

5723419685

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

SPDES ID: NYR20A180

Name of MS4/Coalition: Suffolk County

Additional Watershed Improvement Strategy Best Management Practices

The information in this section is being reported (check one):

- ● On behalf of an individual MS4
- ○ On behalf of a coalition

How many MS4s contributed to this report? 1

MS4s must answer the questions or check NA as indicated in the table below.

MS4 Description	Answer	Check NA	(POC)
NYC EOH Watershed	-	-	-
Traditional Land Use	1,2,3,4,5,6,7,8a,8b,9	10,11,12	Phosphorus
Traditional Non-Land Use	1,2,3,4,7,8a,8b,9	5,10,11,12	Phosphorus
Non-Traditional	1,2,7,8a,8b,9	3,4,5,10,11,12	Phosphorus
Onondaga Lake Watershed	-	-	-
Traditional Land Use	1,4,6,7,8a,9	2,3,5,8b,10,11,12	Phosphorus
Traditional Non-Land Use	1,4,6,7,8a,9	2,3,5,8b,10,11,12	Phosphorus
Non-Traditional	1,6,7,8a,9	2,3,4,5,8b,10,11,12	Phosphorus
Greenwood Lake Watershed	-	-	-
Traditional Land Use	1,6,7,8a,9	2,3,4,5,8b,10,11,12	Phosphorus
Traditional Non-Land Use	1,6,7,8a,9	2,3,4,5,8b,10,11,12	Phosphorus
Non-Traditional	1,6,7,8a,9	2,3,4,5,8b,10,11,12	Phosphorus
Oyster Bay	-	-	-
Traditional Land Use	1,4,7,8a,9,10,11,12	2,3,5,6,8b	Pathogens
Traditional Non-Land Use	1,4,7,8a,9,10,11,12	2,3,5,6,8b	Pathogens
Non-Traditional	1,4,7,8a,9	2,3,4,5,8b,10,11,12	Pathogens
Peconic Estuary	-	-	-
Traditional Land Use	1,4,7,8a,9,10,11,12	2,3,5,6,8b	Pathogens and Nitrogen
Traditional Non-Land Use	1,4,7,8a,9,10,11,12	2,3,5,6,8b	Pathogens and Nitrogen
Non-Traditional	1,4,7,8a,9	2,3,4,5,8b,10,11,12	Pathogens and Nitrogen

1. **Does your MS4/Coalition have an education program addressing impacts of phosphorus/nitrogen/pathogens on waterbodies?**

   ● Yes ○ No ○ N/A

2. **Has 100% of the MS4/Coalition conveyance system been mapped in GIS?**

   ○ Yes ○ No ● N/A

   If N/A, go to question 3.

   If No, estimate what percentage of the conveyance system has been mapped so far. ____ %

   Estimate what percentage was mapped in this reporting period. ____ %

3. **Does your MS4/Coalition have a Stormwater Conveyance System(infrastructure) Inspection and Maintenance Plan Program?**

   ○ Yes ○ No ● N/A

4405419681

MS4 Annual Report Form

This report is being submitted for the reporting period ending March 9, 2009

If submitting this form as part of a joint report on behalf of a coalition leave SPDES ID blank.

Name of MS4/Coalition: Suffolk County

SPDES ID: NYR20A180

4. **Estimate the percentage of on-site wastewater treatment systems that have been inspected and maintained or rehabilitated as necessary in this reporting period?** 0 %

5. **Has your MS4/Coalition developed a program that provides protection equivalent to the NYS DEC SPDES General Permit for Stormwater Discharges from Construction Activities (GP0-08-001) to reduce pollutants in stormwater runoff from construction activities that disturb five thousand square feet or more?** ○ Yes ○ No ● N/A

6. **Has your MS4/Coalition developed a program to address post-construction stormwater runoff from new development and redevelopment projects that disturb greater than or equal to one acre that provides equivalent protection to the NYS DEC SPDES General Permit for Stormwater Discharges from Construction Activities (GP-0-08-001), including the New York State Stormwater Design Manual Enhanced Phosphorus Removal Standards?** ○ Yes ○ No ● N/A

7. **Does your MS4/Coalition have a retrofitting program to reduce erosion or phosphorus/nitrogen/pathogen loading?** ● Yes ○ No ○ N/A

8a. **Has your MS4/Coalition developed and implemented a turf management practices and procedures policy that addresses proper fertilizer application on municipally owned lands?** ● Yes ○ No ○ N/A

8b. **Has your MS4/Coalition developed and implemented a turf management practices and procedures policy that addresses proper disposal of grass clippings and leaves from municipally owned lands?** ○ Yes ○ No ● N/A

9. **Has your MS4/Coalition developed and implemented a program of native planting?** ● Yes ○ No ○ N/A

10. **Has your MS4/Coalition enacted a local law prohibiting pet waste on municipal properties and prohibiting goose feeding?** ○ Yes ● No ○ N/A

11. **Does your MS4/Coalition have a pet waste bag program?** ● Yes ○ No ○ N/A

12. **Does your MS4/Coalition have a program to manage goose populations?** ● Yes ○ No ○ N/A

APPENDIX 1 - REPORTS DOCUMENTING WATER QUALITY TRENDS

Beaver Dam Creek, Brookhaven, N.Y.
Status and Trends in Water Quality

Suffolk County Department of Health Services

Steve Levy, Suffolk County Executive
Humayun J. Chaudhry, D.O., M.S., Commissioner

July 2008

Beaver Dam Creek, Brookhaven, N.Y.
Status and Trends in Water Quality

Suffolk County Department of Health Services
Humayun J. Chaudhry, D.O., M.S., Commissioner

Division of Environmental Quality
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Cover: Beaver Dam Creek looking south from Beaver Dam Road bridge (photo by A.Seal)

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Executive Summary

In response to a request from the Beaver Dam Creek Restoration Task Force, a multi-agency/stakeholder group exploring opportunities for wetland and habitat restoration in the Beaver Dam Creek watershed, the Suffolk County Department of Health Services Office of Ecology initiated efforts to characterize the water quality of the creek in September 2002. Monitoring was conducted at eight sites on an approximate monthly basis through 2003, with additional samples collected intermittently from 2004 through early 2008 to fill data gaps and verify observed trends. In the fall of 2007, sampling was expanded to include sites in nearby Little Neck Run and Yaphank Creek.

Sampling results indicate that Beaver Dam Creek is subject to a combination of impacts from the surrounding watershed, including storm water runoff, a leachate plume from the Town of Brookhaven landfill, a marina located in the northern tidal reaches of the creek, various nearby commercial establishments, and possibly in certain locations, failing or poorly operating septic systems.

However, although a number of contaminant sources are likely, the preponderance of findings of the many investigations conducted regarding the landfill leachate plume, as well as the data collected during this study, strongly suggest that the elevated levels of certain contaminants detected in the northern reaches of creek (particularly ammonia, manganese, iron, chlorides, the volatile organic compounds chlorobenzene, diethyl ether and 1,4-dichlorobenzene, and the plasticizer bisphenol-A) have their principal origin in the plume. This conclusion is supported by the lack of other potential sources in the upgradient area. Also evident, is that the frequency and magnitude of the contamination, as well as the point at which it appears in the creek, varies with fluctuating groundwater levels and the degree of discharge to the creek, both on a seasonal and long-term basis. Results of recent sampling done in Little Neck Run have revealed a similar suite of contaminants, suggesting the plume has advanced at least to that point and will likely continue to travel in a southeasterly direction towards the Carmans River.

The Brookhaven landfill had been used for the disposal of municipal solid wastes from 1974 -1995. A leachate plume emanating from the landfill was discovered in the late 1970s, and prompted a series of studies conducted by the United States Geological Survey (USGS) to document the plumes extent and degree of contamination. As a remediation measure designed to stop the generation of leachate, the Town closed and capped the cells considered most likely to have leaks in the liner (cells 1-3) in 1993, followed by cell 4 in 1997. Town-sponsored investigations characterizing the leachate plume and its effects on area groundwater have been conducted since 1982, with sampling of the waters of nearby Beaver Dam Creek conducted on almost an annual basis since 1991.

Of the contaminants noted during this study, the levels of ammonia found are particularly alarming, considering the well documented toxicity of this chemical to fish and macroinvertebrates. The ecological impact that the ammonia and other contaminants have on the creek, however, is uncertain. A 1996 survey conducted by the New York State Department of Environmental Conservation (NYSDEC) documented an ample number of healthy brook trout in an area of the creek just south of South Country Rd. A more recent (2003) NYSDEC survey of creek macroinvertebrates in the same general location however, noted moderate impacts that were characteristic of poor water quality.

To adequately assess potential impacts to Beaver Dam Creek and nearby streams (Little Neck Run, Yaphank Creek and the Carmans River), efforts should be undertaken to redevelop and sample abandoned wells located southeast of the landfill, as well as install additional downgradient wells, so that the current extent of the plume can be delineated. In conjunction with the groundwater sampling, coincident monitoring of creek surface waters for typical leachate indicator parameters should also be conducted. To provide a current measure of ecological impacts, the feasibility of re-assessing the status/health of fish and invertebrate populations should be given consideration by the NYSDEC.

Status and Trends in Water Quality of Beaver Dam Creek

Introduction

Beaver Dam Creek is a semi-rural coastal stream located on the south shore of Suffolk County in the Hamlet of Brookhaven (Figure 1). The tidal portion of the creek forms the western edge of the lower Carmans River flood plain and was once bordered by extensive salt marshes. As a result of dredging done in the 1920's and 1960's, and the placement of the dredge spoils along the creek's shoreline, the function and benefits of the salt marshes were significantly altered. In 2001, with a goal of restoring the creek's wetlands and associated habitats, and improving the creek's water quality, a Beaver Dam Creek Tributary Corridor Restoration Task Force comprised of various federal, state, and local agencies, non-governmental organizations, and academia, was formed.

As part of the restoration effort, the Suffolk County Department of Health Services (SCDHS) Office of Ecology was requested by the Task Force to characterize the water quality of the creek. Initial monitoring was conducted from 2002-2003 at 8 sites extending from an area north and west of Montauk Highway to Bellport Bay (Figure 1). Follow-up sampling was conducted intermittently from 2004-2008 at these and an additional northern station in an attempt to fill data gaps and verify observed trends. In monitoring done in the fall of 2007, sampling was expanded to include sites in Little Neck Run and Yaphank Creek, nearby tributaries to the Carmans River. Results of this monitoring, combined with previous data collected by the SCDHS, consultants to the Town of Brookhaven, the United States Geological Survey (USGS), and the Long Island Regional Planning Board (LIRPB), are discussed herein.

Study Area

The base (dry weather) streamflow of Beaver Dam Creek is the result of groundwater emerging from the Upper Glacial Aquifer in the area between Sunrise Highway (Rt. 27) and Montauk Highway (Rt. 80), the start of flow fluctuating with changes in water table elevations, from where it flows southward for a distance of approximately 2.5 miles to Bellport Bay (Great South Bay).

The upper freshwater reaches of the creek, extending northward from Beaver Dam Road, are classified by the New York State Department of Environmental Conservation (NYSDEC) as "C(TS)" waters. This designation indicates the waters are suitable for trout spawning and fishing, as well as for fish, shellfish and wildlife propagation and survival (6NYCRR Part 701.8). In addition, the water quality of C(TS) waters shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes. North of Montauk Highway the creek is irregularly shaped,

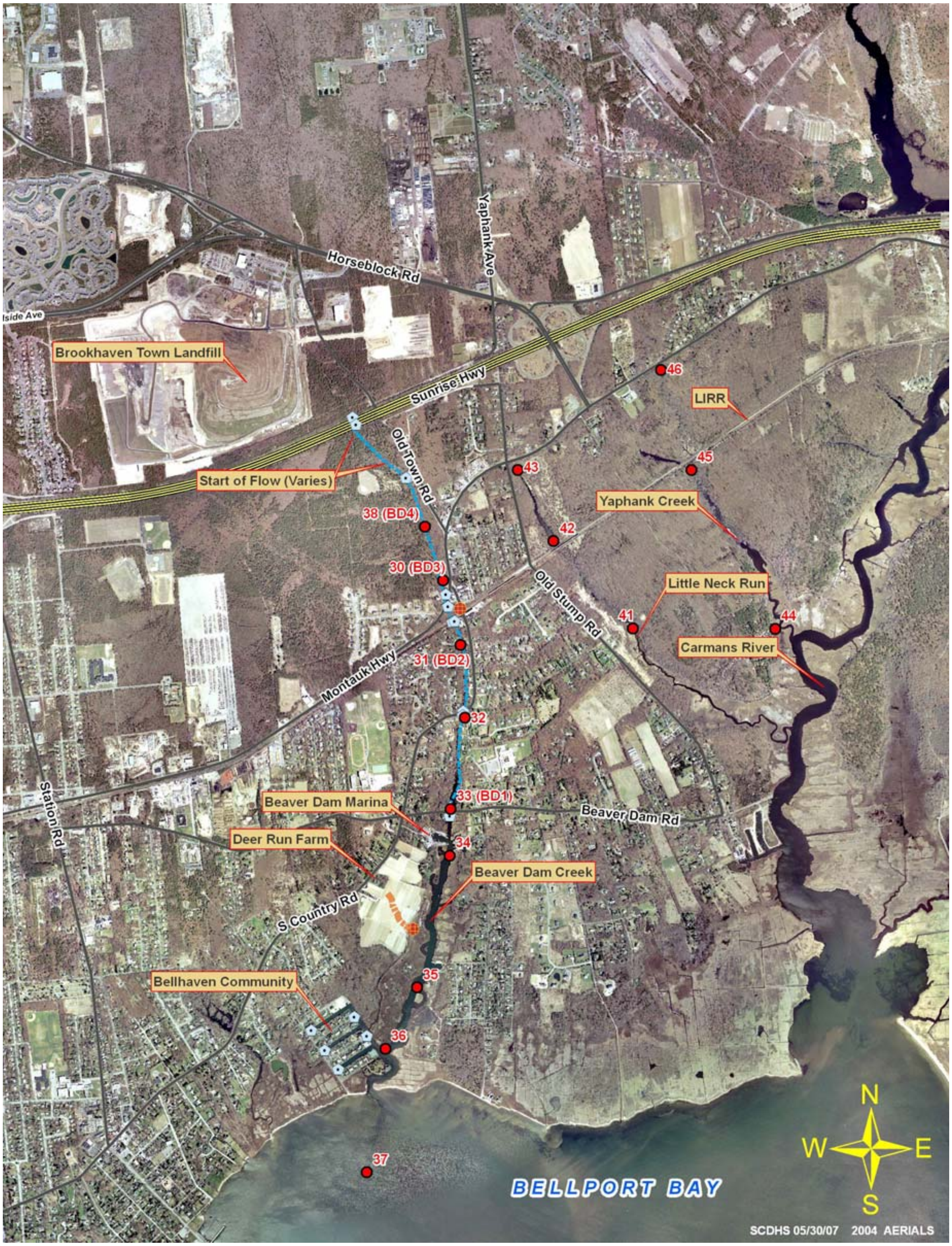


Figure 1. Beaver Dam Creek Sampling Station Location Map


Beaver Dam Creek Station 30

often very narrow, and in some areas consists of small ponds and seeps. Because the creek in this area is often only several inches deep, the number of fish it can support is likely limited.

The tidal portion of the creek, extending a distance of approximately 1.1 miles from the bay northward to the Beaver Dam Road Bridge, has been designated by the New York State Department of State (NYSDOS) as a *Significant Coastal Fish and Wildlife Habitat* due to the rarity of its relatively undeveloped shoreline, the existence of substantial tidal wetlands, and because it was once one of the few streams in the area that supported a population of sea-run brown trout. This portion of the creek is classified by the NYSDEC as "SC" waters, the best usage of which is for fishing and for fish, shellfish and wildlife propagation and survival (6-NYCRR Part 701.12). The water quality of Class SC waters should also be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes. The 2002 Atlantic Ocean/Long Island Sound Waterbody Inventory/Priority Waterbodies List identifies the tidal portion of Beaver Dam Creek as having minor impairments, including the potential for pathogen introduction from marine toilets and stormwater discharges. Past investigations, including an inventory of stormwater sources conducted for the Town of Brookhaven (Voorhis & Associates, 1996) and a watershed analysis done by the Suffolk County Soil and Water Conservation District (McMahon, 2002), have identified numerous locations in both tidal and fresh water portions where storm water runoff discharges into the creek. Areas identified as being of particular concern included the Bellhaven Community on the southwest side of the creek, Deer Run Farm on the west side of the creek, and the area of the creek north of the railroad tracks (Figure 2). According to the NYSDEC, the tidal portion of the creek is currently closed to shellfishing due to elevated levels of coliform bacteria.

In a study done by the Suffolk County Planning Department (Verbarg, 2003) in support of the Beaver Dam Creek restoration effort, the stream corridor was noted to encompass 1,460 acres and over 1,500 tax map parcels. Residential uses, predominantly low and medium density (<5 dwelling units/acre) occupy 35% of the study area; recreational, open space and farmland 25%; vacant land 15%; transportation 14%; institutional 7%; commercial/industrial 2%; and surface waters 2% (Figure 3). Significant features of the tidal portion of the creek include two marinas, a vegetable farm (Deer Run Farm), a

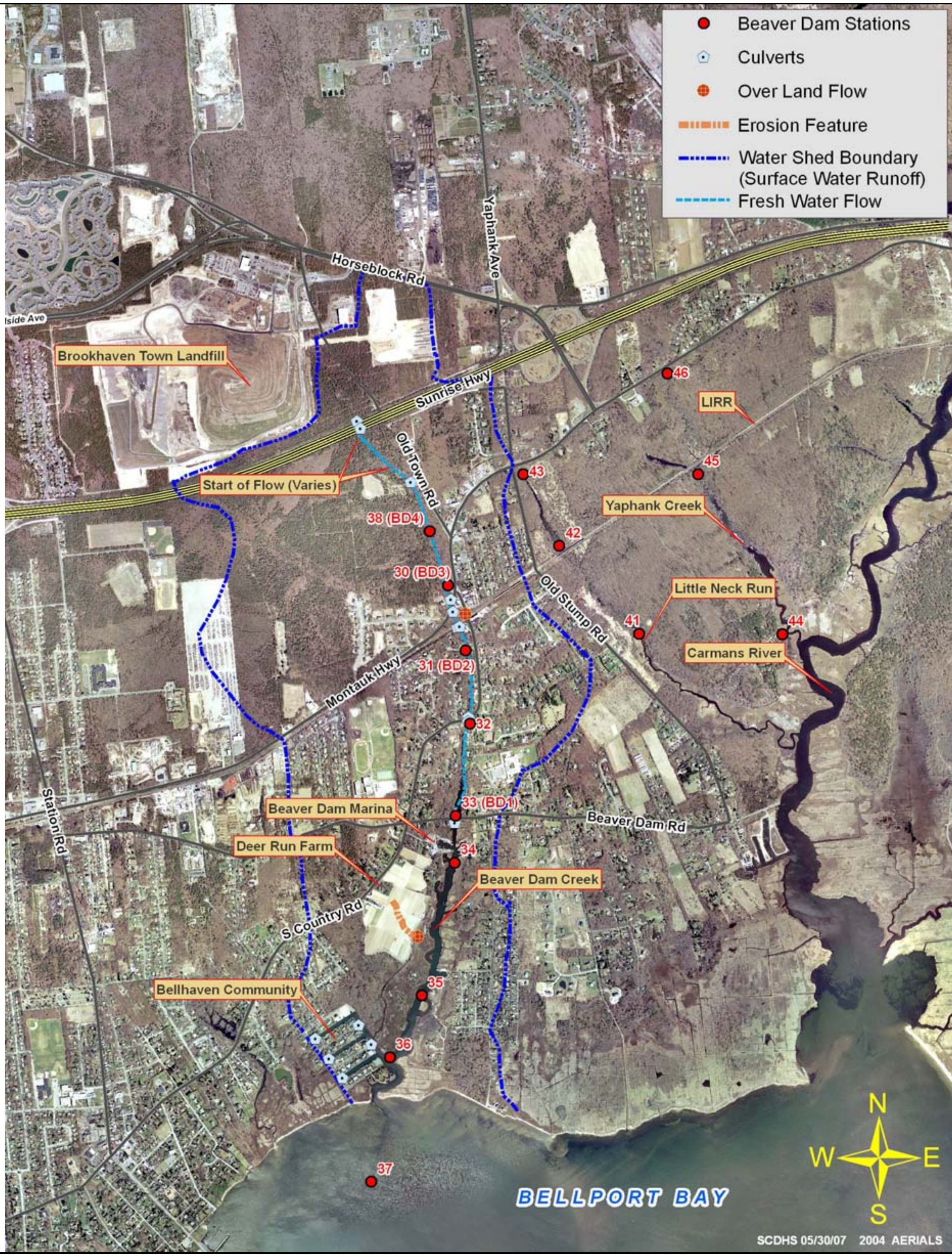


Figure 2. Beaver Dam Creek Stormwater Discharge Locations and Watershed Boundary
(*from Suffolk County Soil and Water Conservation District GIS Coverages, 2002*)

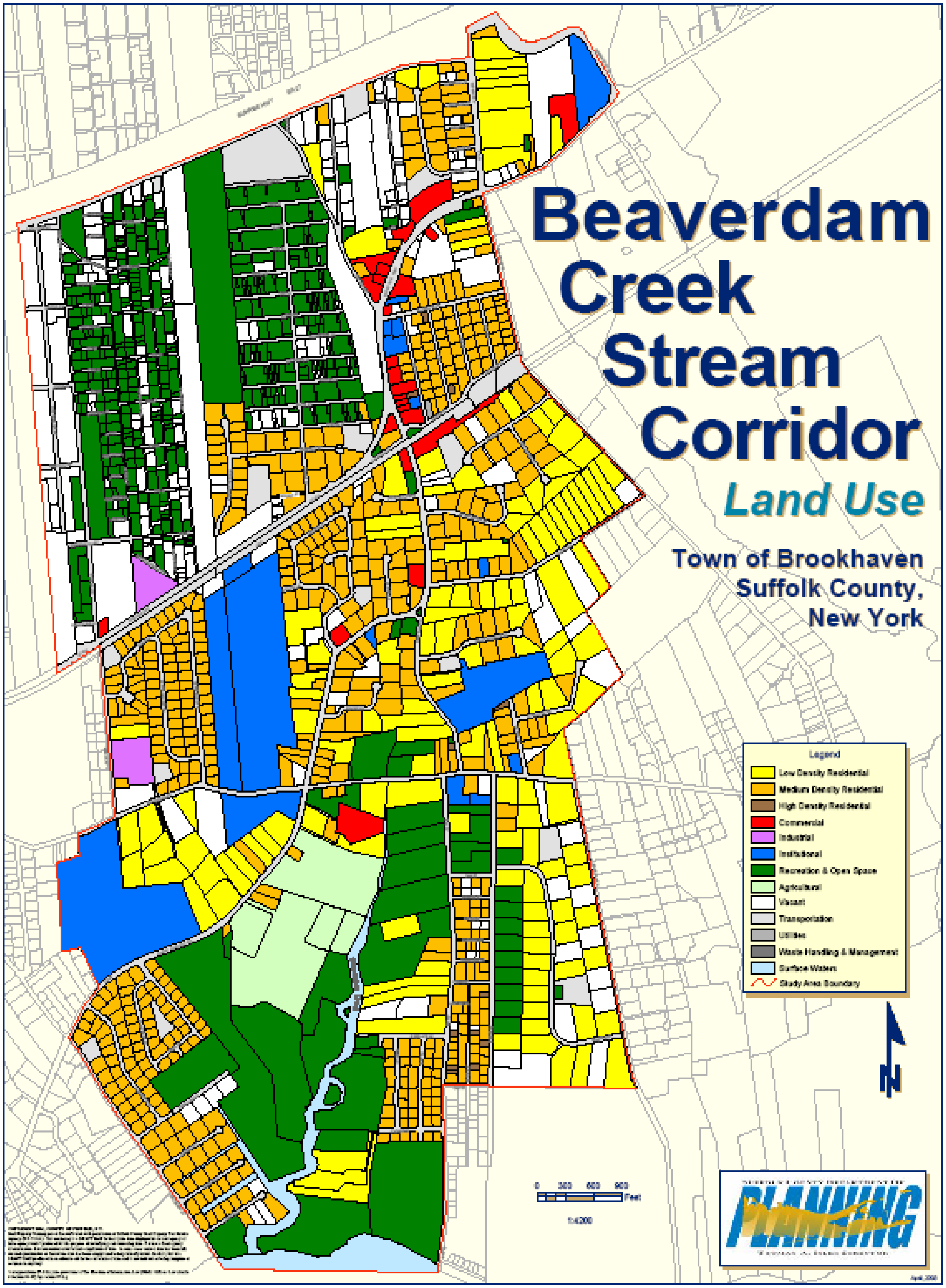


Figure 3. Beaver Dam Creek Land Use Map
(from the Suffolk County Department of Planning: Verbarg, 2003)

residential community bordering a series of canals (Bellhaven), and extensive *Phragmitis* dominated tidal wetlands. The freshwater section of the creek from Beaver Dam Road north to Montauk Highway is predominantly residential, but also includes a few small commercial establishments. The area from Montauk Highway north to Sunrise Highway is comprised of residential and vacant lands to the west, with the area along South Country Road to the east predominantly residential and commercial.


Phragmitis wetlands in the lower tidal portion of Beaver Dam Creek

The Town of Brookhaven sanitary landfill, located on the north side of Sunrise Highway, approximately 0.5 miles northwest of Beaver Dam Creek, has previously been implicated as a source of contamination to the creek. The landfill has been used for the disposal of municipal solid wastes for approximately 20 years (1974-1995). A leachate plume emanating from the landfill was discovered in the late 1970s, and prompted a series of studies conducted by the USGS to document the plumes extent and degree of contamination (Mack and Maus, 1986; Wexler, 1988a; Wexler and Maus, 1988; Wexler, 1988b). The studies found elevated levels of several inorganic compounds in wells downgradient of the landfill (including ammonia, sodium, potassium, calcium, magnesium, chloride, bicarbonate, iron, and manganese) and various volatile organic compounds (primarily benzene, ethylbenzene, chlorobenzene and naphthalene), indicating that leachate had entered the aquifer. It was theorized that leachate was escaping through leaks and/or seams in the landfill liner, or was overflowing the top of the liner (termed the bathtub effect). Wexler (1988a) indicated that the leachate plume extended in a southeastward direction from the landfill and was 3,700 feet long, 2,400 feet wide, and at least 90 feet thick (Figure 4). Based on limited sampling done in 1982 (one sample) however, the study concluded that the plume did not appear to have contaminated the waters of Beaver Dam Creek.

In a subsequent study done for the Town of Brookhaven (Dvirka and Bartilucci, 1990), it was reported that the plume had advanced approximately 3,000 feet in the direction of groundwater flow (southeast) since 1982, and was moving at a rate of about 1 foot/day. The study concluded that the forward edge of the plume had reached Montauk Highway, a distance approximately 5,500 feet from the landfill. Based on sampling results (one sample was collected at each of three locations: stations BD-1, BD-2, & BD-3, Figure 1) the study also concluded that Beaver Dam Creek appeared to have been

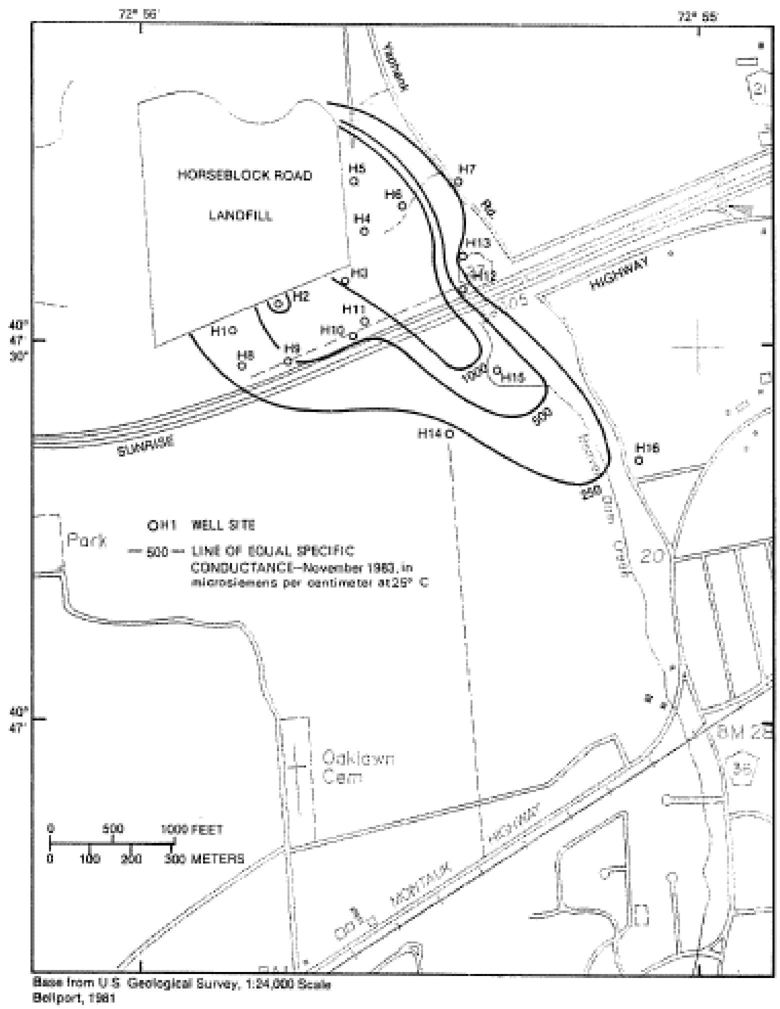


Figure 4. Southeastward extent of the landfill leachate plume in November 1983, as represented by lines of equal specific conductance (*From Mack and Maus, 1986*).

impacted by the leachate plume, but added that other sources of contamination such as storm water runoff may also be contributing factors.

Subsequent investigations conducted through 2004 (Dvirka and Bartilucci, 1992; Tonjes and Black, 1993; Tonjes and Black, 1994; Tonjes and Petrella, 1998; Tonjes and Petrella, 1999; Tonjes and Petrella, 2000; Tonjes and Petrella, 2001; Cashin Associates, 2003; Cashin Associates, 2004; Cashin Associates, 2005) noted periodic impacts to Beaver Dam Creek water quality from the landfill leachate plume. Data collected in 2004 showed C(TS) criteria exceedances for ammonia, iron, lead, and manganese, leading to the conclusion that "releases from the landfill cause groundwater and surface waters downgradient of the landfill to fail to meet standards set by New York State" (Cashin Associates, 2005).

Materials and Methods

Monitoring was initially conducted on an approximate monthly basis from September 2002 to November 2003 (15 occasions). Additional samples were collected intermittently from October 2004 to January 2008 (9 occasions) to fill data gaps and verify observed trends. In 2007, sampling was extended to include three sites in each of Little Neck Run and Yaphank Creek, tributaries to the Carmans River located to the east of Beaver Dam Creek. The 2007-2008 data is included in report appendices, but has not been incorporated into report tables or plots.

To minimize tidal effects at marine sites, sampling was conducted during the last 3 hours of ebbing tides. All samples were analyzed for nitrogen and phosphorus nutrients, including ammonia (NH_3-N), nitrite + nitrate (NO_2-N + NO_3-N) total nitrogen (TN), total dissolved nitrogen (TDN), total phosphorus (TP), total dissolved phosphorus (TDP), and dissolved inorganic phosphorus (ortho-phosphate, o-PO_4-P), and total & fecal coliform bacteria. Samples were also collected for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), organo-halide pesticides, carbamate pesticides, and herbicide metabolites, although on a less frequent basis. At the freshwater sites, samples were also collected for dissolved metals. Field measurements included temperature, pH, secchi depth, dissolved oxygen, salinity (at marine sites) and conductivity (at freshwater sites). Details pertaining to field measurement parameters, including the meters utilized and their calibration requirements, are included in Table 1. All sample analyses were conducted by the Suffolk County Public & Environmental Health Laboratory (PEHL). Table 2 lists the methods of analysis used and associated quality assurance procedures. A full description of analysis methods are given in the *Laboratory Quality Manual for the Suffolk County Public & Environmental Health Laboratory* (SCDHS, 2006a). Details of sample collection and field analysis procedures are described in the *Suffolk County Department of Health Services Surface Water Quality Monitoring Standard Operating Procedures (SOP) Manual* (SCDHS, 2007). Both documents are available upon request.

Table 1. Field Measurement Parameters, Meters, and Calibration Requirements

Parameter	Meter	Meter Range	Resolution	Accuracy	Calibration Requirements	Calibration Frequency
Secchi Depth	Plexiglas Disk	0 to 50 ft.	0.5 ft	± .5 ft	Check gradations on calibrated line	Annually
Water Temperature	YSI Model 85	-5 to 65 ºC	0.1 ºC	± 0.1 ºC	Compare to certified thermometer	Monthly
Salinity	YSI Model 85	0 to 70 psu	0.1 psu	± 2% or 0.1 psu	Done by conductivity calibration	Monthly
Conductivity	YSI Model 85	0 to 49.99 mS/cm	0.01 mS/cm	± 5% FS	2-pt calibration: 1, 10, or 50 mS/cm stds	Monthly
Dissolved Oxygen	YSI Model 85	0 to 20 mg/l	0.01 mg/l	± 0.3 mg/l	Saturated air calibration	Daily
pH	Oakton Model 30	0 to 14 units	0.1 unit	± 0.1 units	2-pt calibration: pH 4 & 10	Daily

Table 2. Laboratory Parameters, Methods and QC Procedures

Parameter	Method	MRL	General QC Procedures*
Ammonia	Wesco SmartChem 200-100C	0.02 mg/L	Calibration curves are established for all nutrient methods; MDLs calculated; LRBs, QCSs at low, mid and high analyte concentrations, matrix spikes, and duplicate samples analyzed.
Total Nitrogen	Lachat QuikChem 31-107-04-3-A	0.05 mg/L	
Nitrate+Nitrite	Lachat 31-107-04-1-C	0.005 mg/L	
Ortho-phosphate	Wesco SmartChem 410-200D	0.01 mg/L	
Total Phosphorus	Lachat QuikChem 31-115-01-3-D	0.05 mg/L	
Total Coliforms	Standard Methods 9221B	20 MPN/100 ml	Sterility checks on media, buffers, and sample bottle lots; method blanks; negative and positive controls analyzed.
Fecal Coliforms	Standard Methods 9221E	20 MPN/100 ml	
Methyl Carbamate Pesticides	EPA Method 531.1	0.5 ug/L	For organic analyses, calibration curves are established; MDLs determined; and a combination of LRBs, LFBs, FRBs, QCSs, LPCs, and LFMs are analyzed either daily or per a specific number of samples.
Organo-halide Pesticides	EPA Method 505	0.2 – 1.0 ug/L	
Microextractables	EPA Method 504.1	0.02 ug/L	
Dacthal Metabolites	Suffolk County Method No.1	5 ug/L	
Herbicide Metabolites	Suffolk County Method No.2	0.2 – 0.8 ug/L	
Semi-volatile Organic Compounds	EPA Method 525.2	0.2 – 2 ug/L	
Volatile Organic Compounds	EPA Method 524.2	0.5 – 20 ug/L	
Metals and Trace Elements	EPA Methods 200.7 & 200.8	200.7: 0.1 – 1 mg/l 200.8: 0.4 – 50 ug/L	Calibration curve established; MDLs determined; LRBs, LFBs, LFMs, and sample duplicates analyzed.
Total Suspended Solids	EPA Method 160.2	5 mg/L	MDL determined; QCS, LRB, and sample duplicates analyzed

* Details of method QC procedures are contained in the PEHL's Quality Manual and the individual method SOPs (available on request). MDL=Minimum Detectable Level; MRL=Minimum Reporting Level; LRB=Laboratory Reagent Blank; QCS=Quality Control Sample; LFB=Laboratory Fortified Blank; FRB=Field Reagent Blank; LPC=Laboratory Performance Check; LFM=Laboratory Fortified Matrix.

The sampling stations chosen (Table 3) approximate those described by the Long Island Regional Planning Board report (LIRPB, 1990), with two exceptions: LIRPB station B8, located in the Bellhaven canals, was not sampled; SCDHS station 38, located north of station 30 and west of Old Town Rd., was not monitored in the LIRPB study. Four of the freshwater station locations (30, 31, 33, & 38) were also monitored by consultants to the Town of Brookhaven (Cashin Associates; Dvirka and Bartilucci). Station references used during those investigations have a BD prefix, as shown in Table 3.

Results

Sampling results for physical and inorganic parameters are included in Appendix I. Result statistics, including mean, maximum and minimum values, number of cases (N), and standard deviation, are included in Table 4 (freshwater stations) and Table 5 (marine stations). For purposes of mean calculations and plotting, non-detect results were replaced with ½ the value of their detection limit.

Table 3. Monitoring Station Locations

SCDHS	LIRPB	Cashin, D&B, Others	Sampling Location
30	B1	BD-3	On the north side of Montauk Highway
31	B2	BD-2	From a culvert at Trout Ponds Court
32	B3	----	At the intersection of South Country and Fireplace Roads
33	B4	BD-1	At the north end of the pond at the Beaver Dam Rd. bridge
34	B5	----	Midstream off the marina approx. 500' south of Beaver Dam Rd.
35	B6	----	Midstream off the marina on the east bank of the creek
36	B7	----	At the confluence of the three "development" canals
37	B9	----	In Bellport Bay, near the RN"4" buoy
38	----	BD-4	On the west side of Old Town Road, off Carmans Blvd.
41	----	----	In Little Neck Run, at the first Wertheim access gate south of Chapel Ave. on the east side of Old Stump Road
42	----	----	In Little Neck Run at the culvert on the north side of the LIRR tracks
43	----	----	In Little Neck Run just south of Montauk Highway
44	----	----	In Yaphank Creek approximately 500' south of LIRR tracks
45	----	----	In Yaphank Creek at the culvert on the south side of the LIRR tracks
46	----	----	In Yaphank Creek at the culvert on the south side of Montauk Hwy.

Conductivity/Salinity

Average conductivity at the freshwater sites ranged from a low of 641 µS/cm at station 32 to 1,229 µS/cm at station 33 (corresponding to salinities of approximately 0.4 – 0.8 psu), the latter likely elevated due to intermittent tidal influences. North of station 32 the average conductivity increased to levels of 404 µS/cm at station 31 and 355 µS/cm at station 30, indicating that an external source of dissolved salts or other contaminants may be impacting the creek (or groundwater) in that area. At the tidal stations, salinity ranged from an average of 11.0 psu at station 34 to 24.1 psu at station 37 in Bellport Bay (Figure 5).

Table 4. Statistics for Physical & Inorganic Parameter Results - Freshwater Stations*

Station	Statistic	Temp (ºC)	D.O. (mg/l)	Cond (µS/cm)	pH	Total Coliform (MPN/100 ml)	Fecal Coliform (MPN/100 ml)	NH_3-N (mg/l)	NO_2+NO_3-N (mg/l)	TN (mg/l)	TDN (mg/l)	TP (mg/l)	TDP (mg/l)	Chloride (mg/l)
30	Mean	11.5	5.4	355	6.9	487	113	15.8	0.975	15.5	15.8	0.040	0.040	45.9
	Max	17.1	8.8	653	7.3	9,000	5,000	40.0	3.09	31.0	29.0	0.125	0.112	69.9
	Min	3.3	4.0	64	6.0	< 20	< 20	0.118	0.069	0.49	0.47	<0.025	<0.025	11.4
	Std Dev	4.0	1.4	183	0.4	2,101	1,186	12.4	0.768	9.77	9.65	0.029	0.031	20.4
	N of Cases	18	17	18	13	17	17	18	18	18	18	18	18	14
31	Mean	12.0	5.5	404	7.0	783	160	14.8	0.772	15.8	15.0	0.032	0.032	52.2
	Max	16.3	7.3	652	7.3	>16,000	9,000	25.5	2.47	25.0	24.0	0.112	0.093	68.4
	Min	6.1	4.0	268	6.2	< 20	< 20	2.0	0.110	7.80	8.0	<0.025	<0.025	35.1
	Std Dev	2.6	0.9	100	0.3	4,795	2,021	6.67	0.577	4.93	3.98	0.028	0.024	9.4
	N of Cases	19	20	20	13	19	19	20	20	20	19	19	19	15
32	Mean	12.0	5.6	264	6.8	1,550	380	7.37	0.867	8.12	7.75	0.043	0.041	37.6
	Max	14.9	9.5	433	7.2	16,000	16,000	13.5	1.62	15.0	13.0	0.109	0.128	52.7
	Min	8.1	4.0	176	6.0	110	20	1.28	0.487	3.60	2.6	<0.025	<0.025	26.5
	Std Dev	2.0	1.3	69	0.3	3,507	3,591	3.53	0.270	3.21	3.0	0.027	0.030	8.2
	N of Cases	20	20	20	13	19	19	20	20	19	19	19	19	15
33	Mean	11.8	7.0	1,229	6.6	2,253	517	1.93	1.20	3.06	2.86	0.045	0.037	341
	Max	14.8	10.5	10,200	7.1	16,000	9,000	3.50	1.71	4.90	4.80	0.126	0.126	1,374
	Min	6.4	4.5	176	5.9	300	20	0.700	0.748	1.90	1.90	<0.025	<0.025	34.2
	Std Dev	2.6	1.6	2,238	0.3	4,424	2,067	0.807	0.311	0.88	0.88	0.028	0.029	380
	N of Cases	19	19	19	13	18	18	19	19	19	19	19	19	14
38	Mean	11.1	5.2	284	6.2	126	25	10.4	0.452	10.0	9.1	<0.025	<0.025	38.1
	Max	17.4	8.5	847	7.1	500	40	40.6	0.967	37.0	34.0	0.029	<0.025	91.8
	Min	4.5	2.2	58	5.5	< 20	< 20	0.354	0.234	0.45	0.44	<0.025	<0.025	13.7
	Std Dev	5.8	3.2	343	0.8	207	15	17.4	0.313	15.7	14.4	----	----	32.9
	N of Cases	5	3	5	4	4	4	5	5	5	5	5	5	5

* All samples collected from 9/02 – 6/06

Table 5. Statistics for Physical & Inorganic Parameter Results - Marine Stations*

Station	Statistic	Secchi (ft)	Temp (ºC)	Surface D.O. (mg/l)	Bottom D.O. (mg/l)	Salinity (psu)	Total Coliform (MPN/100 ml)	Fecal Coliform (MPN/100 ml)	NH_3-N (mg/l)	NO_2+NO_3-N (mg/l)	TN (mg/l)	TDN (mg/l)	TP (mg/l)	TDP (mg/l)	o-PO_4-P (mg/l)
34	Mean	3.1	15.5	5.9	4.3	11.0	2,496	603	2.36	0.562	3.15	3.03	0.061	0.042	0.014
	Max	5.0	22.1	9.9	11.4	25.3	>16,000	9,000	4.60	1.10	6.30	6.70	0.151	0.108	0.030
	Min	1.5	7.8	0.4	0.1	0.4	358	40	0.320	<0.005	0.63	0.60	<0.025	<0.025	0.006
	Std Dev	1.1	4.8	3.0	3.9	8.3	5,241	2,507	1.52	0.379	1.86	1.90	0.036	0.027	0.007
	N of Cases	12	14	14	14	14	14	14	14	14	14	14	14	14	14
35	Mean	3.3	16.6	8.7	6.2	14.4	1,380	245	1.70	0.478	3.14	2.97	0.054	0.030	0.009
	Max	6.0	24.5	14.2	14.0	23.4	11,000	1,300	3.97	1.04	9.20	9.10	0.099	0.081	0.023
	Min	2.0	6.9	3.2	< 0.1	0.9	170	< 20	0.024	0.039	0.41	0.23	<0.025	<0.025	<0.005
	Std Dev	1.2	5.5	3.0	3.8	7.5	3,288	488	1.46	0.343	2.51	2.63	0.025	0.023	0.005
	N of Cases	12	14	14	14	14	14	14	14	14	14	14	13	14	14
36	Mean	3.0	16.6	8.8	7.1	15.9	1,171	335	1.20	0.670	2.05	1.89	0.046	0.033	0.007
	Max	4.5	24.0	12.4	11.6	23.6	9,000	2,400	3.23	1.45	4.70	4.80	0.095	0.091	0.015
	Min	2.0	6.5	3.7	3.5	3.2	80	20	0.043	0.143	0.37	0.23	<0.025	<0.025	<0.005
	Std Dev	0.9	5.7	2.1	3.0	6.1	2,385	736	1.19	0.359	1.38	1.43	0.025	0.026	0.004
	N of Cases	11	14	14	14	14	14	14	14	14	14	14	14	14	14
37	Mean	3.5	16.7	8.2	8.2	24.1	62	20	0.031	0.073	0.50	0.37	0.047	0.026	0.005
	Max	7.0	24.9	11.1	11.2	28.8	800	300	0.099	0.472	0.86	0.61	0.106	0.066	0.017
	Min	1.0	5.8	5.8	5.7	18.8	< 20	< 20	<0.005	<0.005	0.25	0.17	<0.025	<0.025	<0.005
	Std Dev	2.2	6.6	1.8	1.8	3.3	272	77	0.027	0.120	0.20	0.14	0.031	0.020	0.004
	N of Cases	10	14	14	14	14	14	14	14	14	14	14	14	14	14

* All samples collected from 9/02 – 6/06

Temperature

Average water temperature generally declined upstream from Bellport Bay (from approximately 16 °C to 12 °C), reflecting the influence of cooler groundwater entering the northern reaches of the creek (Figure 5). Minimum - maximum values varied from a range of 3.3 - 17.1 °C at station 30 to a range of 5.8 - 24.9 °C at station 37.

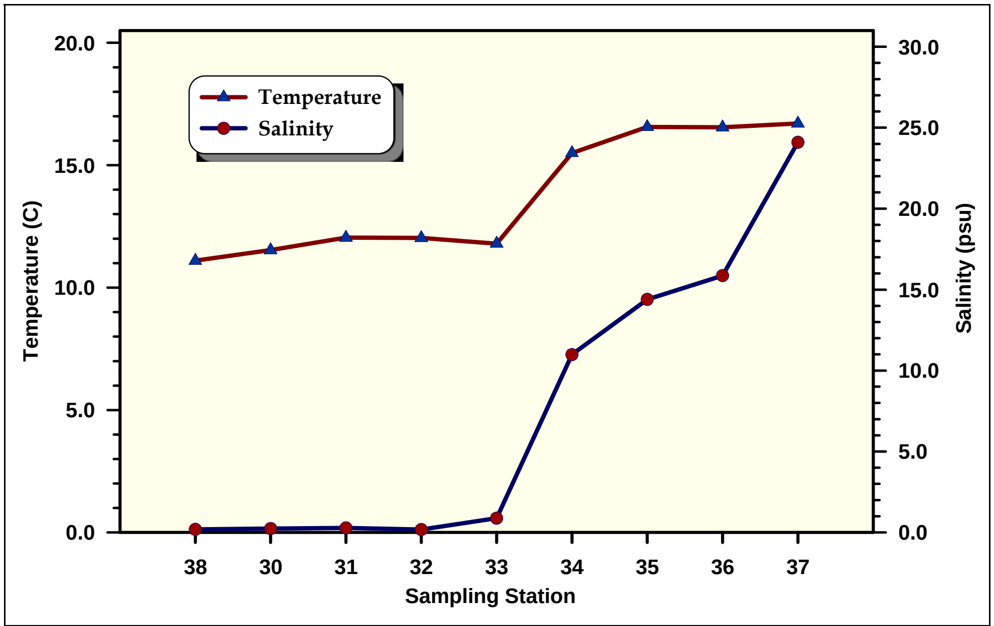


Figure 5. Average Temperature and Salinity from Station 38 (upstream) to Station 37 (Bellport Bay)

Secchi Depth

Secchi depths (a measure of water clarity) at the tidal sites showed little variation, with averages ranging from 3.0 - 3.5 ft. Secchi was not measured at the freshwater sites due to limited water depths. In general, secchi depths increased from north to south in the creek, although on a few occasions showed an opposite trend with lowest values recorded in Bellport Bay. Evidence of extreme sedimentation from a farm on the west side of the creek was noted following a heavy rain in June 2003 (see photo at right). In September of 2003, using funds obtained through the Clean Water/Clean Air Bond Act, the Suffolk County Soil and Water Conservation District constructed a grassed waterway and vegetated strip between the creek and the farm. The system is designed to improve the quality of stormwater runoff entering the creek by filtering out nutrients and sediments.

pH
Results of pH measurements (only done at freshwater sites) varied little between stations 30 and 33, with averages ranging from 6.6 to 7.0. These levels are within the range listed for waters suitable for trout spawning (C[TS]), the criteria being a pH between 6.5 and 8.5. The average pH at the northernmost station (38) was 6.2, but only included four measurements.

Dissolved Oxygen
Temporal variations in dissolved oxygen (D.O.) levels for freshwater and marine sites are shown in Figure 6. Concentrations varied little at the northernmost sites (stations 30 - 32), with a pattern at downstream locations of elevated D.O. levels in the spring (March & April) that declined to minimum levels during the summer and fall (June – October).

A number of D.O. measurements at both marine and freshwater stations were noted below the NYS standards for their respective classifications: 7.0 mg/l for Class C[TS] freshwaters, and 3.0 mg/l (acute criteria) for Class SC waters (6 NYCRR 703.3). Oxygen levels at the freshwater sites were rarely acceptable for trout spawning waters, with close to 80% of all measurements taken noted below the criteria (Table 6). In contrast, D.O. violations at tidal surface sites occurred on only three occasions (5.4% of all readings), while those in tidal bottom waters occurred on ten occasions (18% of readings). Although violations were less frequent at marine sites, the level of oxygen depletion noted was more severe. Minimum D.O. concentrations at freshwater sites ranged from 4.0 - 4.5 mg/l, while those at tidal sites (excluding Bellport Bay) ranged from 0.4 – 3.7 mg/l. Near-anoxic conditions (oxygen depletion) frequently occurred in the bottom waters at the northernmost tidal site (station 34), where levels below 0.5 mg/l were noted in July, September and October 2003, and again in May 2006.

Average surface D.O. levels exhibited an increasing trend from station 38 (5.2 mg/l) downstream to station 33 (7.0 mg/l), likely due to increased water movement and atmospheric exchange (Table 4, Figure 7). With the exception of a decline in the average D.O. level at station 34 (5.9 mg/l), this trend generally continued further downstream where average values ranged from 8.2 – 8.8 mg/l. Average bottom D.O. levels measured at the tidal sites increased steadily from 4.3 mg/l at station 34, to 8.2 mg/l at station 37 (Table 6, Figure 7).

Coliform Bacteria
Figure 8 depicts temporal variations in coliform concentrations at each of the freshwater and marine sampling stations. As shown, both total and fecal coliform levels throughout much of Beaver Dam Creek were persistently elevated during the 9/02 - 11/03 sampling period. Maximum concentrations for total coliform (TC) ranged from ≥16,000 MPN/100 ml at stations 31 through 34, to 500 MPN/100 ml at station 38 (Tables

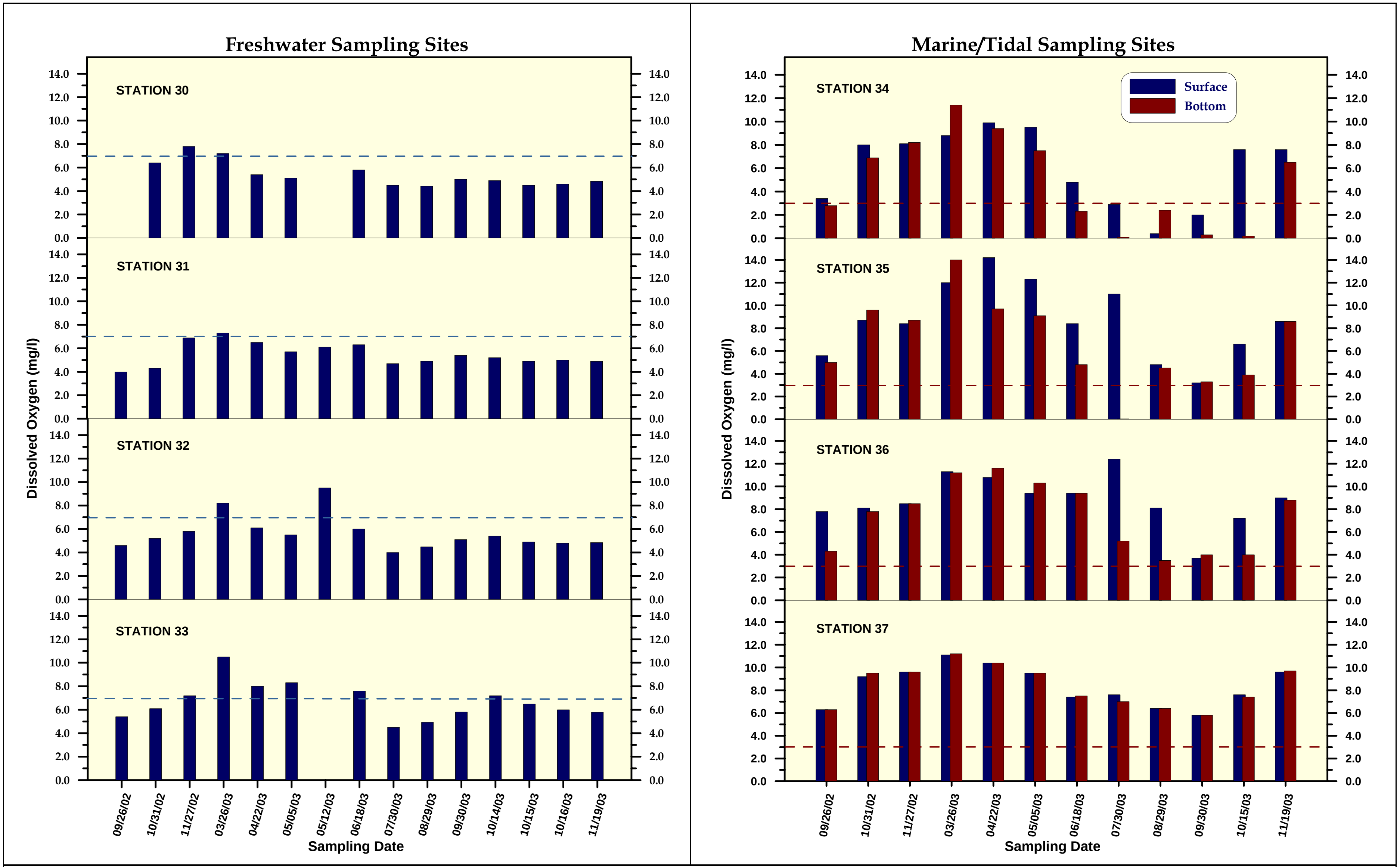


Figure 6. Temporal Variations in Dissolved Oxygen Concentrations, 9/02 – 11/03
(*light blue dashed-line is 7.0 mg/l NYS standard for C(TS) waters; red dashed-line is 3.0 mg/l acute standard for SC waters*)

Table 6. Average Dissolved Oxygen Levels With No. of Measurements Below Acceptable Criteria

Station	No. of Cases	Average Surface D.O. (mg/l)	Min. Surface D.O. (mg/l)	Surface D.O. Results Below Benchmarks *			Average Bottom D.O. (mg/l)	Min. Bottom D.O. (mg/l)	Bottom D.O. Results Below Benchmarks *	
				< 7.0	< 3.0	< 1.0			< 3.0	< 1.0
38	3	5.2	2.2	2	----	0	----	----	----	----
30	17	5.4	4.0	14	----	0	----	----	----	----
31	20	5.5	4.0	19	----	0	----	----	----	----
32	20	5.6	4.0	18	----	0	----	----	----	----
33	19	7.0	4.5	10	----	0	----	----	----	----
34	14	5.9	0.4	----	3	1	4.3	< 0.1	8	4
35	14	8.7	3.2	----	0	0	6.2	< 0.1	2	1
36	14	8.8	3.7	----	0	0	7.1	3.5	0	0
37	14	8.2	5.8	----	0	0	8.2	5.7	0	0

** Criteria for Class C(TS) waters is 7.0 mg/l; acute criteria for Class C waters is 3.0 mg/l (6NYCRR 703.3)*
The 1.0 mg/l level is included to indicate the prevalence of severe hypoxic conditions

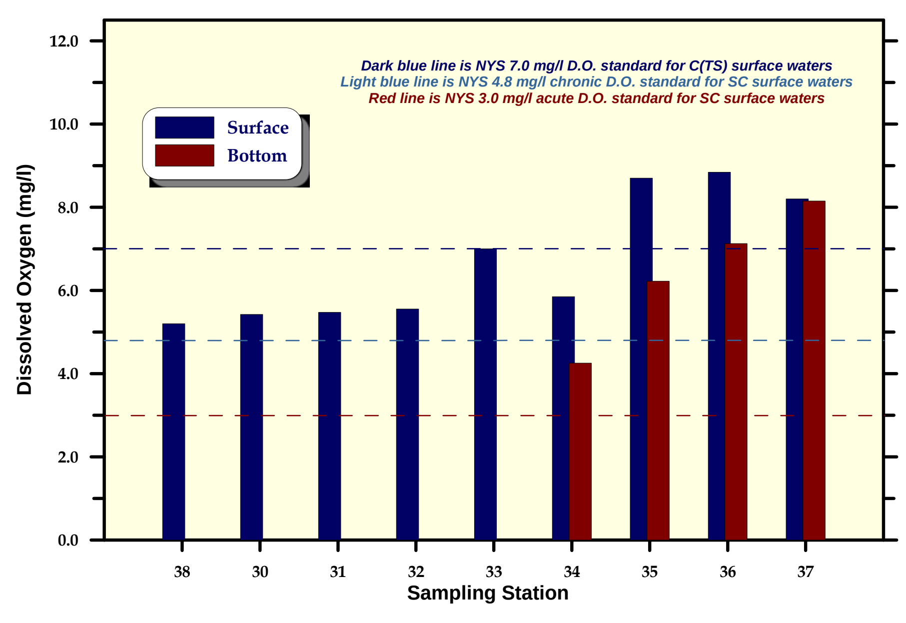


Figure 7. Average Surface & Bottom Dissolved Oxygen Levels

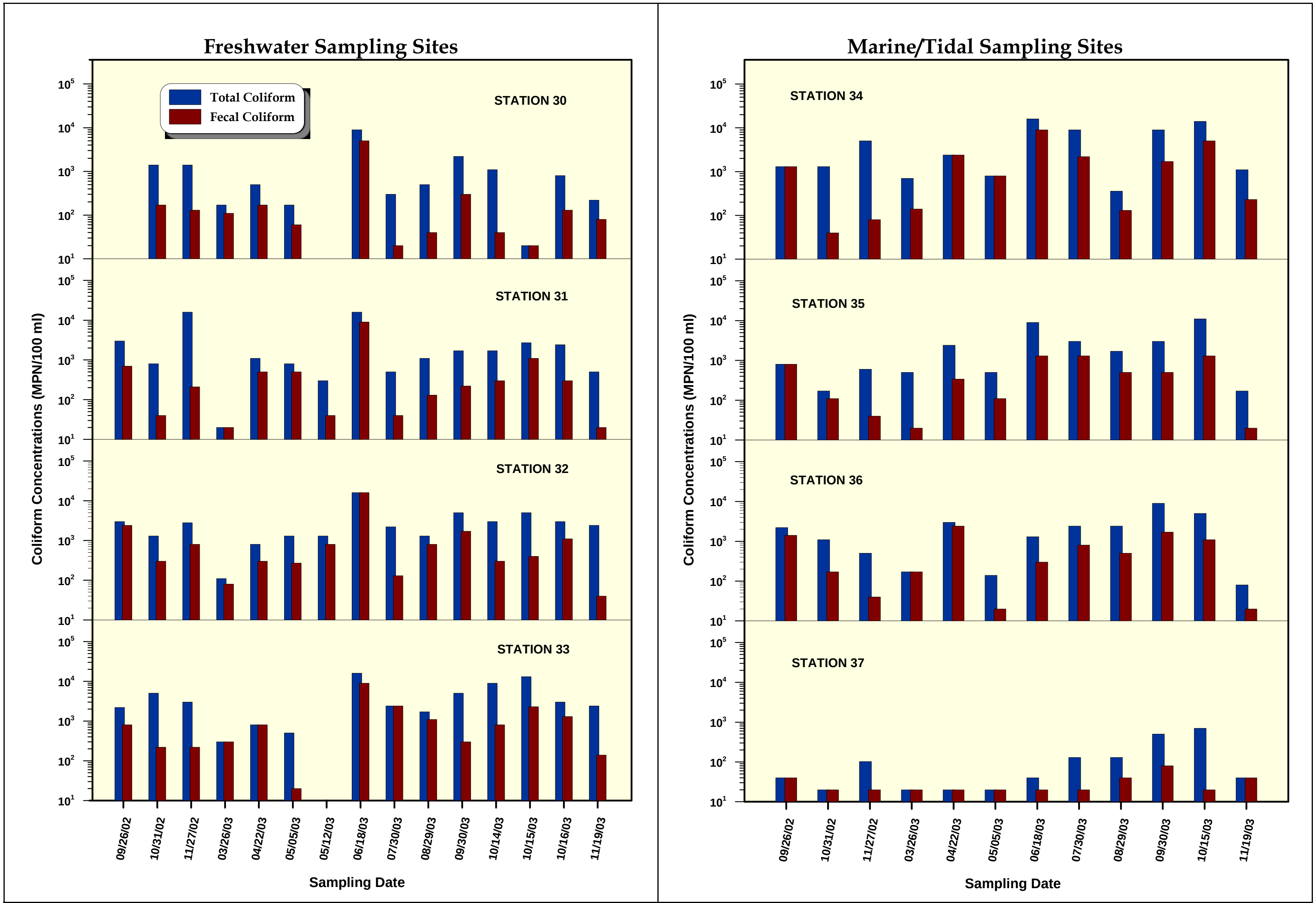


Figure 8. Temporal Variations in Total & Fecal Coliform Concentrations (9/02 – 11/03)

4 & 5). Peak fecal coliform (FC) concentrations ranged from 16,000 MPN/100 ml at station 32 to 40 MPN/100 ml at station 38. Fecal levels of 9,000 MPN/100 ml were also recorded at stations 31, 33 and 34.

Average TC concentrations (including samples collected through 2006) increased downstream from 126 MPN/100 ml at station 38 to a peak level of approximately 2,500 MPN/100 ml at station 34, before declining further downstream to a low of 62 MPN/100 ml at station 37 (Figure 9). Average FC concentrations varied similarly, increasing steadily downstream from station 38 (25 MPN/100 ml) to station 34 (603 MPN/100 ml), and then declining further downstream to a low of 20 MPN/100 ml in Bellport Bay.

A number of stormwater discharge locations that potentially introduce pathogens to Beaver Dam Creek were previously identified in a stormwater discharge inventory conducted for the Town of Brookhaven (Voorhis & Associates, 1996) and a subsequent watershed analysis conducted by the Suffolk County Soil and Water Conservation District (McMahon, 2002). Of the twelve sites identified in the watershed analysis, three were of immediate concern: the farm on the west side of the creek (overland flow); the Bellhaven community on the southwest side of the creek (five discharge points); and a site on the northside of the railroad tracks that receives flow from Montauk Highway (Figure 2).

The impact that storm water has on creek water quality was evident from results of sampling done in conjunction with rainfall events. On 27-Nov-02, 22-Apr-03, 18-Jun-03 & 15-Oct-03, sampling was done either during or within 12-hours of rainfall totaling between 0.5" and 1.3". On each occasion, a dry period of 96-hours or more preceded the sampling event. With the exception of station 38 (which wasn't sampled until 2004), maximum coliform concentrations at all stations were recorded during one of these events. On 18-Jun-03, when 1.3" of rain was recorded in the 12-hours prior to sampling, total coliform levels in 6 of 8 samples collected were $\geq$ 9,000 MPN/100 ml, with four of the results $\geq$ 16,000 MPN/100 ml. Fecal coliform levels were similarly elevated, with 5 of 8 results $\geq$ 5,000 MPN/100 ml. Only at the open water station in Bellport Bay (sta. 37), were coliform levels on that date insignificant (TC=40; FC<20).

Coefficients correlation (R^2) calculated using cumulative rainfall amounts for the 24, 48 & 72 hour periods prior to sampling (Table 7), were used as a general measure of association between coliform levels and previous rainfall. For rainfall amounts in the initial 24-hour period prior to sampling, TC coefficients for stations 30 through 35 ranged from 0.46 to 0.56, indicating a moderate relationship (46-56% of their variance is in common). At the two southernmost sampling sites (stations 36 & 37) however, no relationship between these variables was apparent (R^2 <0.01). A possible explanation for this is that TC levels at station 36 were consistently high (i.e., showed little variation) with 10 of 14 results being >1,000 MPN/100 ml; and at station 37, the majority of TC

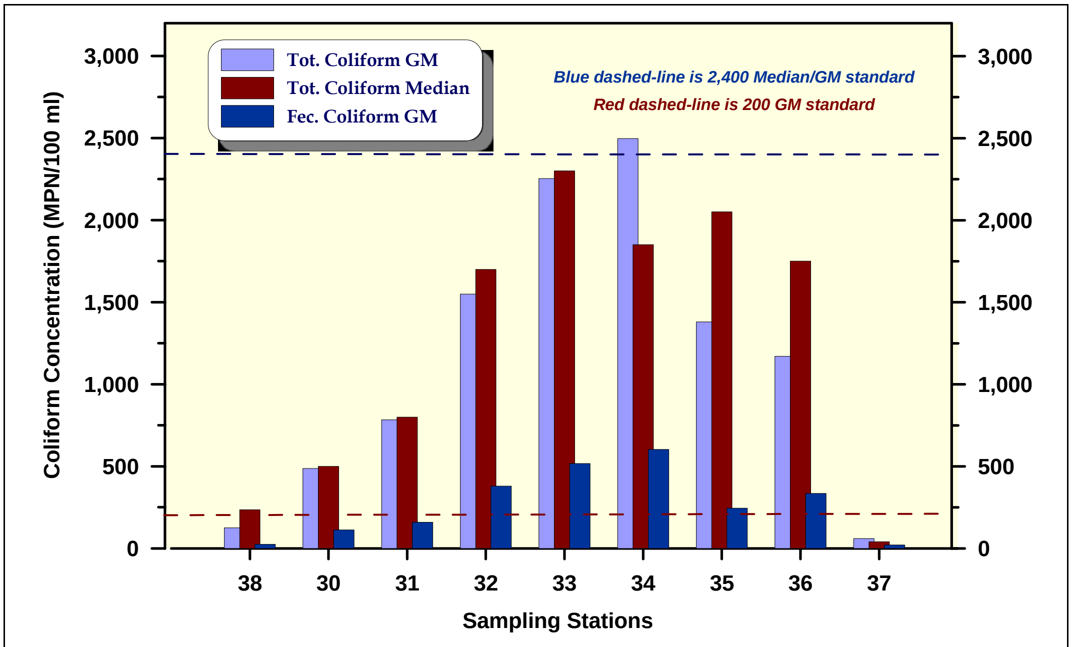


Figure 9. Average Total & Fecal Coliform Concentrations (9/02 - 6/06)

Table 7. Correlation Coefficients (R^2) for Total & Fecal Coliform vs. Previous Rainfall

Station	Total Coliform			Fecal Coliform		
	Rainfall Prev. 24 Hrs	Rainfall Prev. 48 Hrs	Rainfall Prev. 72 Hrs	Rainfall Prev. 24 Hrs	Rainfall Prev. 48 Hrs	Rainfall Prev. 72 Hrs
30	0.49	0.48	0.41	0.56	0.45	0.36
31	0.52	0.40	0.29	0.64	0.49	0.37
32	0.56	0.59	0.52	0.53	0.46	0.37
33	0.46	0.41	0.36	0.59	0.49	0.37
34	0.46	0.61	0.61	0.72	0.67	0.55
35	0.49	0.49	0.44	0.17	0.16	0.14
36	< 0.01	0.12	0.26	0.02	0.08	0.12
37	< 0.01	0.08	0.17	0.06	0.00	0.02

levels (11 of 14) were low ($\leq$ 130). FC coefficients for stations 30 to 34 were similar although somewhat higher than TC (R^2= 0.53 to 0.72), and also showed little to no correlation at the two southernmost stations.

As rainfall amounts in the previous 48 and 72 hour periods were considered, coefficients generally declined in magnitude. Interestingly, coefficients for the two southernmost stations increased steadily from 24 to 72 hours for both total and fecal coliform, although their magnitude at 72 hours (TC: R^2 = 0.26 & 0.17; FC: R^2 = 0.12 & 0.02) didn't suggest a very strong relationship.

In an effort to assess Beaver Dam Creek coliform levels in terms of available criteria, Table 8 includes statistics (mean, median, maximum and geometric mean) associated with NYSDEC surface water standards, NYSDEC shellfish standards, and New York State Department of Health (NYSDOH) bathing beach criteria. While it is recognized that these standards do not necessarily apply to Beaver Dam Creek waters, and the frequency of data collection is less than required in many cases, they are included here to provide points of reference and do not necessarily imply any regulatory significance.

Applying the NYSDEC standard for Class "SC" marine and Class "C" fresh waters (6 NYCRR 703.4), the only stations where coliform levels were within acceptable limits for both the TC and FC criteria (TC median ≤ 2,400, no more than 20% of TC samples > 5,000; FC geometric mean ≤ 200), were the three northernmost fresh water sites (stations 30, 31 & 38) and the southernmost tidal site (station 37). Criteria violations at the other sites included TC levels at station 34 (29% > 5,000) and FC levels at stations 32 - 36 (geometric means ranging from 246 to 603/100 ml).

In terms of the NYSDEC shellfishing standards (TC median or geometric mean ≤ 70 MPN/100 ml; not more than 10% of TC samples > 230 MPN/100 ml; FC geometric mean ≤ 14 MPN/100 ml; not more than 10% of FC samples > 43 MPN/100 ml), coliform levels at all stations violate one or more of the criteria. The Bellport Bay station had an acceptable TC median and geometric mean, but failed on the individual sample criteria (21% of samples were > 230) and on the FC geometric mean criteria (GM of 20). All other sites, both tidal and freshwater, grossly exceed the NYSDEC shellfish coliform criteria. Currently, all of Beaver Dam Creek and the waters surrounding its mouth are closed to shellfishing.

Only one site (station 34) exceeded the NYSDOH bathing beach criteria for TC (GM ≤ 2,400) with a geometric mean of 2,496 MPN/100 ml. At the more than 150 beaches monitored annually by the SCDHS for the past 20+ years, this benchmark has rarely been exceeded. The bathing beach criteria for FC (GM ≤ 200) was exceeded at stations 32 through 36 (GM from 246-603). Additionally, the single-sample FC criteria for beaches (no results > 1000), was exceeded at one time or another at stations 30 through 36 (and on 6 occasions at stations 33 and 34). Only the Bellport Bay station had acceptable water quality for bathing purposes.

Chloride

Samples for chloride analysis were collected at freshwater stations only. Results for station 33, located within the freshwater reaches of the creek but periodically influenced by tidal flow, are not included here. Of the remaining stations, average chloride levels were highest at station 31 (52.2 mg/l) and decreased north and south to station 38 (38.1

Table 8. Statistics for Comparison With Coliform Criteria

Station	Total Coliform (MPN/100 ml)				Fecal Coliform (MPN/100 ml)		
	Median	Geometric Mean	% > 5,000	% > 230	Geometric Mean	% > 43	No. > 1,000
38	235	126	0	50	25	0	0
30	500	487	6	71	114	77	1
31	800	783	11	84	160	68	2
32	1,700	1,550	5	90	380	90	4
33	2,300	2,253	17	100	517	94	6
34	1,850	2,496	29	100	603	93	6
35	2,050	1,380	14	86	246	79	3
36	1,750	1,171	7	79	335	79	5
37	40	62	0	21	20	14	0

***NYSDEC Criteria for Class "SC" and Class "C" waters**: For at least five samples: Total Coliform monthly median $\leq$ 2,400 MPN/100 ml; not more than 20% of TC samples >5,000 MPN/100 ml; Fecal Coliform monthly geometric mean $\leq$ 200 MPN/100 ml.*

***NYSDEC Criteria for Shellfish Waters**: Total Coliform median (or geometric mean) $\leq$ 70 MPN/100 ml; not more than 10% of TC samples > 230 MPN/100 ml. Fecal Coliform geometric mean $\leq$ 14 MPN/100 ml; not more than 10% of FC samples > 43 MPN/100 ml.*

***NYSDOH Bathing Beach Criteria** (all samples in a 30-day period): Total coliform geometric mean $\leq$ 2,400 MPN/100 ml; Fecal Coliform geometric mean $\leq$ 200 MPN/100 ml; individual FC result $\leq$ 1,000 MPN/100 ml.*

mg/l) and station 32 (37.6 mg/l). A similar pattern of variation is also evident in the historical data (Appendix II).

An unusually high chloride level was found at station 38 on 31-May-06 (91.8 mg/l), which coincided with the highest levels found among all stations of a number of other constituents. These included ammonia (40.6 mg/l), barium (215 ug/l), calcium (35.2 mg/l), cobalt (11.8 ug/l), iron (21.1 mg/l), potassium (39.9 mg/l), chlorobenzene (2.8 ug/l), m,p-dichlorobenzene (1.4 ug/l), diethyl-toluamide (Deet, 1.3 ug/l), and bisphenol-A (3.6 ug/l). This sample also had the lowest level of dissolved oxygen (2.2 mg/l) of the 72 stream samples collected during this study. Maximum levels found at other sites occurred on 30-July-06, and coincided with elevated ammonia levels (13.5 – 28.0 mg/l) as well as with low levels of diethyl ether and m,p-dichlorobenzene, but did not exhibit the level of correlation with other constituents as was seen in the May '06 sample at station 38.

Nutrients

Water samples were analyzed for a variety of nutrient parameters, including ammonia (NH_3-N), nitrite + nitrate (NO_2-N + NO_3-N), total nitrogen (TN), total dissolved nitrogen (TDN), ortho-phosphate (o-PO_4), total phosphorus (TP) and total dissolved phosphorus (TDP).

Ammonia: The most notable feature of nutrient results was the recurrence of unusually high concentrations of ammonia at the four northernmost freshwater sites (stations 30, 31, 32 & 38). Average levels at these locations ranged from 7.4 - 15.8 mg/l (Figure 10), with concentrations exceeding 40 mg/l on two occasions (at stations 30 & 38) and 20 mg/l on 14 occasions (all at stations 30 & 31). At downstream sampling sites (south of station 32), ammonia levels declined considerably to average values ranging from 2.36 mg/l at station 34 to 0.031 mg/l in the open waters of Bellport Bay (station 37). Sampling done in 2007 also revealed elevated ammonia levels at station 41 in Little Neck Run, which averaged 16.1 mg/l for the two samples collected. Considerably lower ammonia levels were noted at the other Little Neck Run and Yaphank Creek sites sampled, where concentrations ranged from <0.02 - 0.24 mg/l.

In comparison to the Beaver Dam Creek findings, past monitoring done by the SCDHS Office of Water Resources in a number of other tributaries to Great South Bay, including some located within densely populated watersheds of western Suffolk where elevated ammonia concentrations from area septic systems might be expected, has found considerably lower levels to exist (SCDHS, 2006b). For purposes of this comparison, the dataset for creeks in the western portion of the bay was limited to samples collected prior to the operation of the Southwest Sewer District. Average ammonia levels found ranged from a high of 4.85 mg/l in Ketchum's Creek (Amityville), to 0.13 mg/l in the Carmans River (Table 9). Out of a total of 383 samples in this dataset, only four ammonia results exceeded 10 mg/l.

Contrasting the ammonia levels found in the tidal portion of Beaver Dam Creek (1.2 - 2.4 mg/l), are results of recent monitoring done by the SCDHS in the Forge River (unpublished data), a hyper-eutrophic water body impacted by nitrogen additions from area septic systems and a local duck farm. For the past three summers (2005-2007), tidal waters of the Forge River have experienced extended periods of oxygen depletion, largely thought to be caused by excessive nutrient levels, that has resulted in water discoloration, foul odors, and the mortality of area fish and crustaceans. Average ammonia concentrations found in the tidal reaches of the Forge River ranged from the 0.07 - 0.77 mg/l, considerable lower than those recorded in Beaver Dam Creek tidal waters (Table 10, Figure 11). Despite the elevated levels of ammonia found in both the fresh and tidal portions of the creek however, the average concentration at station 37 in Bellport Bay (0.031 mg/l) was similar in magnitude to historical values for adjacent areas of eastern Great South Bay (~0.02 mg/l) and somewhat lower than levels recorded in western Great South Bay (0.055 mg/l).

Subsequent to the initial sampling done in 2002-2003, a number of shoreline walking surveys and dye-tests of area sanitary systems were conducted in an effort to elucidate potential sources of ammonia to the creek. Available historical data, including that collected by the SCDHS Office of Water Resources as part of its county-wide stream

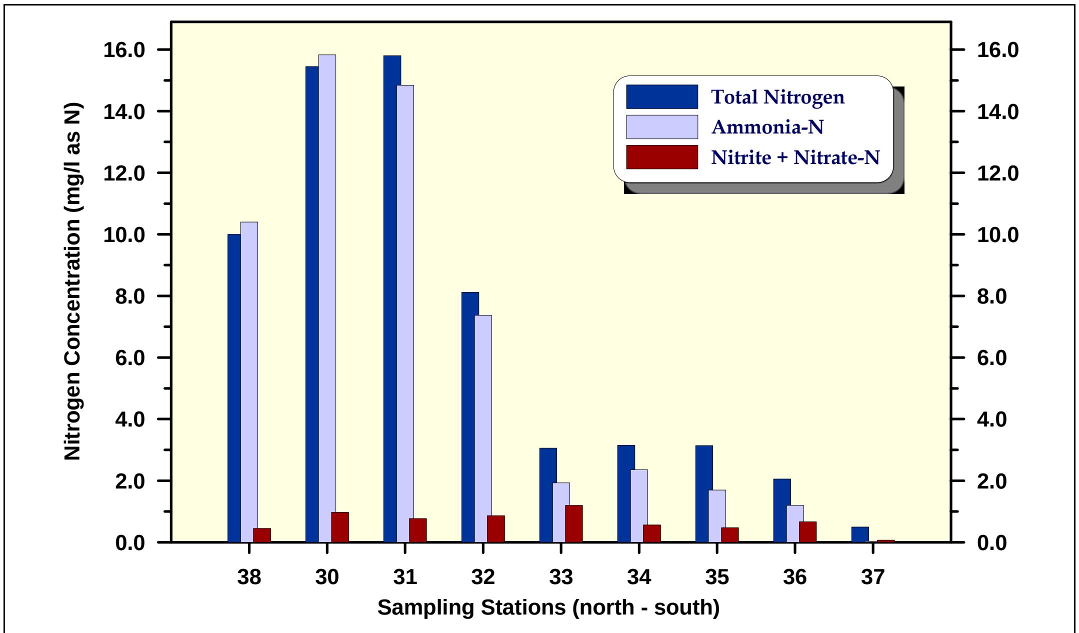


Figure 10. Average Nitrogen Concentrations in Beaver Dam Creek

Table 9. Comparative Nitrogen Levels in Select Suffolk County Streams *

Stream	Ammonia-N (mg/l)			NO_2-N + NO_3-N (mg/l)		
	N of Cases	Mean	Max	N of Cases	Mean	Max
Amityville Creek	40	2.09	4.9	40	2.29	4.72
Awixa Creek	51	4.12	10.5	50	2.06	7.0
Carlls River	21	1.06	2.0	20	2.79	3.52
Carmans River	33	0.13	0.9	43	1.45	4.82
Champlins Creek	26	0.92	1.6	27	1.66	2.32
Great Neck Creek	36	3.50	13.0	38	1.82	3.20
Ketchums Creek	7	4.85	9.4	7	1.31	2.39
Mud Creek	13	4.04	7.0	13	0.70	1.53
Neguntatogue Creek	35	4.39	12.0	33	2.87	7.18
Sampawams Creek	35	1.28	4.8	36	2.89	5.95
Santapogue Creek	31	3.23	5.9	31	1.92	3.65
Strong's Creek	24	3.31	7.9	26	2.16	9.60
Swan River	31	0.49	10.3	41	1.80	9.0

** Data from SCDHS Office of Water Resources (OWR), 1966-1980, prior to operation of the Bergen Point STP*

Table 10. Average Nutrient Concentrations at South Shore Tidal Sampling Locations *						
Embayment/Tidal Area	**Station**	**NH_3-N (mg/l)**	**NOx-N (mg/l)**	**TN (mg/l)**	**TP (mg/l)**	**o-PO4-P (mg/l)**
Beaver Dam Creek	34	2.36	0.562	3.15	0.061	0.014
Beaver Dam Creek	35	1.70	0.478	3.14	0.054	0.009
Beaver Dam Creek	36	1.20	0.670	2.05	0.046	0.007
Beaver Dam Creek (Bellport Bay)	37	0.031	0.073	0.50	0.047	0.005
Forge River North (FRGN)	FRG007	0.768	0.779	2.01	0.450	0.317
Forge River Mid (FRGM)	FRG009	0.145	0.158	0.93	0.181	0.058
Forge River South (FRGS)	FRG012	0.067	0.087	0.66	0.098	0.022
Western Great South Bay (GSBW)	090250	0.055	0.057	0.45	0.062	0.016
Bayshore Cove (BCVE)	090190	0.020	0.039	0.62	0.066	0.008
Patchogue Bay (PTCH)	090130	0.022	0.039	0.75	0.070	0.009
Carmans River Mouth (GSBE)	090110	0.021	0.059	0.64	0.063	0.009
Eastern Moriches Bay (MBE)	080180	0.017	0.016	0.38	0.071	0.017
Western Shinnecock Bay (SBW)	070180	0.013	0.016	0.42	0.072	0.014
Eastern Shinnecock Bay (SBE)	070120	0.010	0.014	0.31	0.053	0.018
** SCDHS SSER Data, 1976-2005; Forge River Data, 2005-2006*						

monitoring program, and by consultants to the Town of Brookhaven (Cashin Associates; Dvirka and Bartilucci) investigating the leachate plume from the Brookhaven Landfill (Appendix II), was also examined for trends that might corroborate the levels observed.

The initial creek surveys located PVC pipes extending into the creek from two structures in the area between Montauk Highway and Old Country Road. During a number of visits to each location however, neither pipe was observed flowing. One pipe was later determined to be part of an old French-drain system that handled roof drainage, and the other pipe was reported to be formerly connected to a basement sump-pump. As a result of inspections and dye-tests conducted by the SCDHS, it has been determined that both pipes no longer discharge to the creek. To date, a total of 20 dye-tests of sanitary systems of both residences and commercial establishments in the area have been conducted; results for all have been negative.

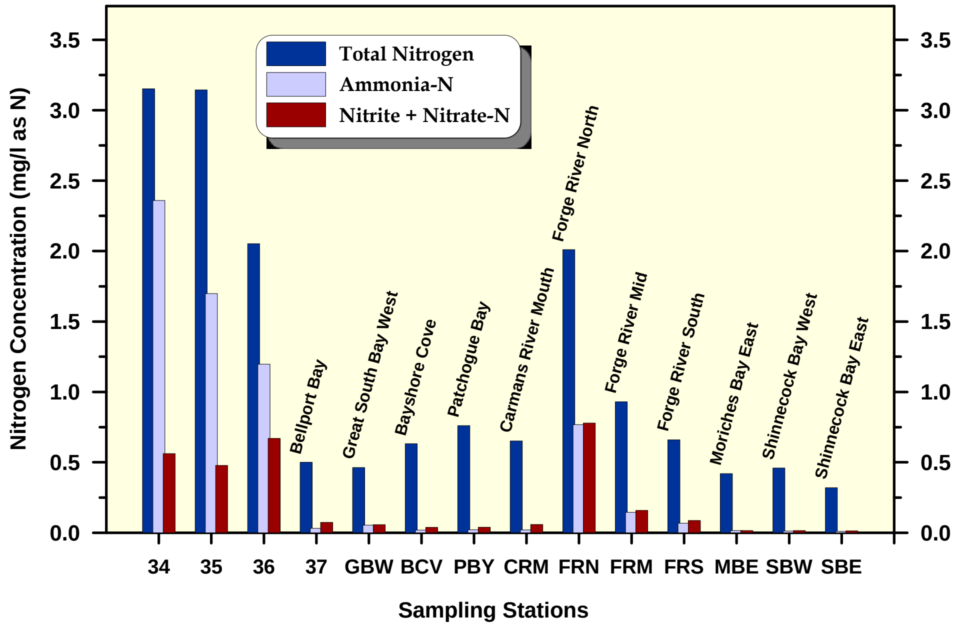


Figure 11. Average Nitrogen Concentrations at Tidal Stations in Beaver Dam Creek and Bellport Bay, Compared to Levels Found at Various SSER Embayment and Forge River Sites (*SCDHS Data, 1976-2006*)

An examination of available historical data collected between 1970 and 2006 (Appendix II), has provided valuable insight concerning the onset and variability of elevated ammonia levels in area groundwater and the creek. From data collected at the Montauk Highway sampling site (station 30/BD-3), it appears that elevated ammonia levels began appearing in the creek sometime between 1982 and 1989 (Figure 12). In samples collected from 1970-1982, ammonia levels ranged from 0.04 mg/l – 0.39 mg/l. A sudden increase was noted in 1989, when a single sample collected had a concentration of 7.78 mg/l NH_3-N. Sampling was not conducted in 1990 at this location, but in 12 samples collected in 1991, concentrations averaged 10.5 mg/l with a result of 19.5 mg/l recorded on 5/20/91. Annual ammonia averages thereafter at this location varied from 0.8 mg/l in 1995 to 22.1 mg/l in 2006. Station 38 showed a similar ammonia level in 1989 (7.17 mg/l), and averaged from 0.4 mg/l in 1999 to 25.5 mg/l in 2006. South of Montauk Highway at the Trout Ponds Court site (station 31/BD-2) sampling wasn't initiated until 1989, so a comparison with ammonia levels prior to the landfill's existence isn't possible. An increasing trend is apparent in the data however, with annual averages in the years 1989 – 1995 ranging from 1.1 - 4.7 mg/l NH_3-N and in the years 1997-2006 from 9.3 - 19.5 mg/l NH_3-N.

At the South Country Rd. site (station 32), sampling was conducted intermittently from 1972 -1997 during which ammonia levels averaged 0.34 mg/l. When sampling was resumed in 2002 as part of this study, an increase in ammonia levels was noted. From 2002 – 2006, sample results ranged from 1.3 – 12.3 mg/l and averaged 7.4 mg/l.

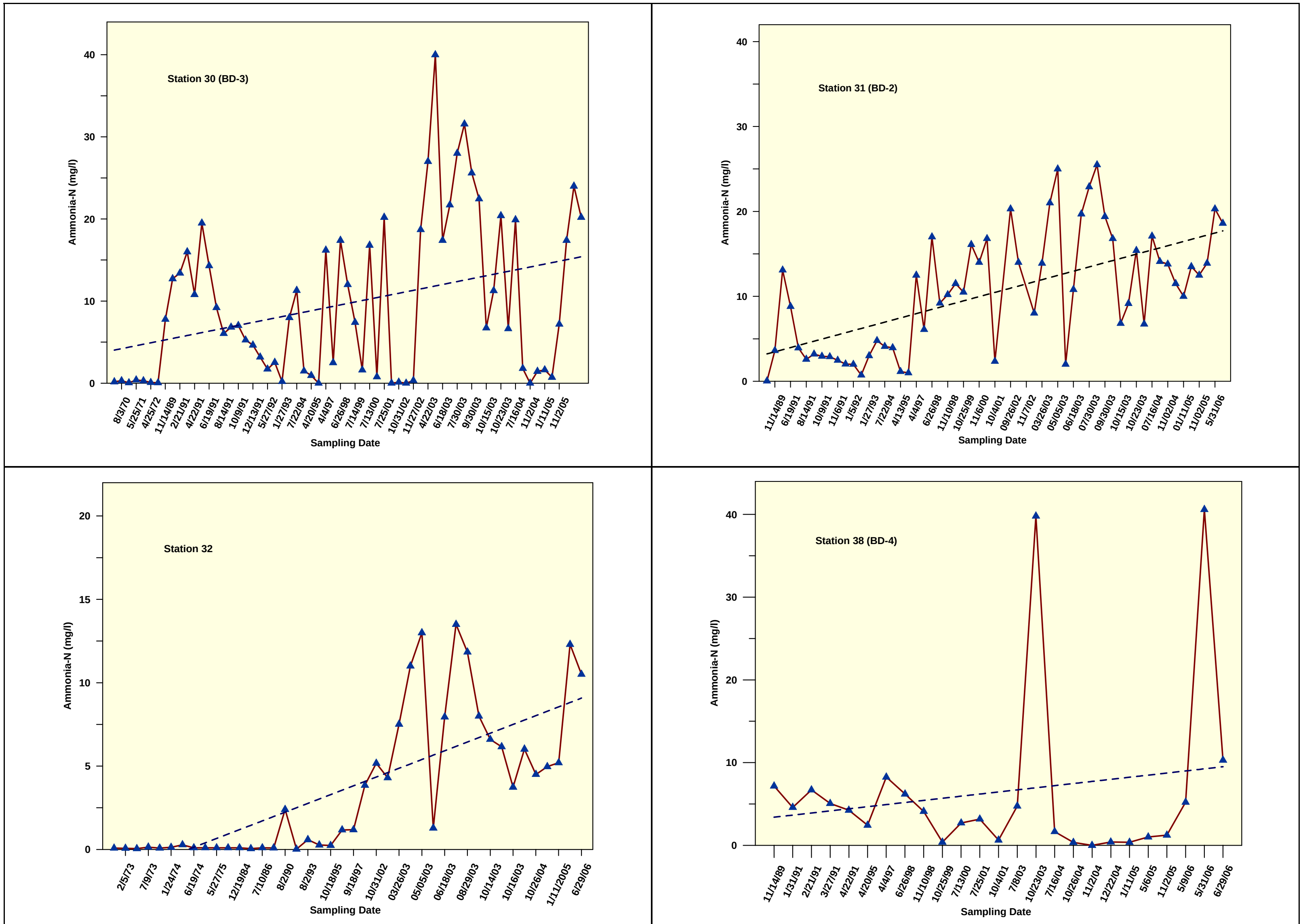


Figure 12. Plots of Historic Ammonia Concentrations at Beaver Dam Creek Stations 30, 31, 32 & 38

Data from SCDHS Office of Ecology and Office of Water Resources, 1970-2006; USGS, 1982; Cashin Associates and Dvirka & Bartilucci, 1989-2005

(Dashed lines are linear trends; note that x-axis dates are not proportionately spaced)

Ammonia levels at the Beaver Dam Rd. site (station 33) also showed an increasing trend, but to less of a magnitude than the other creek sites. Concentrations averaged 0.17 mg/l during the years 1970-1972; 1.16 mg/l from 1991-1995, and 1.9 mg/l from 2002-2006.

Because Beaver Dam Creek is fed by groundwater, observed variability in ammonia and other contaminant levels between sampling years may be attributed to seasonal as well as long-term changes in the height of the water table and thus the degree of discharge to the creek. In discussing contaminant levels in wells downgradient of the Brookhaven landfill, Tonjes (1995) noted that periodic variations in well data may be due to fluxes in leachate plume boundary with varying recharge conditions during the sampling period. Coefficients of correlation calculated between historical ammonia concentrations at station 30 and coincident fluctuations in area groundwater levels (USGS well 3529, Figure 13), suggests that a significant relationship exists between the two variables. For the two periods where sampling was conducted on an approximate monthly basis, Jan '91 – Jan '92 and Oct '02 - Nov'03, coefficients of 0.73 and 0.80 resulted. For the nine samples collected from July '04 through June '06, the correlation coefficient increased to 0.85.

<u>Nitrate + Nitrite</u>
In comparison to ammonia levels, concentrations of nitrite+nitrate (NO_2-N + NO_3-N) found in much of the freshwater reaches of the creek were insignificant. Average values ranged from 0.45 mg/l at station 38 to 1.2 mg/l at station 33, with maximum levels recorded ranging from 0.98 to 3.1 mg/l. These concentrations were also low compared to levels found in other tributaries to Great South Bay (SCDHS, 2006b), where average levels found varied from a low of 1.45 mg/l in the Carmans River to 2.89 mg/l in Sampawams Creek (Table 9).

At the tidal stations, average NO_2-N+NO_3-N concentrations ranged from 0.073 mg/l in Bellport Bay (station 37) to 0.67 mg/l at station 36, with maximum levels varying from 0.47 mg/l to 1.5 mg/l at the same two sites. Similar levels were found in the Forge River, where average values ranged from 0.09 mg/l at the mouth to 0.78 mg/l at the river's northernmost tidal extent. Average NO_2-N+ NO_3-N concentrations in other south shore marine areas sampled by the SCDHS have ranged from 0.014 in eastern Shinnecock Bay to 0.059 mg/l off the Carmans River (Table 10, Figure 11).

<u>Total & Dissolved Nitrogen</u>
Total nitrogen (TN) and total dissolved nitrogen (TDN) concentrations, with the exception of those found at station 37, generally mirrored ammonia levels. Average TN values were highest at stations 30 and 31 (~15-16 mg/l), and declined in a downstream direction to 0.50 mg/l in Bellport Bay (Figure 10). In other south shore embayment areas examined, TN values ranged from 0.31 mg/l in eastern Shinnecock Bay to 0.75

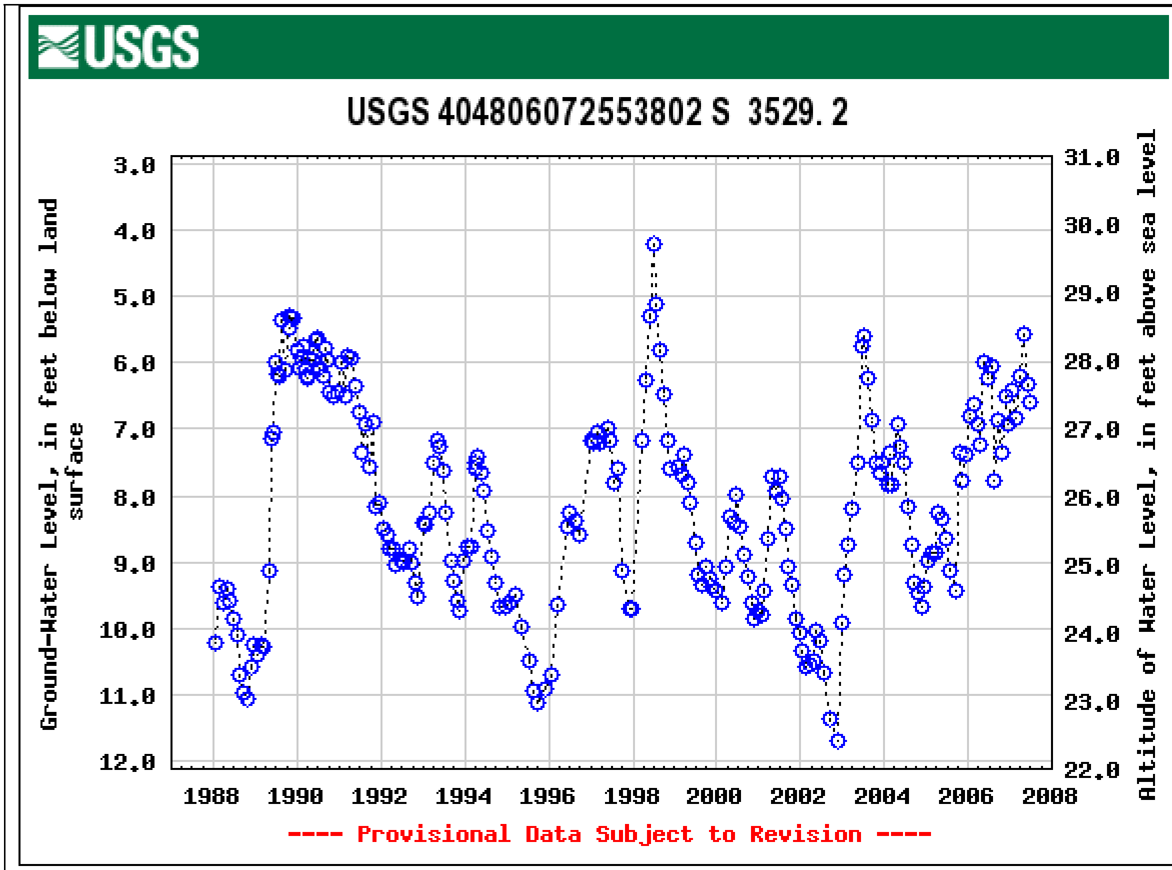


Figure 13. Groundwater Elevation at USGS Well 3529.2, Jan 1988 – June 2007
(well located due north of Beaver Dam Creek near Horseblock Road and Old Town Road)

mg/l in Patchogue Bay (Table 10). Total nitrogen levels in the Forge River ranged from 2.01 mg/l in the northern tidal reaches to 0.66 mg/l near the river's mouth.

Total & Dissolved Phosphorus

Phosphorus concentrations showed little variation throughout Beaver Dam Creek, and were generally similar to levels found in other freshwater and tidal locations on the south shore. Average total phosphate (TP) levels ranged from 0.032 – 0.061 mg/l, while those for total dissolved phosphate (TDP) varied from 0.026 – 0.042. The majority of creek sites examined (those listed in Table 9) had average TP concentrations in the 0.023 – 0.084 mg/l range (not including levels in the Forge River and Mud Creek, which, presumably due to past duck farm activities in these areas, were two orders of magnitude higher), and TDP levels ranging from 0.011 – 0.033 mg/l. Levels of TP found at south shore embayment sites (Table 10) ranged from 0.053 – 0.072 mg/l; those for TDP from 0.031 – 0.043 mg/l.

Levels of dissolved ortho-phosphate (o-PO_4) at the tidal sites in the creek declined from an average of 0.014 mg/l at station 34 to 0.005 mg/l in Bellport Bay. This is similar to concentrations found in the various embayments examined, which averaged from 0.008 mg/l in Bayshore Cove to 0.018 mg/l in eastern Shinnecock Bay (Table 10). Ortho-phosphate results for the freshwater sites have been discarded due to sampling/analysis errors. Aliquots for analysis of this parameter are normally extracted from the same bottle that is used for the ammonia-N analysis. Because ammonia-N levels found at the freshwater sites were so unusually high however, in order to avoid contaminating trace-level instrumentation, these bottles were diverted to an analyzer devoted to "polluted" samples. As a result, o-PO_4 levels were often reported as < 0.2 mg/l, well above levels likely present, rendering the data unusable.

Organics

Samples were collected on five occasions for a full range of organic constituents (229 analytes), including volatile organic compounds (VOCs), semi-volatile compounds (SVOCs), carbamate pesticides, organo-halide pesticides, and herbicides metabolites. On ten other occasions, samples were collected for VOCs only. Compounds detected and their general uses/possible sources are summarized in Table 11. A full listing of organic analytes is included in Appendix III; Appendix IV lists organic positive detects by date and station.

<u>Volatile Organic Compounds</u>

Volatile organic compounds are generally components of various solvents, petroleum fuels, hydraulic fluids, paints, varnishes, cleaning supplies, refrigerants, adhesives, and dry-cleaning agents. During this investigation, 16 different VOCs were detected in the waters of Beaver Dam Creek. Some of the detected compounds potentially have multiple sources, including road runoff, activities at local businesses, boats/marinas, and area septic systems. Others however, are likely contaminants associated with the leachate plume from the Brookhaven landfill. Previous studies concerning the plume have identified a number of VOCs in the leachate and/or groundwater downgradient from the landfill, most notably benzene, toluene, xylene, ethylbenzene, chlorobenzene, naphthalene, and 1,4-dichlorobenzene (Pearsall and Wexler, 1986; Dvirka and Bartilucci, 1990, 2005, 2006a, 2006b; Tonjes and Black, 1993 & 1994; Tonjes, 1995 & 1996; Tonjes and Petrella, 1998-2001; Cashin, 2002 & 2003).

Of the VOCs found during this investigation, many were only detected at marine stations and only on a single day, including benzene, ethylbenzene, trimethylbenzene, naphthalene, tert-amyl-methyl-ether, xylene, and toluene. Their occurrence is likely associated with boats on the creek, either of the two nearby marinas, or runoff from area roads. Because they were only detected once suggests their release in the creek is not a chronic problem.

Table 11. Organic Compounds Detected in Beaver Dam Creek (2002-2006)

Organic Compound	General Use Category	No. Detects / Samples	Min/Max Values	Station With Max Value
Semi-volatile Compounds (SVOCs):				
Acenaphthene	Dye manufacture	1 / 30	<0.2 / 0.24	36
Bisphenol A	Plasticizer	5 / 10	<0.2 / 3.6	38
Carisoprodol	Muscle relaxant	1 / 30	<0.2 / 0.34	31
Diethyltoluamide (DEET)	Insect repellent	21 / 30	<0.2 / 1.4	31
Ibuprofen	Anti-inflamatory, analgesic medication	15 / 25	<0.2 / 1.0	31
Volatile Organic Compounds (VOCs):				
1,1-Dichloroethane	Solvent, degreaser	6 / 119	<0.5 / 0.8	30
1,2,4 -Trimethylbenzene	Gasoline additive, solvent	1 / 119	<0.5 / 3.0	34
1,3,5 -Trimethylbenzene	Solvent, paint thinner, dye manufacture	1 / 119	<0.5 / 0.8	34
1,4 -Dichlorobenzene	Insecticidal fumigant, space deodorizer	18 / 119	<0.5 / 1.4	38
Benzene	Fuel additive, solvent	1/ 119	<0.5 / 0.8	34
Chlorobenzene	Degreaser	7 / 119	<0.5 / 2.8	38
Chlorodifluoromethane	Air conditioner coolants (Freon 22)	1 / 119	<0.5 / 0.5	38
Chloroform	Solvent	2 / 119	<0.5 / 0.7	33
Diethyl ether	Solvent	37 / 119	<0.5 / 3.0	31
Ethylbenzene	Solvent, fuel component	1/ 119	<0.5 / 2.0	34
Methyl sulfide	Produced naturally by marine phytoplankton	15 / 119	<0.5 / 4.0	35
Methyl-Tertiary-Butyl-Ether	Fuel additive	43 / 119	<0.5 / 21.0	34
Naphthalene	Fumigant; used in mothballs	4 / 119	<0.2 / 3.2	37
Tert-Amyl-Methyl-Ether	Fuel additive	1 / 119	<0.5 / 1.0	34
Toluene	Solvent, fuel additive	5 / 119	<0.5 / 8.0	34
Total Xylene	Solvent, fuel additive	6 / 119	<0.5 / 9.0	34

Methyl-tert-butyl-ether (MTBE), a gasoline additive in use since 1995, was the most frequently detected VOC in the creek. The chemical was found in 43 of 119 samples collected (36%), with the majority of detections and the highest levels found in the tidal portion of the creek. Maximum levels found ranged from 2.0 ug/l at station 31 (freshwater), to 21 ug/l at station 34 (tidal). Water quality monitoring done by the SCDHS in tributaries to the Peconic Estuary has found MTBE in 130 of 1,094 samples collected (SCDHS, 2006). Primary sources of MTBE to the creek likely include area boats, marinas, and road runoff, although atmospheric emissions through rain-out have also been reported as a source of MTBE to surface waters (Carlsen et al., 1997).

Diethyl ether, a VOC used as an industrial solvent and a primer for gasoline engines, was the second most common chemical found in Beaver Dam Creek with 37 detects out of 119 samples collected (31%). The compound was found predominantly at freshwater sites south of Montauk Highway (stations 31 & 32), with concentrations ranging from 0.7 – 3.0 ug/l. The highest concentrations were typically found at station 31, and may be associated with runoff from a nearby autobody repair shop. Detects at sites north of Montauk Highway (stations 30 & 38), suggest the landfill may also be a source. A previous study done at a municipal landfill in New Hampshire found diethyl ether in leachate from the landfill and in groundwater downgradient from the site (ATSDR, 1988). In 2007, diethyl ether was detected at station 41 in Little Neck Run at concentrations of 1.9 and 2.1 ug/l, with levels at other sites in Little Neck Run and in Yaphank Creek undetectable.

Chlorobenzene and 1,4-dichlorobenzene, contaminants that were among the most frequently detected VOCs in groundwater downgradient of the Brookhaven landfill (but rarely in Beaver Dam Creek) by previous studies (Pearsall and Wexler, 1986; Dvirka and Bartilucci, 1990, 2005, 2006a, 2006b; Tonjes and Black, 1993 & 1994; Tonjes, 1995 & 1996; Tonjes and Petrella, 1997-2001; Cashin, 2002 & 2003), were also detected during this study at four of the five creek sites. Chlorobenzene is used as a solvent, a degreaser, and in the manufacture of pesticides; 1,4-dichlorobenzene is used as an insecticidal fumigant in mothballs and as a space deodorizer. Potential sources of both VOCs to Beaver Dam Creek include the businesses located along Montauk Highway, as well as the landfill plume. Most of the 1,4-dichlorobenzene detects occurred south of Montauk Highway (at stations 31 & 32), while 5 of the 7 chlorobenzene detects occurred further north at stations 30 & 38. Concentrations of both compounds found were generally low (23 of 25 detects ranged from 0.5 – 0.9 ug/l), with maximum values for both found at station 38 in May 2006 (chlorobenzene - 2.8 ug/l; 1,4-dichlorobenzene – 1.4 ug/l).

Other reported detects of chlorobenzene and 1,4-dichlorobenzene in the surface waters of the creek were limited to samples collected in 2002 and 2003 by consultants to the Town of Brookhaven (Cashin Associates, 2003 & 2004). In these studies, 1,4-dichlorobenzene was found at station BD-2 (station 31) in July and November of 2002 at levels of 1.1 and 6.4 ug/l (Cashin Associates, 2003). The November result (6.4 ug/l) exceeded the surface water guidance value of 5.0 ug/l and coincided with an ammonia result of 16.5 mg/l. In samples collected in 2003, the 1,4-dichlorobenzene was found at stations BD2, BD-3, and BD-4 (31, 30 & 38 of this study) in levels ranging from 0.5 – 2.2 ug/l (Cashin Associates, 2004). The maximum concentration was reported at station BD-4, and coincided with a chlorobenzene level of 3.8 ug/l and an ammonia level of 39.8 mg/l. In referencing the 2002 results, Cashin Associates (2003) noted that contamination from the landfill appeared to have caused the 1,4-dichlorobenzene and ammonia exceedances. As with the elevated ammonia and diethyl ether detects, 1,4-dichlorobenzene was also detected at station 41 in Little Neck Run.

1,1-dichloroethane, used as a solvent, cleaning agent and degreaser, was detected at very low levels (0.6 - 0.8 ug/l) in 6 of 119 samples. Five of the six detects were at station 30; the other at station 38. The compound has also been detected in private wells downgradient from the Brookhaven landfill between 1986 and 1991, but the source of the contamination was not determined (NYSDOH, 2005). Methyl sulfide (dimethyl sulfide), a chemical produced by many marine phytoplankton, was as would be expected, found predominantly at tidal sampling locations (15 of 119 total samples). Other VOCs detected, although found infrequently and at trace levels, included the solvent chloroform at station 33, and the air conditioner coolant chlorodifluoromethane (Freon 22) at station 38.

<u>Semi-Volatile Organic Compounds</u>

The group of semi-volatile organic compounds (SVOCs) analyzed by the Suffolk County PEHL, consists of a variety of chemicals including polyaromatic hydrocarbons (PAHs), phthalate esters, pesticides, pharmaceuticals, and a number of household and industrial compounds. SVOCs found in Beaver Dam Creek include ibuprofen, diethyltoluamide (DEET), bisphenol A, acenaphthene, and carisoprodol.

The insect repellant DEET was the most frequently detected SVOC in the creek, with 30 of 45 samples collected (67%) showing concentrations ranging from 0.2 – 1.3 ug/l. The maximum detected level was found at station 38, closest to the landfill, and at station 41 in Little Neck Run. Sources of DEET in Beaver Dam Creek could include area sanitary systems as well as the landfill plume. In a survey conducted by the United States Geological Survey (USGS) in 139 streams considered to be susceptible to contamination (i.e., those downstream from urban areas and/or sites of livestock production), DEET was one of the most frequently detected compounds (Kolpin, et al., 2002). Other studies conducted by the USGS at landfills in Oklahoma and Minnesota (Barnes et al. 2004; Lee et al. 2004), have identified DEET as a frequent contaminant in the landfill leachate. In comparison to Beaver Dam Creek, monitoring done by the SCDHS in numerous tributaries to the Peconic Estuary has found DEET in only one of 342 samples collected (SCDHS, 2006c).

Ibuprofen, a non-prescription anti-inflammatory medication, was found in 15 of 25 organic samples collected (2003-2006) in concentrations ranging from 0.2 – 1.9 ug/l. Most detects were at freshwater stations (14 of 17 samples collected) with a single detect at station 34 in the tidal portion of the creek. Due to laboratory restrictions, Ibuprofen was not sampled for in 2007. In comparison, water quality monitoring done by the SCDHS in tributaries to the Peconic Estuary has found only two ibuprofen detects in 376 samples collected (SCDHS, 2006c).

The occurrence of ibuprofen and other commonly used pharmaceuticals (i.e., acetaminophen, cotinine, caffeine, etc.) in aquatic environments has often been associated with wastewater contamination (Kanda et al., 2003; Kolpin et al., 2002; Stumpf et al., 1999; Ternes, 1998). A number of studies done in Europe and the United States however, have identified pharmaceuticals in streams and groundwater contaminated by leachate from municipal landfills (Ahel et al., 1998; Holm et al., 1995; Schwarzbauer et al., 2002; Lee et al., 2004). Bound and Voulvoulis (2005), reported that the predominant method for disposal of unwanted pharmaceuticals in the United Kingdom, including ibuprofen, was in household wastes, and that their transport to aquatic systems via landfill leachate was a pathway for contamination currently underestimated in the literature.

Bisphenol-A (BPA), an industrial chemical used to make polycarbonate plastics and epoxy resins that has received considerable attention in recent years as a suspected endocrine disruptor, was found in 5 of 10 samples collected in 2006. In prior years, samples for the analysis of bisphenol-A weren't collected. All detects in 2006 were at the three northernmost sampling sites (stations 30, 31, & 38), with the highest concentration found at station 38 (3.6 ug/l). In 2007, bisphenol-A was also detected at Beaver Dam Creek stations 30 and 31, as well as station 41 in Little Neck Run. As with other organics detected in Beaver Dam Creek, BPA could have multiple sources. Other studies have identified the compound in municipal wastewater (Lee and Peart, 2000; Rudel et al., 1998), in streams associated with urban areas (Kolpin et al., 2002), and in leachate from municipal landfills (Eggen et al., 2003; Yamamoto et al., 2001).

Other SVOCs detected in Beaver Dam Creek include the polycyclic aromatic hydrocarbon (PAH) acenaphthene and the muscle relaxant carisoprodol. Acenaphthene, which results from the burning of diesel fuel and the leaching of creosoted pilings, was detected in a single sample collected at station 36. Its presence at this site is not inconsistent with the characteristics of the surrounding watershed, which includes bulkheaded canals with associated boats, some of which may be diesel powered. Carisoprodol was only found in a single sample collected at station 31. The lack of detects further north suggests a source in the vicinity of that station, likely to be septic system leachate.

Metals

During the 2002-2006 sampling period, a total of 72 samples were collected at freshwater stations for analysis of dissolved metals. Sampling was not attempted at tidal sites because of a salt interference inherent in the analytical procedure used. Metal analytes included the typical trace metals: aluminum, antimony, arsenic, cadmium, chromium, cobalt, copper, lead, manganese, mercury, molybdenum, nickel, selenium, silver, thallium, titanium, vanadium, and zinc; as well as a number of typical mineral and earth metals including barium, beryllium, calcium, magnesium, potassium and sodium. Appendix V includes a listing of all metal results. Result statistics (mean, maximum and minimum values, standard deviation, and N of cases) are included in Table 12.

With the exception of iron and zinc, and to a lesser extent, aluminum and lead, metal concentrations in Beaver Dam Creek were generally below NYSDEC standards for Class C waters (Table 13). Levels of cadmium, copper, cobalt, and nickel were occasionally elevated above criteria, and concentrations of manganese, for which there is no applicable standard for class C waters, were frequently elevated above standards for groundwater (Class GA) and other freshwaters (Class A & AA).

Average iron concentrations ranged from 0.15 mg/l at station 33 to 0.56 mg/l at station 30. The average value at station 38 was 5.08 mg/l, but only included five samples compared to seventeen for the other locations. Because of soil characteristics on Long Island, levels of iron in groundwater fed streams are often detected above standards (0.3 mg/l). Twenty-seven of the 72 samples collected in Beaver Dam Creek (38%) exceeded this level. Maximum values found ranged from 0.42 mg/l at station 33 to 21.1 mg/l at station 38. Both the maximum and the average iron levels found increased in a northerly direction in the creek.

Beaver Dam Creek Station 38 – note the iron stained sediments

Manganese is also an element often found in concentrations above standards (0.3 mg/l for Class GA) in Long Island groundwater and in groundwater fed streams. Of the 72 samples analyzed for manganese (2003-2006), only one result was lower than the groundwater criteria. Manganese levels were unusually elevated at the three northernmost sites, averaging from 3.20 mg/l at station 38 to 5.22 mg/l at station 30, where a maximum level of 9.9 mg/l was also recorded. At station 41 in Little Neck Run, manganese levels were similarly elevated, with the two samples collected in 2007 averaging 4.5 mg/l. In comparison, manganese levels at the other Little Neck Run and Yaphank Creek stations sampled ranged from 0.03 - 0.46 mg/l.

Levels of zinc were frequently found below reportable limits, with results for 42 of the 72 samples collected noted < 50 ug/l. Of the 28 samples where zinc levels were reportable however, 24 were above acceptable criteria. The standard for zinc in Class C waters is calculated from the hardness, a relative measure of calcium and magnesium levels, and during this study varied from 17 – 212 ug/l. The highest level of zinc was found at station 31 (384 ug/l).

Table 12. Descriptive Statistics for Metal Results (Fresh Water Stations)

Station	Statistic	Aluminum (ug/l)	Antimony (ug/l)	Arsenic (ug/l)	Barium (ug/l)	Beryllium (ug/l)	Cadmium (ug/l)	Calcium (mg/l)	Chromium (ug/l)	Cobalt (ug/l)	Copper (ug/l)	Iron (mg/l)	Lead (ug/l)	Magnesium (mg/l)	Manganese (mg/l)	Mercury (ug/l)	Molybdenum (ug/l)	Nickel (ug/l)	Potassium (mg/l)	Selenium (ug/l)	Silver (ug/l)	Sodium (mg/l)	Thallium (ug/l)	Thorium (ug/l)	Titanium (ug/l)	Uranium (ug/l)	Vanadium (ug/l)	Zinc (ug/l)
30	Mean	56.1	< 1	< 2	102.3	< 1	< 1	10.1	1.86	2.05	1.51	0.56	< 1	4.80	5.22	< 0.4	< 1	6.00	17.3	< 2	< 5	33.9	< .5	< 4	0.77	< 1	< 1	51.7
	Max	130	3.95	< 2	143.9	< 1	1.71	18.5	9.10	4.10	6.40	1.61	1.50	7.69	9.91	< 0.4	1.20	17.1	29.3	< 4	< 5	52.7	0.74	< 4	1.90	< 1	2.90	186
	Min	21.6	< 1	< 2	56.1	< 1	< 1	3.6	< 1	< 1	< 1	< 0.1	< 1	1.84	1.98	< 0.4	< 1	< 1	2.92	< 2	< 5	8.4	< .5	< 4	< 1	< 1	< 1	< 50
	SD	33.5	0.84	0	28.6	0	0.29	4.8	2.13	1.38	1.49	0.49	0.34	1.83	2.75	0	0.17	3.98	9.61	0	0	15.8	0.15	0	0.51	0	0.61	48.6
	N	17	17	17	17	17	17	17	17	17	17	17	17	17	16	17	17	17	17	17	17	17	16	17	17	17	16	17
31	Mean	68.2	< 1	< 2	117.2	< 1	< 1	16.9	2.75	3.09	1.39	0.35	1.00	7.13	4.37	< 0.4	< 1	7.51	16.2	< 2	< 5	45.9	< .5	< 4	0.93	< 1	< 1	85.9
	Max	237	< 1	< 2	206.0	< 1	1.58	27.1	11.5	4.64	3.00	0.95	3.76	9.50	7.90	< 0.4	< 1	21.1	25.0	< 4	< 5	159.0	0.76	< 4	4.36	< 1	1.60	384
	Min	16.1	< 1	< 2	58.8	< 1	< 1	12.1	< 1	1.45	< 1	< 0.1	< 1	3.89	0.55	< 0.4	< 1	4.21	10.7	< 2	< 5	27.5	< .5	< 4	< 1	< 1	< 1	< 50
	SD	61.7	0	0	33.3	0	0.27	4.1	2.59	0.96	0.78	0.27	0.97	1.40	2.09	0	0	3.91	4.40	0	0	29.9	0.13	0	1.00	0	0.37	101
	N	16	16	16	16	16	16	17	16	16	16	17	16	17	14	16	16	16	17	16	16	17	15	16	16	16	16	16
32	Mean	47.2	< 1	< 2	75.1	< 1	< 1	13.6	2.02	1.60	< 1	0.30	1.03	5.72	2.38	< 0.4	< 1	5.18	8.26	< 2	< 5	27.3	< .5	< 4	0.83	< 1	< 1	< 50
	Max	172	< 1	2.10	122.0	< 1	< 1	21.8	7.35	2.47	2.80	0.78	2.80	7.10	4.53	< 0.4	< 1	18.3	15.3	< 4	< 5	39.1	0.84	< 4	1.90	< 1	1.42	171
	Min	13.6	< 1	< 2	52.0	< 1	< 1	10.7	< 1	< 1	< 1	0.15	< 1	4.08	1.22	< 0.4	< 1	3.16	4.35	< 2	< 5	18.5	< .5	< 4	< 1	< 1	< 1	< 50
	SD	41.9	0	0.27	14.6	0	0	2.9	1.79	0.54	0.72	0.14	0.76	0.72	0.90	0	0	3.64	2.90	0	0	5.6	0.14	0	0.54	< 1	0.27	39.1
	N	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
33	Mean	55.7	< 1	< 2	40.7	< 1	< 1	14.0	1.13	< 1	< 1	0.15	< 1	16.9	0.65	< 0.4	< 1	2.21	10.5	< 2	< 5	133.8	< .5	< 4	1.51	< 1	< 1	81.1
	Max	156	< 1	< 2	64.4	< 1	< 1	28.7	2.60	1.00	2.50	0.42	4.00	56.0	1.26	0.44	< 1	3.94	30.7	< 4	< 5	459.0	< .5	< 4	4.59	< 1	1.20	321
	Min	14.5	< 1	< 2	17.0	< 1	< 1	7.8	< 1	< 1	< 1	< 0.1	< 1	3.74	0.17	< 0.4	< 1	1.30	2.82	< 2	< 5	22.4	< .5	< 4	< 1	< 1	< 1	< 50
	SD	42.1	0	0	12.4	0	0	5.2	0.69	0.13	0.67	0.10	0.89	13.3	0.29	0.06	0	0.72	7.09	0	0	112.7	0	0	1.21	0	0.18	79.1
	N	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
38	Mean	29.7	< 1	< 2	82.5	< 1	< 1	12.8	1.35	3.41	< 1	5.08	< 1	5.06	3.20	< 0.4	< 1	3.61	11.9	< 4	< 5	22.5	< .5	< 4	0.74	< 1	< 1	< 50
	Max	38.2	< 1	2.04	215.0	< 1	< 1	35.2	4.74	11.8	< 1	21.1	2.01	14.3	7.45	< 0.4	< 1	11.9	39.9	< 4	< 5	55.9	< .5	< 4	1.10	< 1	1.39	52.1
	Min	24.2	< 1	< 2	30.8	< 1	< 1	3.3	< 1	< 1	< 1	0.20	< 1	1.85	0.96	< 0.4	< 1	< 1	2.32	< 4	< 5	7.3	< .5	< 4	< 1	< 1	< 1	< 50
	SD	5.2	0	0.47	76.2	0	0	14.0	1.90	4.90	0	9.06	0.68	5.34	2.75	0	0	4.79	16.2	0	0	20.6	0	0	0.32	0	0.40	12.1
	N	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

Table 13. Exceedances of NYSDEC Class "C" Water Quality Standards for Metals											
Metal Compound	**Class "C" Freshwater Standard**	**No. of Standard Exceedances By Station**					**Maximum Concentrations (ug/l)**				
		38	**30**	**31**	**32**	**33**	**38**	**30**	**31**	**32**	**33**
Aluminum	100 ug/l	0	2	3	2	2	38.2	130	237	172	156
Cadmium	Variable [1] (0.49 – 4.9 ug/l)	0	1	1	0	0	< 1	1.71	1.58	< 1	< 1
Cobalt	5 ug/l	1	0	0	0	0	11.8	4.1	4.64	2.47	1.0
Copper	Variable [1] (1.85 – 23 ug/l)	0	1	0	0	0	< 1	6.40	3.0	2.8	2.5
Iron	300 ug/l	3	10	8	5	1	21,100	1,610	950	780	420
Lead	Variable [1] (0.49 – 12.3 ug/l)	0	0	2	2	1	2.01	1.5	3.76	2.8	4.0
Manganese	300 ug/l [2]	5	16	14	17	15	7,450	9,910	7,900	4,530	1,260
Nickel	Variable [1] (10.9 – 132 ug/l)	0	1	0	0	0	11.9	17.1	21.1	18.3	3.94
Zinc	Variable [1] (17 – 212 ug/l)	0	6	7	6	5	52	186	384	171	321

[1] Magnitude of standard criteria varies with sample hardness
[2] Manganese standard listed is for Class "GA" groundwater and Class "A" & "AA" Freshwaters

Aluminum concentrations were noted above the 100 ug/l standard on 9 occasions, with levels ranging from 103 - 237 ug/l. Average aluminum levels were similar at most sites sampled, ranging from 47.2 ug/l at station 32 to 68.2 ug/l at station 31. The five samples collected at station 38 averaged 29.7 ug/l.

Lead concentrations were also frequently found below the minimum reportable limit. Results for 51 of 72 samples were reported as < 1 ug/l. Of the 21 reportable results, 5 were above the Class C lead standard with concentrations ranging from 2.20 – 3.76 ug/l. The lead standard is also calculated from the hardness, and varied during this study from 0.49 – 12.3 ug/l. Other exceedances of Class C standard criteria included cadmium on two occasions, and cobalt, copper, and nickel each on one occasion (Table 13).

Discussion

Results of water quality monitoring done in Beaver Dam Creek from November 2002 to January 2008, depict a water body periodically impacted by low levels of dissolved oxygen, potential pathogen contamination from stormwater discharges and possibly local sanitary systems, and by multiple contaminants (particularly ammonia, manganese, iron, chlorides, the volatile organic compounds chlorobenzene, 1,4-dichlorobenzene and diethyl ether, and the plasticizer bisphenol-A) that are likely associated with a leachate plume emanating from the Town of Brookhaven sanitary landfill. Limited sampling done in 2007-2008 in Little Neck Run, a tributary to the Carmans River located east of Beaver Dam Creek and downgradient of the landfill (Figure 1), also revealed elevated levels of contaminants likely associated with the leachate plume.

The Brookhaven landfill, located on the north side of Sunrise Highway approximately 0.5 miles northwest of Beaver Dam Creek (Figure 14), has periodically been implicated as a source of contamination to the creek. The landfill was used for the disposal of municipal solid wastes from 1974 to 1995. A leachate plume emanating from the landfill has been known to exist since the late 1970s. As a remediation measure designed to stop the generation of leachate, the Town closed and capped Cells 1-3 (those considered most likely to be leaking) in 1993, followed by Cell 4 in 1997. Town-sponsored investigations characterizing the leachate plume and its effects on area groundwater have been conducted since 1982, with sampling of the waters of nearby Beaver Dam Creek conducted on almost an annual basis since 1991. A review of significant findings of these and other studies, particularly as they pertain to Beaver Dam Creek, follows.

Initial monitoring to determine the extent of groundwater contamination was conducted by the USGS and reported on in five subsequent publications (Pearsall and Wexler, 1986; Mack and Maus, 1986; Wexler and Maus, 1988; Wexler, 1988a; Wexler, 1988b). The studies found elevated levels of several inorganic compounds in wells downgradient of the landfill, including sodium, potassium, calcium, magnesium, ammonia, bicarbonate, chloride, iron, and manganese, and of various volatile organic compounds (VOCs), indicating that leachate had entered the aquifer. Wexler (1988a) noted that although elevated chloride levels may be related to sources other than the landfill, the presence of ammonia in groundwater in Long Island is unusual and is considered to be a reliable indicator of contamination by landfill leachate. It was theorized that leachate was escaping through leaks and/or seams in the landfill liner, or was overflowing the top of the liner (termed the bathtub effect). Wexler (1988a) indicated that the leachate plume extended in a southeastward direction from the landfill, and was 3,700 feet long, 2,400 feet wide, and at least 90 feet thick. Based on limited sampling done in 1982 (one sample) however, the study concluded that the plume did not appear to have contaminated the waters of Beaver Dam Creek.

Following the USGS work, a series of assessments that included monitoring of contaminants in the leachate, groundwater, and to a limited extent, Beaver Dam Creek, were conducted from 1989 through 1993 by consultants to the Town of Brookhaven. Findings discussed in reports of these investigations (Dvirka and Bartilucci, 1990a; Dvirka and Bartilucci, 1990b; Dvirka and Bartilucci, 1992; Tonjes and Black, 1993; Tonjes and Black, 1994) included the following:

Figure 14. Brookhaven Landfill Showing Locations of Cells 1 through 5 and South Perimeter Monitoring Wells (73758, 73759, 73761 & 73763)

- The plume continued to grow downgradient of the landfill, moving at an estimated rate of one foot per day in a southeasterly direction, and had reached (or was approaching) Montauk Highway. The plume had expanded to the west, suggesting that Cell #1 in addition to Cell #2 was then leaking, and covered the entire southern border of the landfill.
- Some contamination was detected in Beaver Dam Creek, mainly that of ammonia and manganese. Dvirka and Bartilucci (1990b) reported that the water quality of the creek downgradient of the landfill had been impacted by the leachate, but added that other sources of contamination (stormwater runoff) may also be factors.

Subsequent operational and post closure monitoring reports for Cells 1-4, describing results for sampling done from 1997 through 2004 (Tonjes and Petrella, 1998; Tonjes and Petrella, 1999; Tonjes and Petrella, 2000; Tonjes and Petrella, 2001; Cashin Associates, 2003; Cashin Associates, 2004), continued to document impacts to Beaver Dam Creek from the landfill leachate plume:

- The 1998 Post Closure Monitoring Report (Tonjes and Petrella, 1999) indicated that the creek exhibited a "strong leachate signature", possibly due to the high groundwater table that resulted from heavy rains and greater discharges from the aquifer to the creek. The report also noted that Beaver Dam Creek had lower dissolved oxygen and higher manganese, iron, and ammonia levels than a control site in the Forge River.
- The 2003 monitoring report (Cashin Associates, 2004) noted exceedances of NYS criteria for ammonia at stations BD-2 (station 31 in this study), BD-3 (station 30), and BD-4 (station 38). The leachate indicator chemicals benzene, chlorobenzene, and 1, 4-dichlorobenzene were also detected at station BD-4.
- Data collected in 2004 showed exceedances of the C(TS) surface water criteria for ammonia, iron, lead, and manganese, leading to the reported conclusion that "releases from the landfill cause groundwater and surface waters downgradient of the landfill to fail to meet standards set by New York State" (Cashin Associates, 2005).
- Also noteworthy in these reports was the observation that following capping of Cells 1 – 3 (completed in 1993), levels of contaminants in wells along the southern perimeter of the landfill began to decline precipitously. This was taken as evidence of the effectiveness of capping as a remediation measure to mitigate downgradient contamination from the landfill.

A Draft Environmental Impact Statement (DEIS) prepared for a proposed expansion of the landfill (EMCON/OWT, 2001) discussed results of monitoring done in July 2000 at three locations in Beaver Dam Creek (stations BD-2 through BD-4). Ammonia levels cited in the DEIS were well over NYSDEC surface water standards, likely indicating that the leachate plume was entering the creek. **However, because of apparent confusion over parameter units used in the NYSDEC standards (the criteria value for ammonia is given in ug/l; the DEIS applied the criteria as if it were in mg/l), the report incorrectly indicated that ammonia results were within acceptable limits. Results for all three samples actually exceeded the NYSDEC criteria, with two being more than 500 times greater than the acceptable limit. In the Final Environmental Impact Statement for the landfill expansion (EMCON/OWT, 2002), the mistake went undetected and the document concluded that the water quality of Beaver Dam Creek had not been impaired by the plume.**

In recent studies conducted for the Town of Brookhaven by Dvirka and Bartilucci (2005, 2006a, 2006b), stations BD-2 to BD-4 (corresponding to stations 31, 30 & 38 in this study) and a control site in the Forge River were each sampled for leachate indicator parameters, metals, and VOCs. For samples collected in 2005, levels of various metal constituents and leachate indicator parameters found at station BD-2 (Trout Ponds Court) and BD-3 (located north and west of Montauk Highway) were elevated relative to the Forge River control site, while levels at BD-4 (closest to the landfill) were found to be similar to concentrations found at the control site. In samples collected in May 2006 however, concentrations of a number of parameters (most notably calcium, cobalt, iron, magnesium, manganese, nickel, potassium, selenium, sodium, ammonia, and total Kjeldahl nitrogen) increased significantly over levels noted in 2005 in the creek, as well as in relation to concentrations noted at the Forge River control site. Ammonia concentrations reported for stations BD-3 and BD-4 increased from values of 0.7 & 1.0 mg/l in May 2005 to 17.4 & 5.2 mg/l in May 2006. The SCDHS sampling results exhibited a similar trend at the same two stations (30 & 38), with ammonia levels increasing from 1.6 & 0.4 mg/l in January 2005 to 24.0 & 40.6 mg/l in May 2006. The increase in groundwater elevation that occurred during this period (Figure 13) likely resulted in an increased level of discharge to the creek and was responsible for the coincident increase in levels of plume contaminants noted. The report for that year (Dvirka and Bartilucci, 2006b) however, concluded that the elevated contaminant levels observed were likely due to sources other than the landfill.

***Dissolved Oxygen*:**

In addition to periodic impacts from chemical contaminants, hypoxic conditions within the landfill leachate plume also apparently impact levels of dissolved oxygen in the upper reaches of Beaver Dam Creek. Biochemical processes occurring within the landfill and the leachate plume, principally the bacterial decomposition of organic matter, act to consume the supply of dissolved oxygen and create strongly reducing conditions (Pearsall and Aufderheide, 1995). As a local discharge point for the upper glacial aquifer, levels of dissolved oxygen in Beaver Dam Creek reflect those in groundwater, and can therefore be expected to fluctuate with variations in the height of the water table and the degree of recharge, as well as with changing temperature, water depth, and stream flow.

During this study, concentrations of dissolved oxygen at the four northernmost freshwater sites (stations 38 & 30 - 32) averaged from 5.2 – 5.6 mg/l, and were less than the 7.0 mg/l standard for trout spawning waters (Class C-TS) in 80% of measurements taken (63 of 79). Monitoring data collected in the same time period as this study (2003) from wells downgradient of the landfill, also suggest a connection between oxygen levels in leachate affected groundwater and those in receiving waters of the creek. In a report of this work, Cashin Associates (2004) noted levels of dissolved oxygen in deep and shallow wells along the southeast perimeter of the landfill (well Nos. 73758 & 73759) in the 2.3 – 2.9 mg/l range. At the same time (within days) measurements of dissolved oxygen in a well upgradient to the landfill (No. 72816) showed levels >10 mg/l. Oxygen levels in Beaver Dam Creek were also monitored during the Cashin study and reported in the 3.9 – 7.2 mg/l range, while those done concurrently in the upper reaches of the Forge River (used as a control site) ranged from 9.2 - 9.7 mg/l.

Concentrations of dissolved oxygen in the tidal reaches of the creek, particularly those measured during the warmer summer months in near-bottom waters, were also at levels below acceptable criteria (3.0 mg/l) on a number of occasions. The lowest average dissolved oxygen and the greatest number of criteria violations among tidal stations occurred at the northernmost sampling site (station 34), located just south of the Beaverdam Marina boat basin (Figure 1). Because the average dissolved oxygen level at this site was lower than that of station 33 immediately to the north, and considerably lower than tidal sites further south (Figure 7), suggests that a localized phenomenon may be involved. Oxygen levels in the tidal portion of the creek are affected by influent levels from waters to the north as well as local processes, including the degree of tidal flushing, nutrient inputs, algal growth, and diel (day-night) variations in plant productivity. Sediment oxygen demand and possibly summer stratification may also be factors involved. A study done by the Long Island Regional Planning Board (LIRPB, 1990) similarly reported that bottom waters rapidly became hypoxic with the onset of thermal stratification in the spring, and in the northern tidal reaches of the creek were anoxic in July and August.

Considering the distance from station 34 to Bellport Bay, tidal flushing is likely minimal and probably a factor contributing to the periodic decline in oxygen levels noted. Nutrient inputs from the nearby marina (subsequent to this study, three housebarges moored in the marina were found to be actively discharging untreated wastes) and from nitrogen (ammonia) enriched waters to the north, may be supporting localized algal blooms which act to lower oxygen levels through nighttime respiration and eventual cellular decomposition. Unfortunately, sufficient resources were not available during this study to assess either phytoplankton populations or levels of plant chlorophyll-a. Samples collected during the LIRPB (1990) study however, found chlorophyll-a levels exceeding 365 ug/l at station 34 (LIRPB station B5) in July and at station 35 (LIRPB station B6) in August. These unusually high levels of phytoplankton biomass likely reflect nutrient-enriched, eutrophic conditions in the creek were probably a contributing factor in the depressed oxygen levels noted in bottom waters during that study.

Coliform Bacteria:

Coliform levels noted during this study were persistently elevated throughout Beaver Dam Creek, often exceeding established water quality standards. In the freshwater section of the creek, average coliform concentrations increased steadily in a downstream direction, likely reflecting influences from stormwater discharge sites and potentially from sanitary system leachate. This may be particularly true in the area between Beaverdam Road and Montauk Highway where land use is predominantly low to medium density residential (Verbarg, 2003) and the creek flows adjacent to and under a number of roadways and in many cases through developed neighborhoods.

In an effort to locate potential sources of the coliform levels observed, sanitary surveys were conducted throughout this area and dye-tests of a number of homes and businesses performed. An illegal discharge pipe was found just north of Station 32 and, while it may have added to the elevated coliform values at the downstream stations, it is not possible to determine to what degree. The pipe has since been removed. The apparent lack of other sources of bacterial contamination however, further suggests the significance of stormwater runoff as a source of coliforms to the creek.

A number of stormwater discharge locations that potentially introduce pathogens to Beaver Dam Creek were previously identified in a stormwater discharge inventory conducted for the Town of Brookhaven (Voorhis & Associates, 1996) and a subsequent watershed analysis conducted by the Suffolk County Soil and Water Conservation District (McMahon, 2002). Of the twelve sites identified in the watershed analysis, three were of immediate concern: the farm on the west side of the creek (overland flow); the Bellhaven community on the southwest side of the creek (five discharge points); and a site on the northside of the railroad tracks that receives flow from Montauk Highway (Figure 2).

An association between stormwater and coliform levels was clearly evident from results of wet-weather sampling events conducted in the creek. For rainfall amounts in the 24-hour period prior to sampling vs. total coliform levels, correlation coefficients at stations 30 through 35 ranged from 0.68 to 0.75 (Table 7), indicating a fairly strong relationship. Coefficients for fecal coliforms at stations 30 to 34 were similar although somewhat higher, ranging from 0.73 to 0.85.

Illegal discharges from the marina located on the west side of the creek may also have been a source of coliforms and possibly more pathogenic bacteria. Although the discharges associated with the housebarges have apparently been removed, additional sampling has periodically shown elevated coliform levels in waters in that vicinity. Further investigations in this area are ongoing.

Chloride:

Typical chloride levels in streams on Long Island vary widely, and are a reflection of land use and density, and of impacts from sources such as road runoff and septic wastes. Average levels found in Beaver Dam Creek were similar to those found in streams adjacent to developed areas in the southwestern portion of the county (Lindenhurst to Bayshore, 25-56 mg/l), but significantly higher than average levels found in the freshwater reaches of the nearby Carmans River (15 mg/l) and the Forge River (6-11 mg/l) to the east (SCDHS, 2006b).

Although chloride is generally considered a conservative solute (meaning its concentration is not affected by chemical processes), contamination from other sources such as road salt and septic systems affect its usefulness as a tracer of leachate contamination (Wexler, 1988a). This is particularly true at station 31, located just south of Montauk Highway and west of South Country Road, where the highest average chloride levels have been noted. It seems less likely that this would be the case at sites further north (stations 30 & 38) however, which are more removed from area roadways and considering the direction of groundwater flow, probably not impacted by septic systems. It is not clear however, the degree to which runoff from Sunrise Highway can impact these sites.

In a study of groundwater quality in the area of the Brookhaven Landfill, Pearsall and Aufderheide (1995) reported that chloride concentrations ranged from 10 mg/l in upgradient wells to 450 mg/l at the southern boundary of the landfill, and decreased downgradient from that point. They concluded that the primary source of chloride in the study area was the landfill leachate, but that road salt and cesspool discharges could increase chloride concentrations in downgradient residential areas.

Nutrients:

A significant feature of nutrient results was the periodic detection of unusually high levels of ammonia in the upper freshwater portion of the creek, some in the 20-40 mg/l range, and their likely association with the leachate plume from the Brookhaven landfill. Elevated ammonia levels found recently in nearby Little Neck Run, indicate the plume has advanced at least to that point and will likely continue to move in a southeasterly direction towards the Carmans River.

On average, the concentrations found in Beaver Dam Creek were considerably higher than has been detected in other tributaries to Great South Bay (Table 9), many of which are located in densely populated areas where additions from septic systems, and thus potentially elevated ammonia levels, might be expected. The Beaver Dam Creek nitrogen values are also unusually high when compared to the total nitrogen values reported by Monti & Scorca (2003) for 13 Suffolk County streams entering the South Shore Estuary Reserve. They found that long-term (1971-1997) median concentrations of total nitrogen generally declined from west to east, and ranged from a high of 4.4 mg/l in Santapogue Creek in Lindenhurst, to 1.25 mg/l in the Carmans River.

Numerous investigations conducted by consultants to the Town of Brookhaven have also identified elevated levels of ammonia (and other contaminants) in Beaver Dam Creek. Many of these studies acknowledge that the ammonia levels are likely associated with the plume; some suggest a possible relationship with other contaminant sources such as septic leachate from homes and businesses downgradient from the landfill.

Also indicative of effects from the leachate impacted groundwater, was the finding of concentrations of nitrite+nitrate in the freshwater reaches of the creek that were frequently insignificant compared to ammonia levels, and on average lower than levels found in other area tributaries (Table 9). Pearsall and Wexler (1986) found concentrations of nitrate in area wells that were lower than those in native groundwater, and concluded that all nitrogenous compounds were likely being converted to ammonia and elemental nitrogen in the anoxic, reducing conditions of the plume. Similarly, in their discussion of nitrogen levels in the anoxic environment of the leachate contaminated groundwater, Pearsall and Aufderheide (1995) indicated that ammonification (the conversion of organic nitrogen to ammonia) and denitrification (the reduction of nitrate to ammonia and nitrogen) were dominant processes, and that nitrification (the conversion of ammonia to nitrite and nitrate) did not occur.

Despite the high concentrations of ammonia noted in the upper reaches of the creek however, results show that levels were significantly attenuated by the time they reached Great South Bay. From station 32 (South Country Road) south to station 33 (Beaverdam Road), average ammonia concentrations declined precipitously from 7.4 to 1.9 mg/l, and although they increase slightly further south to station 34 (possibly due to former discharges from housebarges moored at a nearby marina), levels continue to decline downstream to a level of 0.031 mg/l in Bellport Bay. As indicated in Table 10, this concentration is somewhat higher than average ammonia levels found in similar areas of eastern Great South Bay (~0.020 mg/l), but lower than that found in western Great South Bay (0.055 mg/l).

The downstream decline in ammonia levels can probably be attributed to uptake by bacteria and algae as well as to dilution and nitrification processes. Denitrification isn't likely to occur within the creek since the waters are oxygenated, but may be a factor in sediments. The unusually high chlorophyll levels noted in the tidal portion of the creek by the LIRPB (1990) study is an indication that the nutrients were being incorporated into plant biomass.

Other than effects typically associated with elevated nitrogen levels (i.e., eutrophication, algal blooms, hypoxia), ammonia concentrations in the ranges seen in Beaver Dam

Creek, likely to have been occurring periodically for the past 10-15 years, may have additional long-term impacts on the creek's ecology and may even be toxic. The toxicity of ammonia to aquatic organisms is well documented. As defined by EPA criteria (1999) however, levels considered toxic are difficult to determine since they vary with pH, temperature, and whether salmonids or "early life stage" organisms are present, and are based on the concentration of total ammonia. Total ammonia is the sum of the ionized (NH_4^+ or ammonium) and the unionized (NH_3) forms. Unionized ammonia is the more toxic of the two forms, and was the fraction measured during this investigation.

Results from numerous studies done on the effects of unionized ammonia on a variety of aquatic organisms suggest that the high levels found in Beaver Dam Creek are likely acutely toxic, and lower levels possibly chronically toxic, to many species. In bioassays done using freshwater fish, including rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*), and fathead minnows (*Pimephales promelas*), acute toxic levels of ammonia at various levels of pH and temperature were reported in the 0.16 - 3.4 mg/l range (Calamari et al., 1977; Calamari et al., 1981; Thurston and Russo, 1983; Thurston et al., 1981; Thurston et al., 1983; Thurston et al., 1984a; Reinbold and Pescitelli, 1982; West, 1985). Acute toxic ammonia levels for freshwater mollusks, including pond snails (*Physa gyrina*) and fingernail clams (*Musculium transversum*) have ranged from 0.93 – 2.49 mg/l (West, 1985); while those for amphipods (*Crangonyx pseudogracilis*), mayflies (*Ephemerella grandis*), and water fleas (*Daphnia magna*) have been reported in the 0.53 – 5.88 mg/l range (West, 1985; Thurston et al., 1984b). The four northernmost stations in the creek averaged from 7.4 – 15.8 mg/l ammonia, with levels > 20 mg/l frequently noted.

Despite the potential for toxicity posed by documented levels of ammonia in the creek, a survey conducted by the Fisheries Bureau of the NYSDEC in 1996 documented a viable native brook trout population existing at a location just downstream of South Country Road, approximately the same location as station 32 of this study (C. Guthrie, pers. comm., 2-Jan-07).

A subsequent survey of macroinvertebrates in the same area, conducted in 2003 by the Stream Biomonitoring Unit of the NYSDEC, however, found a low level of biodiversity (poor species richness) characteristic of poor water quality. Based on the dominant species found (facultative midges and tolerant sow bugs), the study concluded that the creek in that area was probably impacted by decomposable wastes (R. Bode, pers. comm., 2-Jan-07). Because the land use immediately upstream from this location is primarily low to medium density residential, with a number of homes and some businesses located adjacent to the creek, the source(s) of "decomposable wastes" may include area septic systems as well as the leachate impacted groundwater.

Organics:

Of the 229 organic constituents that were tested for, only sixteen volatile organic compounds (VOCs) and five semi-volatile organic compounds (SVOCs) were detected in the creek. Both groups have multiple potential sources in the Beaver Dam Creek area, including road and land runoff, septic systems, boat discharges, point source spills/dumping, and the leachate plume from the Brookhaven landfill.

The VOC methyl-tert-butyl-ether (MTBE), a gasoline additive, was the most frequently detected organic compound in the creek. The highest concentrations and the majority of MTBE detections (as well as those of a number of other VOCs that are also common constituents in gasoline such as toluene, xylene, and benzene) were in the marine portion of the creek, suggesting their occurrence was primarily associated with exhaust residues from boats. Other potential sources of MTBE to both fresh and marine surface waters include runoff from area roads and atmospheric emissions through rain-out (Carlsen et al., 1997).

The solvent diethyl ether was the second most frequently detected organic compound and VOC in the creek, with levels also found at both fresh and marine sites. The highest concentrations and most detects occurred at station 31 (Trout Ponds Court), suggesting that upstream commercial establishments located along Montauk Highway, in addition to the landfill leachate plume, may be possible sources. Other commonly detected VOCs in the creek, including chlorobenzene and 1,4-dichlorobenzene, were predominantly found at the three northernmost stations, with highest concentrations found at the two sites closest to the landfill (stations 30 & 38). Sampling done in 2007, detected both diethyl ether and 1,4-dichlorobenzene at a site in Little Neck Run (station 41), located downgradient of the landfill. Previous studies identified chlorobenzene and 1,4-dichlorobenzene as frequent contaminants in wells downgradient of the landfill, but rarely found reportable levels in Beaver Dam Creek. Exceptions included samples collected in 2002 at station BD-2, when levels of 1,4-dichlorobenzene that exceeded guidance values (0.5 ug/l) were noted (Cashin Associates, 2003), and in 2003 at station BD-4 when levels of both compounds were detected (Cashin Associates, 2004).

The most commonly detected SVOCs, found in 60-70% of samples collected, were the insect repellant diethyltoluamide (DEET) and the analgesic ibuprofen. Both were detected throughout much of the freshwaters reaches of the creek and at the northernmost tidal station. Bisphenol-A (BPA), an industrial chemical (and known endocrine disrupter) used to make plastics and resins that are found in a wide variety of consumer products, was detected at the three northernmost stations in 5 of 6 samples collected in 2006, as well as in both samples collected at station 41 in Little Neck Run in 2007. Other investigations have noted the presence of these compounds in groundwater impacted by wastewater (Dumouchelle and Stoeckel, 2005; Lee et al., 2004; Lee and Peart, 2000; Rudel et al., 1998) and in leachate plumes from municipal landfills

(Barnes et al., 2004; Lee et al., 2004; Eggen *et al*., 2003). Yamamoto et al. (2001) noted that landfill leachates may be a significant source of BPA to the environment.

In addition to the direct disposal of household and commercial solid wastes, the practice of disposing municipal sewage sludge in landfills is another source of contaminants to leachate plumes. In a study of municipal and industrial wastewater, Lee and Peart (2000) noted that on average, 68% of BPA in sewage influent was removed in the treatment process and incorporated into sewage sludge. Barnes et al. (2004) suggested that if biosolids from wastewater treatment plants are disposed of in landfills, detections of pharmaceuticals in leachate plumes would likely increase. Under a cooperative agreement with Suffolk County, the Brookhaven landfill received sewage sludge and sludge ash from the Bergen Point Sewage Treatment plant during the 1980s, in exchange for processing leachate collected at the landfill.

Metals:
With the exception of iron and zinc, and to a lesser extent, aluminum and lead, metal concentrations in Beaver Dam Creek were generally below NYSDEC standards for Class C waters (Table 13). Levels of cadmium, copper, cobalt, and nickel were occasionally elevated above criteria, and concentrations of manganese, for which there is no applicable standard for Class C waters, were frequently elevated above standards for groundwater (Class GA) and other freshwaters (Class A & AA).

Because of soil characteristics on Long Island, levels of both iron and manganese in streams and groundwater are often elevated above applicable standards. In the anoxic environment of the landfill leachate plume, dissolved levels of both elements further increase in concentration due to the reduction of oxide coatings on aquifer minerals. A number of previous studies similarly noted elevated iron and manganese concentrations in groundwater downgradient of the landfill as well as in Beaver Dam Creek. Pearsall and Aufderheide (1995) reported iron and manganese concentrations in the < 0.003 mg/l to 0.016 mg/l range in upgradient wells, compared with levels as high as 30 mg/l for iron and 57 mg/l for manganese in wells along the landfills southern perimeter. In the 2000–2003 Post Closure Monitoring Reports for Cells 1-4, iron concentrations in northern Beaver Dam Creek waters (stations BD-3 & BD-4) were reported as generally being an order of magnitude higher than iron levels found at a Forge River control site (Tonjes & Petrella, 2001; Cashin Associates, 2002; Cashin Associates, 2003; Cashin Associates, 2004). Similarly, levels of manganese at the same sites were generally two orders of magnitude higher than the Forge River location.

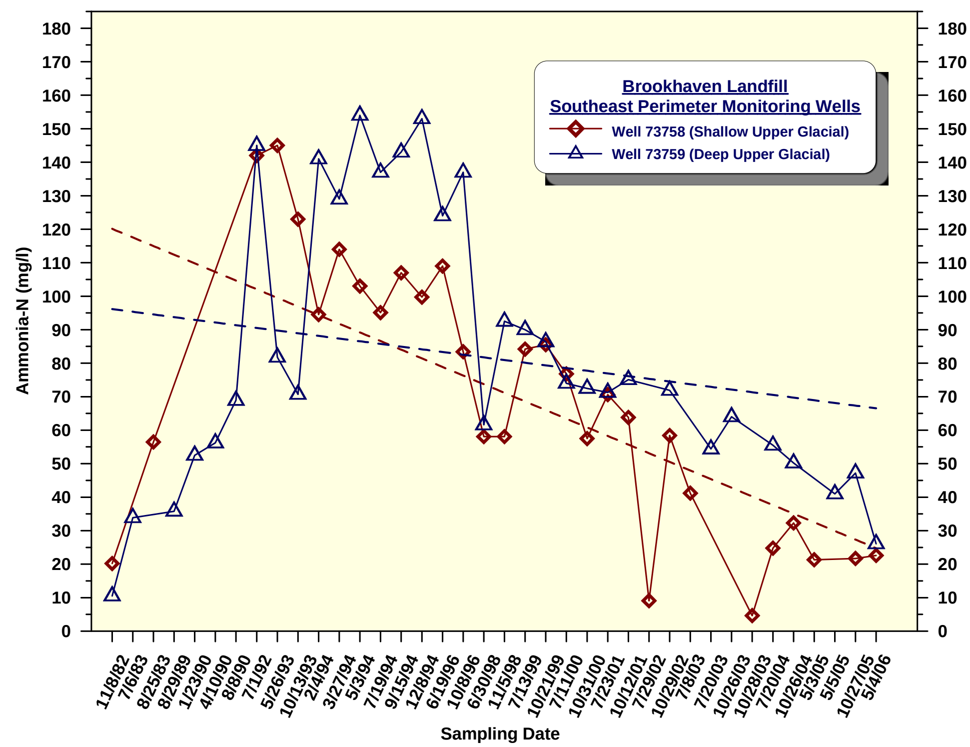
The Beaver Dam Creek results for this study showed average levels of both iron and manganese to generally increase in a northerly direction. At the northernmost sampling site (station 38, BD-4), average concentrations were more than an order of magnitude greater than applicable surface water and groundwater criteria. The unusually high concentration of iron (21.1 mg/l) found on 31-May-06 at this location, and the coincident occurrence of elevated levels of other leachate-indicator constituents (ammonia, chlorobenzene, m,p-dichlorobenzene, cobalt, potassium and calcium), further suggests the plume as a source of these elevated metal concentrations.

Plume Remediation:
Subsequent to the finding that leachate was escaping from the landfill in the late 1970s, the Town of Brookhaven provided public water to homes downgradient of the landfill to quell concerns over VOC contamination, and increased its efforts to remove leachate from the liner system. In an effort to prevent further generation of leachate and its subsequent discharge to the upper glacial aquifer, the Town capped the sections of the landfill thought to be most responsible for the leaks (cells 1-3, Figure 14) in 1993, followed by cell 4 in 1997.

Subsequent monitoring reports covering the 1997-2004 post-closure period noted precipitous declines in contaminant levels in near-field downgradient wells along the southern perimeter of the landfill, and concluded that capping of the landfill and the continued removal of leachate from the liners was an effective remedial strategy for minimizing future impacts to groundwater. Tonjes and Petrella (2000) reported that a trend analysis of seven years of samples (1993-1999) showed diminishing contaminant levels in wells near the landfill. Monitoring in subsequent years indicated the trend was continuing, as Cashin Associates (2002) reported a 50% reduction in maximum contaminant levels at all perimeter groundwater sampling locations. Recent reports (Dvirka and Bartilucci, 2005a, 2005b, & 2006) have reached similar conclusions, indicating that partly due to capping of the leaking cells, leachate generation from the landfill has decreased and local groundwater quality improved.

In support of these conclusions, plots of historical ammonia concentrations in shallow and deep upper glacier aquifer wells located along the south and southeast perimeter of the landfill (Figure 15) show a definite trend of declining levels since the late 1990s. Post-closure ammonia concentrations in northern Beaver Dam Creek also show a declining trend from mid-2003 through 2005 (Figure 16). Recent increases in ammonia levels in the creek (from late 2005 through 2006) however, demonstrate that observed trends in the creek are strongly influenced by fluctuations in groundwater levels and the degree of recharge, and are not necessarily indicative of declining contaminant levels in the plume.

Summary and Conclusions
In response to a request from the Beaver Dam Creek Restoration Task Force to characterize the water quality of the creek, the Suffolk County Department of Health Services Office of Ecology initiated sampling at eight sites (Figure 1) in September 2002. Monitoring was conducted on an approximate monthly basis through 2003,



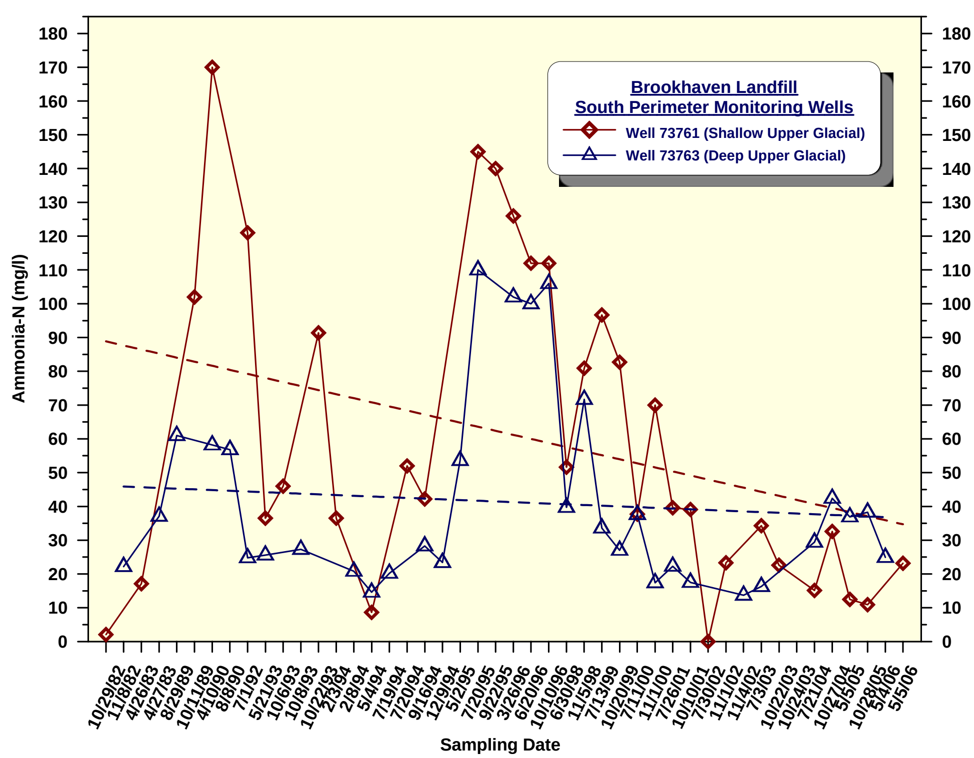
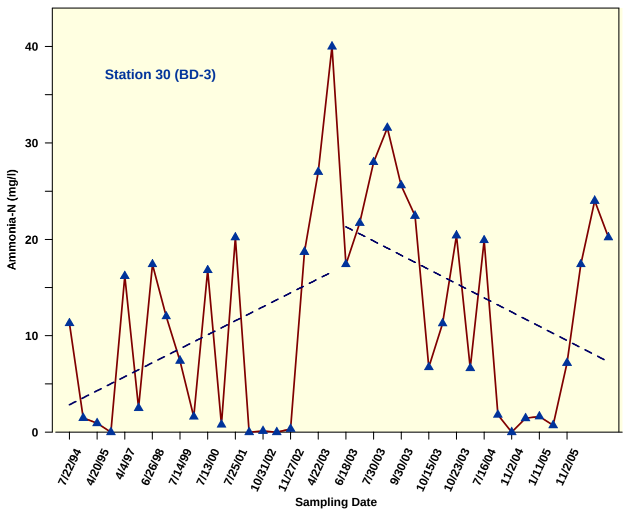
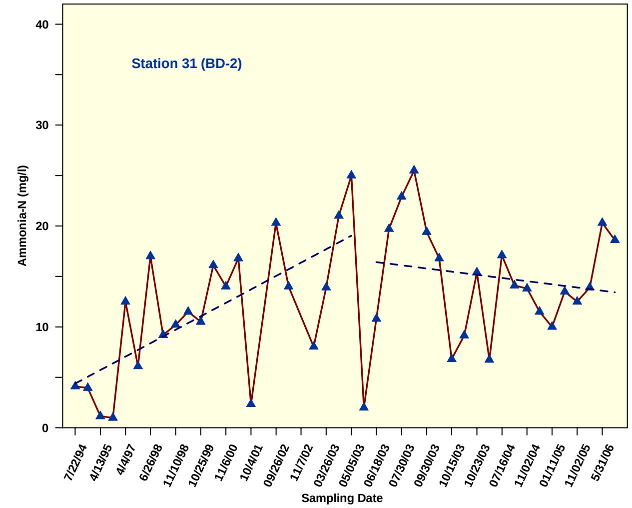
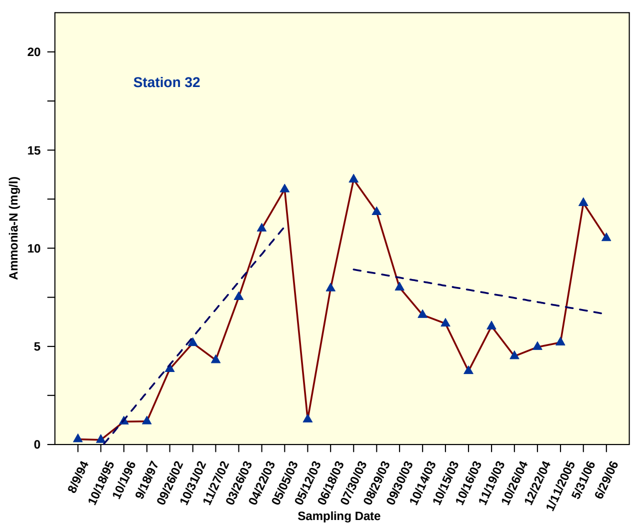


Figure 15. Historical Ammonia Levels in Perimeter Monitoring Wells South of the Brookhaven Town Landfill

(Data from USGS, Cashin Associates, and Dvirka & Bartilucci. Dashed lines are linear trends; note date intervals are not uniform)







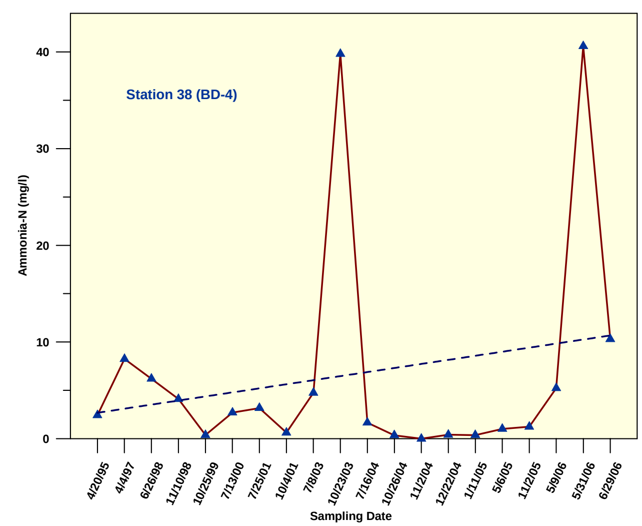


Figure 16. Plots of Post-Closure (1994-2006) Ammonia Concentrations at Beaver Dam Creek Stations 30, 31, 32 & 38
(Dashed lines are linear trends; note date intervals are not uniform)

with additional samples collected intermittently from 2004 through early 2008 to fill data gaps and verify observed trends. Sampling was expanded in 2007 to include sites in Little Neck Run and Yaphank Creek, tributaries to the Carmans River.

Sampling results indicate that Beaver Dam Creek is periodically subject to a combination of impacts from the surrounding watershed, predominantly due to storm water runoff and a leachate plume from the Town of Brookhaven landfill, but also likely including a marina located in the northern tidal reaches of the creek, various other nearby commercial establishments, and possibly in certain locations, failing or poorly operating septic systems.

Significant findings are summarized as follows:

- Dissolved oxygen levels in the freshwater reaches of the creek were frequently depressed below established standards, possibly due to the low flow and shallow nature of the creek, and likely exacerbated by the hypoxic waters of the landfill leachate plume.
- Dissolved oxygen levels in the northern tidal portion of the creek were also depressed on a number of occasions, particularly during the warmer summer months and in deeper bottom waters. Limited tidal flushing, nutrient inputs leading to algal blooms, and effects from sediment oxygen demand are likely contributing factors.
- Levels of total and fecal coliform bacteria were persistently elevated throughout the creek, often exceeding various water quality standards, including those for surface waters, shellfishing areas, and bathing beaches. A strong relationship between coliform levels and storm water runoff (rainfall) was clearly evident from results of wet-weather sampling.
- Housebarges moored at a marina located in the northern tidal reaches of the creek were found to be actively discharging untreated wastes to surface waters of the creek. The discharges have since been removed, but were likely ongoing for a number of years. Effects on area nutrient and bacterial levels may have been significant, have not been specifically assessed.
- Average chloride levels (measured only in the freshwater reaches of the creek) were similar to those found in streams adjacent to densely populated and developed areas of the county, and significantly greater than averages found in nearby Forge River and Carmans River. The landfill leachate plume was likely a source of chlorides to the creek, although in some areas other potential sources such as road salt and cesspool discharges may also exist.
- A significant feature of nutrient results was the periodic detection of unusually high levels of ammonia in the upper freshwater portion of the creek, some in the 20-40 mg/l range, and their likely association with the leachate plume from the Brookhaven landfill.

- Elevated ammonia concentrations found at station 41 in Little Neck Run in the fall of 2007 (an average of 16.1 mg/l) were also likely leachate related, as were levels of a number of other constituents also noted at that site (calcium, iron, magnesium, manganese, potassium, bisphenol-A, diethyl ether, and 1,4-dichlorobenzene). These contaminant detections indicate the plume is advancing in a southeasterly direction towards the Carmans River.
- Concentrations of nitrite+nitrate in the freshwater reaches of the creek were frequently insignificant compared to ammonia levels, and on average lower than levels found in other area tributaries. This pattern may have been related to effects from the anoxic, reducing conditions present in the landfill plume, where ammonification (the conversion of organic nitrogen to ammonia) and denitrification (the reduction of nitrate to ammonia and nitrogen) are dominant processes.
- Despite the high concentrations of ammonia noted in the upper reaches of the creek, results show that levels were significantly attenuated by the time they reached Great South Bay. This can probably be attributed to uptake by bacteria and algae as well as to dilution and nitrification processes.
- Results from numerous studies done on the effects of unionized ammonia on a variety of aquatic organisms, suggest that the high levels found in Beaver Dam Creek may be acutely toxic, and lower levels possibly chronically toxic to many species.
- Despite the potential for toxicity posed by the levels of ammonia in the creek, a 1996 survey conducted by the NYSDEC in an area just downstream of South Country Road documented an abundant population of brook trout existing in the creek.
- A survey of macroinvertebrates conducted in 2003 by the Stream Biomonitoring Unit of the NYSDEC however, found a low level of biodiversity (poor species richness), and concluded that the creek was moderately impacted, of poor water quality, and likely impacted by decomposable wastes.
- Of the 229 organic constituents that were tested for, 16 volatile organic compounds (VOCs) and 5 semi-volatile organic compounds (SVOCs) were detected in the creek. The most commonly detected chemicals included MTBE, diethyl ether, chlorobenzene, 1,4-dichlorobenzene, DEET, ibuprofen, and bisphenol-A. Both groups of compounds have multiple potential sources, including road and land runoff, septic systems, boat discharges, point source spills/dumping, and the leachate plume from the Brookhaven landfill.
- With the exception of iron and zinc, and to a lesser extent, aluminum and lead, metal concentrations in Beaver Dam Creek were generally below NYSDEC standards for Class C waters (Table 13). Levels of cadmium, copper, cobalt, and nickel were occasionally elevated above criteria, and concentrations of manganese, for which there is no applicable standard for Class C waters, were frequently elevated above standards for groundwater (Class GA) and other freshwaters (Class A & AA).

Although it is likely that a number of contaminant sources impact Beaver Dam Creek, the preponderance of findings of the many investigations conducted regarding the landfill leachate plume, as well as the data collected during this study, strongly suggest that the elevated levels of certain contaminants periodically detected in the northern reaches of the creek have their principal origin in the plume. It is also evident that the frequency and magnitude of the contamination, as well as the point at which it appears in the creek, varies with fluctuating groundwater levels and thus the degree of discharge to the creek, both on a seasonal and long-term basis.

In portions of Beaver Dam Creek south of Montauk Highway, where the land use is primarily residential/commercial, other sources of contamination (i.e., surface runoff and septic leachate from area homes and businesses) may be important factors. At sampling locations north of Montauk Highway (stations 30 & 38) however, where the upstream/upgradient area is primarily vacant land, the potential for other sources of contamination is less obvious. Most development in the vicinity of these two northernmost sites is located to the east and northeast, from where contaminants would be expected to move to the southeast in the direction of groundwater flow, away from Beaver Dam Creek.

The overall impact that these contaminants have on the creek's ecology remain uncertain. The periodic low dissolved oxygen levels noted, as well as the potentially toxic levels of ammonia routinely found, are likely to be detrimental to aquatic life in general. A 1996 survey done by the NYSDEC in the lower freshwater reaches of the creek found ample numbers of seemingly healthy brook trout, while a more recent NYSDEC survey (2003) in the same area noted moderate impacts to macroinvertebrate communities that were characteristic of poor water quality.

Recommendations

Considering the potential for impacts to the water quality and natural resources of Beaver Dam Creek and other nearby streams (i.e., Little Neck Run, Yaphank Creek and the Carmans River), efforts to delineate the current extent of the landfill leachate plume should be undertaken as soon as possible. As part of an Environmental Monitoring Plan approved by the NYSDEC, the Town of Brookhaven has been required to sample a "perimeter network" of well clusters located immediately south and east of the landfill (Tonjes and Petrella, 1998), as well as a limited number of stations in Beaver Dam Creek, since the early 1990s. Monitoring of the leachate plume's movement and extent in groundwater beyond the landfill perimeter however, hasn't been conducted since that time. Monitoring wells that were installed in the area southeast of the landfill (south of Sunrise Highway) have apparently long since been vandalized and are no longer usable. These wells should be re-developed and others installed in appropriate locations so that the plume's current extent and its potential impact on Beaver Dam Creek and nearby water bodies can be assessed.

In conjunction with groundwater monitoring, surface water sites in Beaver Dam Creek monitored during this study, as well as representative sites in Little Neck Run, Yaphank Creek and the Carmans River, should also be sampled at least on a quarterly basis. Sampling analytes should include the standard leachate indicator parameters (6 NYCRR Part 360 baseline parameters) in addition to MTBE and SVOCs (including bis-phenol-A). If contaminants of concern are detected, the frequency of monitoring should be increased to monthly to properly delineate temporal variations. To provide a measure of ecological impacts, the feasibility of re-assessing the status/health of fish and invertebrate populations should be given consideration by the NYSDEC.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1998. Health Assessment for the Coakley Landfill. North Hampton, New Hampshire. October, 1988.

Ahel, M., N. Mikac, B. Cosovic, E. Prohic, and V. Soukup. 1998. The Impact of Contamination from a Municipal Solid Waste Landfill (Zagreb, Croatia) on Underlying Soil. *Water Sci. Technol.* 37: 203-210.

Barnes, K.K., S.C. Christenson, D.W. Kolpin, M.J. Focazio, E.T. Furlong, S.D. Zaugg, M.T. Meyer, and L.B. Barber. 2004. Pharmaceuticals and Other Organic Waste Water Contaminants within a Leachate Plume Downgradient of a Municipal Landfill. *Ground Water Monitoring & Remediation* 24(2): 119-126.

Bound, J.P. and N. Voulvoulis. 2005. Household Disposal of Pharmaceuticals as a Pathway for Aquatic Contamination in the United Kingdom. *Environ. Health Perspect.* 113(12): 1705-1711.

Calamari, D., R. Marchetti, and G. Vailati. 1977. Effects of Prolonged Treatments with Ammonia on Stages of Development of *Salmo gairdneri*. *Nuovi Ann. Lg. Microbiol*. 28: 333-345.

Calamari, D., R. Marchetti, and G. Vailati. 1981. Effects of Long-term Exposure to Ammonia on the Developmental Stages of Rainbow Trout (*Salmo gairdneri)* Richardson. *Rapp. P.-v. Reun. Cons. int. Explor. Mer.* 178: 81-86.

Carlsen, T., L. Hall, and D. Rice. 1997. Ecological Hazards of MTBE Exposure: A Research Agenda. Lawrence Livermore National Laboratory Report UCRL-ID-126290. 11p.

Cashin Associates. 2002. Town of Brookhaven 2001 Waste Management Facility Post-Closure Monitoring Report Cells 1-4. Town of Brookhaven, Medford, N.Y.

Cashin Associates. 2002. Carmans River Environmental Assessment. Suffolk County, New York. Report prepared for Suffolk County Department of Health Services, Hauppauge, N.Y.

Cashin Associates. 2003. Town of Brookhaven 2002 Groundwater & Leachate Monitoring Report Cells 1-4. Report prepared for Town of Brookhaven Department of Waste Management, Medford, N.Y.

Cashin Associates. 2004. Town of Brookhaven 2003 Groundwater & Leachate Monitoring Report Cells 1-4. Report prepared for Town of Brookhaven Department of Waste Management, Medford, N.Y.

Cashin Associates. 2005. Town of Brookhaven 2004 Groundwater & Leachate Monitoring Report Cells 1-4. Report prepared for Town of Brookhaven Department of Waste Management, Farmingville, N.Y.

Dumouchelle, D.H. and D.M. Stoeckel. 2005. Preliminary Investigation of Wastewater Related Contaminants near Home Sewage Treatment Systems in Ohio. U.S. Geological Survey Open File Report 2005-1282, 31 p.

Dvirka and Bartilucci. 1990a. Groundwater Assessment Report Brookhaven Landfill, 1990 Update. Town of Brookhaven, Suffolk County, N.Y. March 1990.

Dvirka and Bartilucci. 1990b. Groundwater Assessment Report Brookhaven Landfill, 1990 Update. Town of Brookhaven, Suffolk County, N.Y. November 1990.

Dvirka and Bartilucci. 1992. Groundwater Assessment Report Brookhaven Landfill, 1991 Update. Town of Brookhaven, Suffolk County, N.Y.

Dvirka and Bartilucci. 2005. Town of Brookhaven Landfill. Unified Environmental Monitoring Program First Semiannual Report of 2005. Town of Brookhaven, Suffolk County, N.Y.

Dvirka and Bartilucci. 2006a. Town of Brookhaven Landfill. Unified Environmental Monitoring Program Second Semiannual Report of 2005. Town of Brookhaven, Suffolk County, N.Y.

Dvirka and Bartilucci. 2006b. Town of Brookhaven Landfill. Unified Environmental Monitoring Program First Semiannual Report of 2006. Town of Brookhaven, Suffolk County, N.Y.

Eggen, T., P. Snilsberg, and M. Moder. 2003. Organic Compounds in Municipal Landfill Leachate – Pharmaceuticals and Musk Compounds – an Environmental Problem? Norwegian Centre for Soil and Environmental Research. Jordforsk Report 67/03, 15 p.

EMCON/OWT Solid Waste Services, IT Engineering of New York, P.C., 2001. Draft Environmental Impact Statement for the Town of Brookhaven Cell 6 Landfill Expansion, Brookhaven, New York, Volume 1.

EMCON/OWT Solid Waste Services, IT Engineering of New York, P.C., 2002. Final Environmental Impact Statement for the Town of Brookhaven Cell 6 Landfill Expansion, Brookhaven, New York.

Holm, J.V., K. Rugge, P.L. Bjerg, and T.H. Christensen. 1995. Occurrence and Distribution of Pharmaceutical Compounds in the Groundwater Downgradient of a Landfill (Grinstead, Denmark). *Environ. Sci. Technol*. 29: 1415-1420.

Kanda, R., P. Griffin, H.A. James, and J. Fothergill. 2003. Pharmaceutical and Personal Care Products in Sewage Treatment Works. *J. Environ. Monit*. 5: 823-830.

Kolpin, D.W., E.T. Furlong, M.T. Meyer, E.M. Thurman, S.D. Zaugg, L.B. Barber, and H.T. Buxton. 2002. Pharmaceuticals, Hormones, and Other Organic Wastewater Contaminants in U.S. Streams, 1999-2000: A National Reconnaissance. *Environ. Sci. Technol.* 36: 1202-1211.

Lee, H., and T.E. Pert. 2000. Bisphenol-A Contamination in Canadian Municipal and Industrial Wastewater and Sludge Samples. *Water Quality Research Journal of Canada*, 35(2): 283-298.

Lee, K.E., Barber, L.B., Furlong, E.T., Cahill, J.D., Kolpin, D.W., Meyer, M.T., and S.D. Zaugg. 2004. Presence and Distribution of Organic Wastewater Compounds in Wastewater, Surface, Ground, and Drinking Waters, Minnesota, 2000-02. U.S. Geological Survey Scientific Investigation Report 2004-5138, 47p.

Long Island Regional Planning Board (LIRPB). 1990. Evaluation of Land Use Impacts on Environmental Quality in Urban and Semi-rural Streams Tributary to Great South Bay, Long Island, New York.

Mack, J., and P.E. Maus. 1986. Detection of Contaminant Plumes in Groundwater of Long Island, New York by Electromagnetic Terrain Conductivity Surveys. U.S. Geological Survey Report 86-4045, 1986, 39p.

McMahon, T., 2002. Beaver Dam Creek Watershed Analysis. Suffolk County Soil and Water Conservation District. Unpublished Report.

Monti, J. and M.P. Scorca. 2003. Trends in Nitrogen Concentration and Nitrogen Loads Entering the South Shore Estuary Reserve from Streams and Ground-Water Discharge in Nassau and Suffolk Counties, Long Island, New York, 1952-97. U.S. Geological Survey Water Resources Investigations Report 02-4255, 36p.

New York State Department of Health (NYSDOH). 2005. Health Consultation for the Brookhaven Landfill. Town of Brookhaven, Suffolk County, New York.

Noaksson, E., M. Linderoth, A.T. Bosveld, L. Norrgren, Y. Zebuhr, and L. Balk. 2003. Endocrine Disruption in Brook Trout (*Salvelinus fontinalis*) Exposed to Leachate From a Public Refuse Dump. *Sci. Total Environ*. 305(1-3): 87-103.

Pearsall, K.A. and M.J. Aufderheide. 1995. Ground-Water Quality and Geochemical Processes at a Municipal Landfill, Town of Brookhaven, Long Island, New York. U.S. Geological Survey Water Resources Investigations Report 91-4154, 45p.

Pearsall, K.A. and E.J. Wexler, 1986. Organic Compounds in Ground Water Near a Sanitary Landfill in the Town of Brookhaven, Long Island, New York. U.S. Geological Survey Water Resources Investigations Report 85-4218, 22p.

Reinbold, K.A., and S.M. Pescitelli. 1982. Effects of Exposure to Ammonia on Sensitive Life Stages of Aquatic Organisms. Report to U.S. EPA by Illinois Natural History Survey, Champaign, IL.

Rudel, R.A., Melly, S.J., Geno, P.W., Sun, G., and J.G. Brody. 1998. Identification of Alkylphenols and Other Estrogenic Phenolic Compounds in Wastewater, Septage, and Groundwater on Cape Cod, Massachusetts. *Environ. Sci. Technol.*, 32(7): 861-869.

Schwarzbauer, J., S. Heim, S. Brinker, and R. Littke. 2002. Occurrence and Alteration of Organic Contaminants in Seepage and Leakage Water from a Waste Deposit Landfill. *Water Res*. 36: 2275-2287.

Stumpf, M., T.A. Ternes, R.D. Wilken, S.V. Rodrigues, and W. Baumann. 1999. Polar Drug Residues in Sewage and Natural Waters in the State of Rio de Janeiro, Brazil. *Sci. Total Environ*. 225: 135-141.

Suffolk County Department of Health Services (SCDHS). 2006a. *Laboratory Quality Manual for the Suffolk County Public & Environmental Health Laboratory*. Hauppauge, N.Y.

Suffolk County Department of Health Services (SCDHS). 2006b. Suffolk County Stream Water Quality Monitoring Database. Office of Water Resources. Yaphank, N.Y.

Suffolk County Department of Health Services (SCDHS). 2006c. Peconic Estuary Program Water Quality Monitoring Database. Office of Ecology. Yaphank, N.Y.

Suffolk County Department of Health Services (SCDHS). 2007. *Surface Water Quality Monitoring Standard Operating Procedures Manual*. Office of Ecology, Bureau of Marine Resources. Yaphank, N.Y.

Ternes, T.A. 1998. Occurrence of Drugs in German Sewage Treatment Plants and Rivers. *Water Res*. 32: 3245-3257.

Thurston, R.V., and R.C. Russo. 1983. Acute Toxicity of Ammonia and Nitrite to Cutthroat Trout Fry. *Trans. Amer. Fish. Soc*., 112: 696-704.

Thurston, R.V., R.C. Russo, and G.A. Vinogradov. 1981. Ammonia Toxicity to Fishes. Effect of pH on the Toxicity of the Un-ionized Ammonia Species. *Environ. Sci. Technol*., 15: 37-840.

Thurston, R.V., R.C. Russo, and G.R. Phillips. 1983. Acute toxicity of Ammonia to Fathead Minnows. *Trans. Amer. Fish. Soc*. 112: 705-711.

Thurston, R.V., R.C. Russo, R.J. Luedtke, C.E. Smith, E.L. Meyn, C. Chakoumakos, K.C. Wang, and C.J.D. Brown. 1984a. Chronic Toxicity of Ammonia to Rainbow Trout. *Trans. Amer. Fish. Soc.*, 113: 56-73.

Thurston, R.V., R.J. Luedtke, and R.C. Russo. 1984b. Toxicity of Ammonia to Freshwater Insects of Three Families. Technical Report No. 84-2, Fisheries Bioassay Laboratory, Montana State University, Bozeman, MT. 26pp.

Tonjes, D.J. 1995. Town of Brookhaven Waste Management Facility Operational Water Quality Monitoring Plan. Technical Report to NYSDEC, October 1993 - December 1994. Town of Brookhaven, Medford, NY.

Tonjes, D.J. 1996. Town of Brookhaven 1995 Waste Management Facility Operational Monitoring Report. Town of Brookhaven, Medford, NY.

Tonjes, D.J. and J.A. Black. 1993. Town of Brookhaven Landfill Groundwater Assessment 1992 Update. Town of Brookhaven, Medford, NY.

Tonjes, D.J. and J.A. Black. 1994. Town of Brookhaven Landfill Groundwater Assessment 1993 Update. Town of Brookhaven, Medford, NY.

Tonjes, D.J. and J.H. Heil. 1996. The Yaphank Landfill Leachate Plume. Town of Brookhaven, Medford, N.Y.

Tonjes, D.J. and R. Pettrella. 1997. Town of Brookhaven 1996 Waste Management Facility Operational Monitoring Report. Town of Brookhaven, Medford, N.Y.

Tonjes, D.J. and R. Pettrella. 1998. Town of Brookhaven 1997 Waste Management Facility Operational Monitoring Report, Cells 1-4. Town of Brookhaven, Medford, N.Y.

Tonjes, D.J. and R. Pettrella. 1999. Town of Brookhaven 1998 Waste Management Facility Post-Closure Monitoring Report, Cells 1-4. Town of Brookhaven, Medford, N.Y.

Tonjes, D.J. and R. Pettrella. 2000. Town of Brookhaven 1999 Waste Management Facility Post-Closure Monitoring Report, Cells 1-4. Town of Brookhaven, Medford, N.Y.

Tonjes, D.J. and R. Pettrella. 2001. Town of Brookhaven 2000 Waste Management Facility Post-Closure Monitoring Report, Cells 1-4. Town of Brookhaven, Medford, N.Y.

USEPA. 1999. Update of Ambient Water Quality Criteria for Ammonia (EPA-822-R-99-014). United States Environmental Protection Agency, Office of Water, 147p.

Verbarg, R., 2003. Land use Analysis for the Beaver Dam Creek Stream Corridor. Suffolk County Department of Planning. Unpublished Report. 6pp.

Voorhis, C. and Associates. 1996. Stormwater Inventory for South Shore Bays. Town of Brookhaven, Medford, N.Y.

West, C.W. 1985. Acute Toxicity of Ammonia to Fourteen Freshwater Species. Internal Report. U.S. EPA, Environmental Research Laboratory, Duluth, MN.

Wexler, E.J., 1988a. Ground-Water Flow and Solute Transport at a Municipal Landfill Site on Long Island, New York. Part 1: Hydrogeology and Water Quality. U.S. Geological Survey Water Resources Investigations Report 86-4070, 18p.

Wexler, E.J., 1988b. Ground-Water Flow and Solute Transport at a Municipal Landfill Site on Long Island, New York. Part 3: Simulation of Solute Transport. U.S. Geological Survey Water Resources Investigations Report 86-4207, 46p.

Wexler, E.J., and P.E. Maus. 1988. Ground-water flow and solute transport at a municipal landfill site on Long Island, New York: Part 3: Simulation of Ground Water Flow. U.S. Geological Survey Water Resources Investigations Report 86-4106, 44p.

Wilkison, D.H., D.J. Armstrong, and D.W. Blevins. 2002. Effects of Wastewater and Combined Sewer Overflows on Water Quality in the Blue River Basin, Kansas City, Missouri and Kansas, July 1998 - October 2000. U.S. Geological Survey, Water Resources Investigations Report 02-4107. 162p.

Yamamoto, T., A. Yasuhara, H. Shiraishi, and O. Nakasugi. 2001. Bisphenol-A in Hazardous Waste Landfill Leachates. *Chemosphere* 42(4): 415-418.

Appendix I. Beaver Dam Creek Water Quality Monitoring Results for Physical and Inorganic Parameters

Sampling Date	Time	Station No.	Location	Secchi	Temperature	Dissolved Oxygen	Conductivity	pH	Salinity	Total Coliform	Fecal Coliform	Ammonia	Nitrate + Nitrite	Total Nitrogen	Dissolved Nitrogen	Total Phosphorus	Dissolved Phosphorus	Ortho-Phosphate	Chloride
				(ft)	(C)	(mg/L)	(uS/cm)		(o/oo)	(MPN/100 ml)		(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
09/26/02	9:20	31	S	----	14.0	4.0	433	----	----	3,000	700	20.3	0.616	21.0	18.0	< 0.025	< 0.025	0.010	----
09/26/02	9:35	32	S	----	13.1	4.6	176	----	----	3,000	2,400	3.9	0.746	4.7	4.4	< 0.025	< 0.025	0.014	----
09/26/02	9:45	33	S	----	13.6	5.4	1,075	----	----	2,200	800	1.1	0.763	1.9	1.9	0.039	0.032	0.024	----
09/26/02	8:20	34	S	3.0	20.8	3.4	----	----	10.8	1,300	1,300	0.32	0.161	1.3	0.98	0.087	< 0.025	0.008	----
09/26/02	8:25	34	B	----	19.5	2.8	----	----	----	----	----	----	----	----	----	----	----	----	----
09/26/02	8:05	35	S	3.0	21.6	5.6	----	----	21.7	800	800	0.23	0.148	1.2	0.62	0.080	< 0.025	0.005	----
09/26/02	8:10	35	B	----	22.2	5.0	----	----	----	----	----	----	----	----	----	----	----	----	----
09/26/02	7:58	36	S	3.0	20.8	7.8	----	----	21	2,200	1,400	0.07	0.738	1.0	0.80	0.059	< 0.025	0.009	----
09/26/02	8:00	36	B	----	22.6	4.3	----	----	----	----	----	----	----	----	----	----	----	----	----
09/26/02	7:50	37	S	3.0	21.0	6.3	----	----	26.7	40	40	< 0.005	0.015	0.56	0.46	0.052	< 0.025	< 0.005	----
09/26/02	7:52	37	B	----	21.1	6.3	----	----	----	----	----	----	----	----	----	----	----	----	----
10/31/02	8:36	30	S	----	6.8	6.4	77	6.6	----	1,400	170	0.12	0.069	0.49	0.47	0.027	< 0.025	< 0.005	11.4
10/31/02	9:14	31	S	----	10.9	4.3	390	7.0	----	800	40	14.0	0.330	18.0	18.0	< 0.025	< 0.025	0.010	52.3
10/31/02	9:42	32	S	----	10.3	5.2	183	6.8	----	1,300	300	5.2	0.660	5.4	5.2	0.032	0.030	0.016	26.5
10/31/02	10:17	33	S	----	9.1	6.1	1,600	6.7	----	5,000	220	1.6	0.900	2.1	2.3	0.036	0.033	0.017	505
10/31/02	11:18	34	S	2.0	11.7	8.0	----	----	25.3	1,300	40	0.55	0.222	1.2	1.0	0.089	0.036	0.006	----
10/31/02	11:19	34	B	----	10.9	6.9	----	----	----	----	----	----	----	----	----	----	----	----	----
10/31/02	11:42	35	S	3.0	11.9	8.7	----	----	23.4	170	110	0.14	0.108	0.63	0.43	0.052	< 0.025	0.007	----
10/31/02	11:43	35	B	----	10.1	9.6	----	----	----	----	----	----	----	----	----	----	----	----	----
10/31/02	12:01	36	S	4.0	11.9	8.1	----	----	23.6	1,100	170	0.04	0.536	0.78	0.64	0.042	< 0.025	< 0.005	----
10/31/02	12:02	36	B	----	11.6	7.8	----	----	----	----	----	----	----	----	----	----	----	----	----
10/31/02	12:24	37	S	>4	10.1	9.2	----	----	27	20	< 20	0.01	0.088	0.43	0.27	0.036	< 0.025	< 0.005	----
10/31/02	12:25	37	B	----	9.6	9.5	----	----	----	----	----	----	----	----	----	----	----	----	----
11/27/02	9:00	30	S	----	4.4	7.8	64	----	----	1,400	130	0.33	0.323	0.92	0.91	0.038	0.031	< 0.005	----

Location key: S = surface; B = bottom
Nutrients calculated as N or P

Sampling Date	Time	Station No.	Location	Secchi (ft)	Temperature (C)	Dissolved Oxygen (mg/L)	Conductivity (uS/cm)	pH	Salinity (o/oo)	Total Coliform (MPN/100 ml)	Fecal Coliform	Ammonia (mg/l)	Nitrate + Nitrite (mg/l)	Total Nitrogen (mg/l)	Dissolved Nitrogen (mg/l)	Total Phosphorus (mg/l)	Dissolved Phosphorus (mg/l)	Ortho-Phosphate (mg/l)	Chloride (mg/l)
11/27/02	9:15	31	S	----	6.1	6.9	652	----	----	>16000	210	8.0	0.375	8.1	8.0	0.043	0.038	0.012	----
11/27/02	9:35	32	S	----	8.1	5.8	221	----	----	2,800	800	4.3	0.580	4.7	4.5	0.038	0.033	0.022	----
11/27/02	9:50	33	S	----	7.6	7.2	456	----	----	3,000	220	1.8	0.750	2.4	2.3	0.031	0.030	0.020	----
11/27/02	10:16	34	S	4.0	7.8	8.1	----	----	23.7	5,000	80	1.0	0.530	1.7	1.6	0.044	0.034	0.016	----
11/27/02	10:17	34	B	----	7.7	8.2	----	----	----	----	----	----	----	----	----	----	----	----	----
11/27/02	9:59	35	S	4.0	6.9	8.4	----	----	19.2	600	40	0.34	0.436	1.1	0.93	0.059	0.029	0.017	----
11/27/02	10:00	35	B	----	7.1	8.7	----	----	----	----	----	----	----	----	----	----	----	----	----
11/27/02	9:43	36	S	>4	6.5	8.5	----	----	20	500	40	0.14	0.608	1.2	1.1	0.039	< 0.025	< 0.005	----
11/27/02	9:44	36	B		6.6	8.5	----	----	----	----	----	----	----	----	----	----	----	----	----
11/27/02	9:19	37	S	>4.5	5.8	9.6	----	----	----	----	----	----	----	----	----	----	----	----	----
11/27/02	9:20	37	B	----	5.7	9.6	----	----	----	----	----	----	----	----	----	----	----	----	----
03/26/03	10:40	30	S	----	12.8	7.2	404	7.0	----	----	----	----	----	----	----	----	----	----	60.7
03/26/03	11:05	31	S	----	12.6	7.3	298	7.0	----	< 20	< 20	13.9	0.544	17.0	17.0	0.031	0.027	< 0.1	59.1
03/26/03	11:20	32	S	----	13.0	8.2	286	6.9	----	110	80	7.5	0.767	9.1	9.0	0.027	0.031	< 0.1	49.4
03/26/03	11:45	33	S	----	14.3	10.5	419	6.6	----	300	300	2.1	1.210	4.1	3.9	0.029	< 0.025	< 0.1	107
03/26/03	11:37	34	S	----	11.0	8.8	----	----	----	700	140	3.2	0.870	4.0	4.1	0.028	< 0.025	0.010	----
03/26/03	11:38	34	B	----	11.3	11.4	----	----	----	----	----	----	----	----	----	----	----	----	----
03/26/03	11:20	35	S	----	11.2	12.0	----	----	9.2	500	< 20	0.87	0.494	2.1	2.1	< 0.025	< 0.025	< 0.005	----
03/26/03	11:21	35	B	----	11.2	14.0	----	----	----	----	----	----	----	----	----	----	----	----	----
03/26/03	11:12	36	S	4.0	11.9	11.3	----	----	17	170	170	0.64	1.450	2.9	2.8	0.036	0.037	< 0.005	----
03/26/03	11:13	36	B	----	11.7	11.2	----	----	----	----	----	----	----	----	----	----	----	----	----
03/26/03	10:56	37	S	7.0	10.1	11.1	----	----	23.4	< 20	< 20	0.01	0.060	0.33	0.28	0.026	< 0.025	< 0.005	----
03/26/03	10:57	37	B	----	10.1	11.2	----	----	----	----	----	----	----	----	----	----	----	----	----
04/22/03	8:14	30	S	----	10.2	5.4	405	7.1	----	500	170	27.0	0.698	20.0	21.0	0.044	0.038	< 0.005	----
04/22/03	9:31	31	S	----	10.2	6.5	332	7.1	----	1,100	500	21.0	0.567	16.0	15.0	0.044	0.035	< 0.005	----
04/22/03	9:10	32	S	----	10.2	6.1	253	6.9	----	800	300	11.0	0.487	9.3	9.3	0.041	0.030	0.017	----

Location key: S = surface; B = bottom
Nutrients calculated as N or P

Sampling Date	Time	Station No.	Location	Secchi	Temperature	Dissolved Oxygen	Conductivity	pH	Salinity	Total Coliform	Fecal Coliform	Ammonia	Nitrate + Nitrite	Total Nitrogen	Dissolved Nitrogen	Total Phosphorus	Dissolved Phosphorus	Ortho-Phosphate	Chloride
				(ft)	(C)	(mg/L)	(uS/cm)		(o/oo)	(MPN/100 ml)		(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
04/22/03	10:07	33	S	----	9.8	8.0	459	6.8	----	800	800	3.5	0.933	3.7	3.8	0.046	0.031	0.012	----
04/22/03	10:30	34	S	3.0	11.8	9.9	----	----	20.7	2,400	2,400	3.7	0.434	3.5	3.4	0.051	0.028	0.006	----
04/22/03	10:33	34	B	----	12.5	9.4	----	----	----	----	----	----	----	----	----	----	----	----	----
04/22/03	10:45	35	S	4.0	12.9	14.2	----	----	22.5	2,400	340	3.0	0.460	3.3	2.7	0.041	< 0.025	0.007	----
04/22/03	10:48	35	B	----	11.9	9.7	----	----	----	----	----	----	----	----	----	----	----	----	----
04/22/03	10:58	36	S	3.0	11.1	10.8	----	----	9.5	3,000	2,400	2.9	0.480	2.7	2.0	0.029	< 0.025	< 0.005	----
04/22/03	11:00	36	B	----	12.1	11.6	----	----	----	----	----	----	----	----	----	----	----	----	----
04/22/03	10:15	37	S	6.0	10.8	10.4	----	----	28.8	< 20	< 20	0.01	< 0.005	0.36	0.31	< 0.025	< 0.025	< 0.005	----
04/22/03	10:17	37	B	----	10.9	10.4	----	----	----	----	----	----	----	----	----	----	----	----	----
05/05/03	19:17	30	S	----	11.5	5.1	496	7.1	----	170	60	40.0	0.520	31.0	29.0	0.079	0.074	< 0.005	----
05/05/03	19:36	31	S	----	11.4	5.7	453	7.0	----	800	500	25.0	0.460	25.0	24.0	0.068	0.065	0.005	----
05/05/03	19:50	32	S	----	11.1	5.5	315	6.9	----	1,300	270	13.0	0.628	14.0	13.0	0.096	0.091	0.014	----
05/05/03	20:06	33	S	----	11.2	8.3	377	6.5	----	500	20	0.89	1.710	2.6	2.6	0.073	0.070	< 0.005	----
05/05/03	19:40	34	S	----	12.9	9.5	----	----	2	800	800	4.6	0.845	5.6	5.5	0.099	0.108	0.016	----
05/05/03	19:42	34	B	----	15.6	7.5	----	----	----	----	----	----	----	----	----	----	----	----	----
05/05/03	19:32	35	S	----	15.8	12.3	----	----	9.4	500	110	2.8	0.889	4.4	4.3	0.099	0.081	0.005	----
05/05/03	19:34	35	B	----	16.4	9.1	----	----	----	----	----	----	----	----	----	----	----	----	----
05/05/03	19:19	36	S	----	14.7	9.4	----	----	13.7	140	20	1.8	0.735	2.0	1.5	0.095	0.078	< 0.005	----
05/05/03	19:22	36	B	----	16.6	10.3	----	----	----	----	----	----	----	----	----	----	----	----	----
05/05/03	19:04	37	S	----	15.6	9.5	----	----	24.5	< 20	< 20	0.01	0.021	0.29	0.18	0.071	0.062	< 0.005	----
05/05/03	19:05	37	B	----	15.6	9.5	----	----	----	----	----	----	----	----	----	----	----	----	----
05/12/03	12:05	31	S	----	12.9	6.1	463	----	----	300	40	2.0	2.471	----	----	----	----	< 0.1	52.7
05/12/03	12:45	32	S	----	12.7	9.5	433	----	----	1,300	800	1.3	0.596	----	----	----	----	< 0.1	44.7
06/18/03	8:45	30	S	----	13.2	5.8	363	7.1	----	9,000	5,000	17.4	1.510	17.3	17.2	< 0.025	< 0.025	< 0.1	50.7
06/18/03	9:00	31	S	----	14.1	6.3	273	7.0	----	16,000	9,000	10.8	< 0.2	11.0	11.0	< 0.025	< 0.025	< 0.1	35.1
06/18/03	9:10	32	S	----	14.7	6.0	243	6.9	----	16,000	16,000	8.0	0.776	8.6	8.5	0.031	0.025	< 0.1	32.7

Location key: S = surface; B = bottom
Nutrients calculated as N or P

Sampling Date	Time	Station No.	Location	Secchi (ft)	Temperature (C)	Dissolved Oxygen (mg/L)	Conductivity (uS/cm)	pH	Salinity (o/oo)	Total Coliform (MPN/100 ml)	Fecal Coliform	Ammonia (mg/l)	Nitrate + Nitrite (mg/l)	Total Nitrogen (mg/l)	Dissolved Nitrogen (mg/l)	Total Phosphorus (mg/l)	Dissolved Phosphorus (mg/l)	Ortho-Phosphate (mg/l)	Chloride (mg/l)
06/18/03	9:25	33	S	----	13.2	7.6	176	6.4	----	16,000	9,000	0.70	0.989	2.0	2.1	0.033	0.025	< 0.1	40.6
06/18/03	9:45	34	S	----	15.1	4.8	----	----	3.3	>16000	9,000	3.2	0.632	4.7	4.4	0.033	0.027	0.030	----
06/18/03	9:47	34	B	----	19.8	2.3	----	----	----	----	----	----	----	----	----	----	----	----	----
06/18/03	9:25	35	S	----	16.0	8.4	----	----	4.3	9,000	1,300	3.9	0.700	5.3	5.4	0.041	< 0.025	0.023	----
06/18/03	9:27	35	B	----	21.0	4.8	----	----	----	----	----	----	----	----	----	----	----	----	----
06/18/03	9:10	36	S	----	18.5	9.4	----	----	11.1	1,300	300	3.1	0.864	4.7	4.8	< 0.025	0.031	0.015	----
06/18/03	9:12	36	B	----	20.5	9.4	----	----	----	----	----	----	----	----	----	----	----	----	----
06/18/03	8:50	37	S	----	20.2	7.4	----	----	19	40	< 20	0.10	0.101	0.54	0.39	< 0.025	< 0.025	< 0.005	----
06/18/03	8:52	37	B	----	20.4	7.5	----	----	----	----	----	----	----	----	----	----	----	----	----
07/30/03	6:40	30	S	----	14.8	4.5	535	7.3	----	300	20	28.0	0.875	25.0	26.0	< 0.025	< 0.025	< 0.1	69.9
07/30/03	7:05	31	S	----	14.7	4.7	482	7.3	----	500	40	22.9	0.767	22.0	14.0	< 0.025	0.184	< 0.1	68.4
07/30/03	7:30	32	S	----	13.4	4.0	345	7.2	----	2,200	130	13.5	1.001	15.0	13.0	< 0.025	< 0.025	< 0.1	52.7
07/30/03	8:00	33	S	----	13.6	4.5	470	6.8	----	2,400	2,400	2.6	1.460	3.7	3.9	< 0.025	< 0.025	< 0.1	147
07/30/03	7:53	34	S	2.0	22.0	2.9	----	----	8	9,000	2,200	1.4	0.944	6.3	6.7	0.052	0.038	0.011	----
07/30/03	7:54	34	B	----	11.9	0.1	----	----	----	----	----	----	----	----	----	----	----	----	----
07/30/03	7:35	35	S	2.0	24.5	11.0	----	----	9.1	3,000	1,300	1.4	0.941	5.2	5.7	0.047	0.025	0.005	----
07/30/03	7:36	35	B	----	24.9	0.0	----	----	----	----	----	----	----	----	----	----	----	----	----
07/30/03	7:21	36	S	2.0	23.3	12.4	----	----	10.1	2,400	800	0.73	0.893	3.2	2.5	0.053	< 0.025	0.006	----
07/30/03	7:22	36	B	----	25.0	5.2	----	----	----	----	----	----	----	----	----	----	----	----	----
07/30/03	6:52	37	S	1.5	24.9	7.6	----	----	18.8	130	< 20	0.05	0.472	0.54	0.35	0.058	< 0.025	0.007	----
07/30/03	6:53	37	B	----	24.9	7.0	----	----	----	----	----	----	----	----	----	----	----	----	----
08/29/03	7:55	30	S	----	14.6	4.4	653	7.2	0.4	500	40	31.6	1.364	19.0	17.9	0.059	0.057	< 0.1	67.1
08/29/03	7:40	31	S	----	13.9	4.9	587	7.2	0.4	1,100	130	25.5	1.116	24.0	14.0	0.057	0.052	< 0.1	67.2
08/29/03	7:20	32	S	----	12.8	4.5	368	6.9	0.2	1,300	800	11.8	1.172	11.0	7.5	0.068	0.069	< 0.1	45.5
08/29/03	7:00	33	S	----	13.7	4.9	1,014	6.5	0.6	1,700	1,100	3.3	1.659	4.9	4.8	0.075	0.074	< 0.1	328
08/29/03	7:44	34	S	1.5	22.1	0.4	----	----	10.3	358	130	3.4	0.804	2.2	2.2	0.074	0.059	0.013	----

Location key: S = surface; B = bottom
Nutrients calculated as N or P

Sampling Date	Time	Station No.	Location	Secchi (ft)	Temperature (C)	Dissolved Oxygen (mg/L)	Conductivity (uS/cm)	pH	Salinity (o/oo)	Total Coliform (MPN/100 ml)	Fecal Coliform (MPN/100 ml)	Ammonia (mg/l)	Nitrate + Nitrite (mg/l)	Total Nitrogen (mg/l)	Dissolved Nitrogen (mg/l)	Total Phosphorus (mg/l)	Dissolved Phosphorus (mg/l)	Ortho-Phosphate (mg/l)	Chloride (mg/l)
08/29/03	7:45	34	B	----	23.9	2.4	----	----	----	----	----	----	----	----	----	----	----	----	----
08/29/03	7:21	35	S	2.0	23.9	4.8	----	----	12.8	1,700	500	2.5	0.126	9.2	9.1	0.073	0.057	0.005	----
08/29/03	7:22	35	B	----	24.7	4.5	----	----	----	----	----	----	----	----	----	----	----	----	----
08/29/03	7:04	36	S	2.0	24.0	8.1	----	----	13.5	2,400	500	0.95	0.286	1.6	1.5	0.074	0.050	< 0.005	----
08/29/03	7:05	36	B	----	24.8	3.5	----	----	----	----	----	----	----	----	----	----	----	----	----
08/29/03	6:44	37	S	2.5	23.9	6.4	----	----	20.6	130	40	0.04	0.030	0.86	0.61	0.099	0.066	0.006	----
08/29/03	6:45	37	B	----	23.8	6.4	----	----	----	----	----	----	----	----	----	----	----	----	----
09/30/03	9:44	30	S	----	13.2	5.0	473	7.2	----	2,200	300	25.6	1.381	21.0	21.0	0.037	0.032	< 0.1	59.6
09/30/03	9:15	31	S	----	12.5	5.4	414	7.0	----	1,700	220	19.4	0.961	15.0	17.0	0.034	0.098	< 0.1	56.5
09/30/03	8:54	32	S	----	11.6	5.1	257	6.8	----	5,000	1,700	8.0	1.061	7.9	8.6	0.051	0.035	< 0.1	38.1
09/30/03	8:30	33	S	----	11.6	5.8	760	6.6	----	5,000	300	2.4	1.335	3.3	1.9	0.042	0.041	< 0.1	292
09/30/03	7:36	34	S	4.0	20.8	2.0	----	----	17.8	9,000	1,700	1.8	0.303	1.5	1.5	0.045	0.039	0.014	----
09/30/03	7:37	34	B	----	17.9	0.3	----	----	----	----	----	----	----	----	----	----	----	----	----
09/30/03	7:13	35	S	5.0	18.7	3.2	----	----	19.7	3,000	500	1.5	0.286	1.5	1.0	0.206	0.045	0.009	----
09/30/03	7:14	35	B	----	21.5	3.3	----	----	----	----	----	----	----	----	----	----	----	----	----
09/30/03	7:00	36	S	4.5	20.6	3.7	----	----	21.5	9,000	1,700	0.98	0.480	0.84	0.81	0.054	0.042	0.009	----
09/30/03	7:01	36	B	----	21.5	4.0	----	----	----	----	----	----	----	----	----	----	----	----	----
09/30/03	6:40	37	S	6.5	20.0	5.8	----	----	27.3	500	80	0.04	0.020	0.25	0.26	0.031	0.027	< 0.005	----
09/30/03	6:41	37	B	----	20.0	5.8	----	----	----	----	----	----	----	----	----	----	----	----	----
10/14/03	14:30	30	S	----	13.7	4.9	437	----	----	1,100	40	22.4	1.855	19.0	21.0	< 0.025	< 0.025	< 0.1	55.5
10/14/03	14:20	31	S	----	13.8	5.2	394	----	----	1,700	300	16.8	1.121	12.0	16.0	< 0.025	< 0.025	< 0.1	53.1
10/14/03	14:10	32	S	----	13.9	5.4	243	----	----	3,000	300	6.6	1.148	7.1	7.4	0.036	0.035	< 0.1	35
10/14/03	13:35	33	S	----	14.1	7.2	1,010	----	----	9,000	800	1.4	1.289	3.1	3.2	0.038	0.035	< 0.1	344
10/15/03	10:30	30	S	----	13.1	4.5	430	----	----	< 20	< 20	6.7	3.087	24.0	20.0	0.025	0.105	< 0.1	56
10/15/03	10:20	31	S	----	13.3	4.9	385	----	----	2,700	1,100	6.8	1.952	15.0	17.0	< 0.025	< 0.025	< 0.1	56.5
10/15/03	10:10	32	S	----	13.0	4.9	245	----	----	5,000	400	6.2	1.624	7.9	7.8	0.041	0.038	< 0.1	38.5

Location key: S = surface; B = bottom
Nutrients calculated as N or P

Sampling Date	Time	Station No.	Location	Secchi	Temperature	Dissolved Oxygen	Conductivity	pH	Salinity	Total Coliform	Fecal Coliform	Ammonia	Nitrate + Nitrite	Total Nitrogen	Dissolved Nitrogen	Total Phosphorus	Dissolved Phosphorus	Ortho-Phosphate	Chloride
				(ft)	(C)	(mg/L)	(uS/cm)		(o/oo)	(MPN/100 ml)		(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
10/15/03	9:55	33	S	----	14.4	6.5	10,200	----	----	13,000	2,300	2.5	0.919	2.3	1.9	0.034	< 0.025	0.325	1,374
10/15/03	8:50	34	S	3.5	15.4	7.6	----	----	14	14,000	5,000	0.50	< 0.005	0.63	0.60	< 0.025	< 0.025	0.012	----
10/15/03	8:55	34	B	----	15.4	0.2	----	----	----	----	----	----	----	----	----	----	----	----	----
10/15/03	8:35	35	S	3.0	16.2	6.6	----	----	23.4	11,000	1,300	0.02	0.039	0.41	0.23	0.027	< 0.025	0.007	----
10/15/03	8:40	35	B	----	16.5	3.9	----	----	----	----	----	----	----	----	----	----	----	----	----
10/15/03	8:25	36	S	3.0	16.0	7.2	----	----	21.9	5,000	1,100	0.13	0.143	0.37	0.23	< 0.025	< 0.025	0.011	----
10/15/03	8:30	36	B	----	16.2	4.0	----	----	----	----	----	----	----	----	----	----	----	----	----
10/15/03	8:10	37	S	1.0	16.0	7.6	----	----	25.9	700	< 20	0.01	0.011	0.25	0.17	< 0.025	< 0.025	0.010	----
10/15/03	8:15	37	B	----	16.0	7.4	----	----	----	----	----	----	----	----	----	----	----	----	----
10/16/03	6:42	30	S	----	11.6	4.6	414	----	----	800	130	11.3	1.650	23.0	25.0	0.125	0.112	----	----
10/16/03	7:11	31	S	----	11.4	5.0	374	----	----	2,400	300	9.2	0.989	16.0	16.0	0.112	0.093	----	----
10/16/03	7:33	32	S	----	10.8	4.8	230	----	----	3,000	1,100	3.7	1.020	8.6	8.8	0.109	0.128	----	----
10/16/03	8:02	33	S	----	10.2	6.0	683	----	----	3,000	1,300	1.3	1.140	3.4	3.2	0.126	0.126	----	----
11/19/03	13:00	30	S	----	13.1	4.8	418	7.3	0.3	220	80	6.6	1.520	13.0	19.0	0.058	0.055	< 0.1	49
11/19/03	12:30	31	S	----	12.5	4.9	409	7.1	0.3	500	< 20	6.7	0.970	15.0	14.0	0.060	0.052	< 0.1	50
11/19/03	12:15	32	S	----	12.4	4.8	270	6.9	0.2	2,400	40	6.0	1.060	6.8	6.4	0.069	0.077	< 0.1	33
11/19/03	11:45	33	S	----	12.1	5.8	586	6.8	0.4	2,400	140	2.6	1.190	4.1	3.4	0.048	0.068	< 0.1	167
11/19/03	12:45	34	S	4.0	9.6	7.6	----	----	6.4	1,100	230	1.3	< 0.005	2.0	1.8	0.055	0.040	0.010	----
11/19/03	12:46	34	B	----	7.6	6.5	----	----	----	----	----	----	----	----	----	----	----	----	----
11/19/03	12:28	35	S	3.0	10.1	8.6	----	----	17.1	170	< 20	0.18	0.214	0.77	0.63	0.039	< 0.025	0.007	----
11/19/03	12:29	35	B	----	8.1	8.6	----	----	----	----	----	----	----	----	----	----	----	----	----
11/19/03	12:16	36	S	3.0	9.3	9.0	----	----	22	80	20	0.08	0.192	0.57	0.51	< 0.025	< 0.025	0.007	----
11/19/03	12:17	36	B	----	8.9	8.8	----	----	----	----	----	----	----	----	----	----	----	----	----
11/19/03	11:59	37	S	1.5	8.5	9.6	----	----	26.7	40	40	0.04	0.038	0.47	0.39	0.034	< 0.025	0.017	----
11/19/03	12:00	37	B	----	8.3	9.7	----	----	----	----	----	----	----	----	----	----	----	----	----
10/26/04	13:43	30	S	----	13.5	4.0	98	6.9	----	1,300	300	1.8	< 0.2	1.2	2.0	< 0.025	< 0.025	< 0.2	15.9

Location key: S = surface; B = bottom
Nutrients calculated as N or P

Sampling Date	Time	Station No.	Location	Secchi	Temperature	Dissolved Oxygen	Conductivity	pH	Salinity	Total Coliform	Fecal Coliform	Ammonia	Nitrate + Nitrite	Total Nitrogen	Dissolved Nitrogen	Total Phosphorus	Dissolved Phosphorus	Ortho-Phosphate	Chloride
				(ft)	(C)	(mg/L)	(uS/cm)		(o/oo)	(MPN/100 ml)		(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
10/26/04	14:01	31	S	----	12.4	4.1	322	7.1	----	500	500	14.1	0.320	14.0	13.0	< 0.025	< 0.025	< 0.2	42.5
10/26/04	14:14	32	S	----	13.7	5.4	195	6.8	----	1,100	110	4.5	0.759	5.4	5.0	< 0.025	< 0.025	< 0.2	26.5
10/26/04	14:28	33	S	----	12.6	6.4	2,404	6.9	----	1,100	300	1.9	0.748	2.5	2.4	< 0.025	< 0.025	< 0.2	927
10/26/04	13:12	38	S	----	13.0	----	69	6.5	----	500	40	0.35	0.234	0.73	0.74	< 0.025	< 0.025	< 0.2	19.0
12/22/04	10:28	30	S	----	3.3	8.8	83	6.0	----	----	----	1.4	0.363	1.3	1.0	< 0.025	< 0.025	< 0.2	18.1
12/22/04	10:43	31	S	----	7.8	6.5	270	6.2	----	----	----	11.5	0.346	7.8	8.0	< 0.025	< 0.025	< 0.2	41.9
12/22/04	11:02	32	S	----	8.5	6.3	184	6.0	----	----	----	5.0	0.848	4.2	4.2	0.034	0.037	< 0.2	28.9
12/22/04	11:26	33	S	----	7.9	8.2	363	5.9	----	----	----	1.3	1.410	2.1	2.2	0.034	0.029	< 0.2	109
12/22/04	10:04	38	S	----	4.5	8.5	58	5.5	----	----	----	0.40	0.247	0.45	0.44	< 0.025	< 0.025	< 0.2	18.3
01/11/05	9:40	30	S	----	5.4	----	102	6.2	----	110	80	1.6	0.583	2.3	2.4	0.027	0.026	< 0.2	18.6
01/11/05	9:55	31	S	----	8.0	6.3	268	6.3	----	20	< 20	10.0	0.542	9.2	9.2	< 0.025	< 0.025	< 0.2	39.8
01/11/05	10:11	32	S	----	8.6	5.7	192	6.2	----	110	20	5.2	0.986	3.6	2.6	< 0.025	< 0.025	< 0.2	29.2
01/11/05	10:30	33	S	----	6.4	7.7	826	6.2	----	1,700	500	1.1	1.640	2.5	2.5	< 0.025	< 0.025	< 0.2	345
01/11/05	9:22	38	S	----	5.4	----	68	5.6	----	< 20	< 20	0.37	0.495	0.85	0.83	0.029	< 0.025	< 0.2	13.7
05/31/06	10:00	30	S	----	15.3	4.0	475	----	----	300	130	24.0	0.592	20.0	21.0	0.068	0.046	< 0.2	55.9
05/31/06	10:30	31	S	----	----	5.2	444	----	----	230	80	20.3	0.456	18.0	19.0	< 0.025	0.042	< 0.2	54.5
05/31/06	11:00	32	S	----	13.8	4.8	326	----	----	500	130	12.3	0.697	12.0	12.0	0.029	0.032	< 0.2	41.9
05/31/06	11:30	33	S	----	14.8	10.0	282	----	----	500	80	1.8	1.410	3.3	2.1	0.087	< 0.025	< 0.2	59.5
05/31/06	10:44	34	S	2.0	18.3	3.9	----	7.3	9.7	900	300	4.5	1.096	5.0	4.3	0.032	0.054	0.014	----
05/31/06	10:45	34	B	----	12.7	0.3	----	----	----	----	----	----	----	----	----	----	----	----	----
05/31/06	10:30	35	S	2.0	21.5	9.6	----	7.1	8.8	3,000	800	4.0	0.812	4.7	4.6	0.050	0.029	0.011	----
05/31/06	10:31	35	B	----	22.2	2.8	----	----	22.1	----	----	----	----	----	----	----	----	----	----
05/31/06	10:17	36	S	2.0	21.0	10.1	----	7.3	14.0	3,000	1,300	3.2	0.872	4.2	4.4	0.054	0.091	0.009	----
05/31/06	10:18	36	B	----	23.0	7.7	----	----	21.2	----	----	----	----	----	----	----	----	----	----
05/31/06	9:58	37	S	2.0	22.7	8.8	----	8.7	23.0	20	< 20	< 0.02	< 0.005	0.85	0.48	0.106	0.052	< 0.005	----
05/31/06	9:59	37	B	----	22.5	8.1	----	----	23.2	----	----	----	----	----	----	----	----	----	----

Location key: S = surface; B = bottom
Nutrients calculated as N or P

Sampling Date	Time	Station No.	Location	Secchi	Temperature	Dissolved Oxygen	Conductivity	pH	Salinity	Total Coliform	Fecal Coliform	Ammonia	Nitrate + Nitrite	Total Nitrogen	Dissolved Nitrogen	Total Phosphorus	Dissolved Phosphorus	Ortho-Phosphate	Chloride
				(ft)	(C)	(mg/L)	(uS/cm)		(o/oo)	(MPN/100 ml)		(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
05/31/06	9:30	38	S	----	15.2	2.2	847	----	----	170	40	40.6	0.967	37.0	34.0	< 0.025	< 0.025	< 0.2	91.8
06/29/06	9:25	30	S	----	17.1	5.0	471	7.3	----	700	230	20.2	0.364	18.6	17.7	0.033	0.035	< 0.2	53.7
06/29/06	9:50	31	S	----	16.3	5.3	434	7.2	----	500	300	18.6	0.372	16.1	16.1	0.029	0.041	< 0.2	52.8
06/29/06	10:15	32	S	----	14.9	4.5	319	6.8	----	1,700	800	10.5	0.700	9.0	10.0	0.063	0.040	< 0.2	40.8
06/29/06	10:40	33	S	----	14.8	6.6	196	7.1	----	2,200	1,300	2.9	1.190	4.1	4.0	0.043	0.038	< 0.2	34.2
06/29/06	8:00	34	B	----	20.9	1.3	----	----	16.3	----	----	----	----	----	----	----	----	----	----
06/29/06	9:59	34	S	3.0	17.7	5.0	711	----	0.4	5,000	500	3.6	1.025	4.5	4.3	0.151	0.083	0.023	----
06/29/06	7:45	35	S	3.0	20.7	7.7	1,558	----	0.9	2,400	500	3.0	1.039	4.2	3.9	0.087	0.060	0.011	----
06/29/06	7:46	35	B	----	23.8	3.1	----	----	18.8	----	----	----	----	----	----	----	----	----	----
06/29/06	7:30	36	S	3.0	22.1	8.0	----	----	3.2	1,300	500	2.0	1.097	2.7	2.9	0.069	0.041	0.011	----
06/29/06	7:31	36	B	----	22.6	3.5	----	----	14.4	----	----	----	----	----	----	----	----	----	----
06/29/06	7:00	37	S	4.0	23.9	5.8	----	----	20.4	800	300	0.04	0.087	0.65	0.58	0.073	0.039	< 0.01	----
06/29/06	7:01	37	B	----	24.0	5.7	----	----	20.4	----	----	----	----	----	----	----	----	----	----
06/29/06	9:05	38	S	----	17.4	5.0	376	7.1	----	300	40	10.3	0.286	11.1	9.6	< 0.025	< 0.025	< 0.2	47.6
4/10/07	11:44	30	S	----	11.1	8.7	350	7.0	----	----	----	16.3	0.622	17.3	17.3	< 0.05	< 0.05	< 0.2	46.7
4/10/07	12:01	31	S	----	11.3	9.3	355	7.2	----	----	----	14.6	0.575	16.5	15.5	< 0.05	< 0.05	< 0.2	47.3
4/10/07	12:27	32	S	----	11.3	11.0	262	7.0	----	----	----	8.7	0.895	10.5	10.7	< 0.05	< 0.05	< 0.2	36.1
4/10/07	13:06	33	S	----	12.8	12.7	214	7.0	----	----	----	5.0	1.130	6.40	6.65	< 0.05	< 0.05	< 0.2	31.7
4/10/07	11:18	38	S	----	9.3	9.2	257	6.8	----	----	----	7.47	0.590	8.48	8.55	< 0.05	< 0.05	< 0.2	41.0
10/23/07	9:34	30	S	----	16.8	5.0	176	6.9	----	5,000	300	4.51	0.283	4.62	4.92	< 0.05	< 0.05	< 0.2	16.8
10/23/07	10:06	31	S	----	14.8	4.4	326	7.0	----	3,000	1,100	10.6	0.426	11.0	11.2	< 0.05	0.055	< 0.2	30.1
10/23/07	10:37	32	S	----	14.7	5.1	204	6.7	----	9,000	600	3.43	1.160	4.85	4.49	< 0.05	< 0.05	< 0.2	21.1
10/23/07	11:48	33	S	----	15.7	5.5	718	6.7	----	5,000	1,100	0.96	1.060	2.43	2.43	0.056	0.058	< 0.2	185
10/23/07	8:55	38	S	----	16.2	3.7	165	6.7	----	1,300	800	2.41	0.265	3.08	2.94	< 0.05	< 0.05	< 0.2	20.2
10/23/07	11:00	41	S	----	14.6	4.3	480	6.9	----	5,000	1,300	13.5	1.068	15.1	13.5	< 0.05	< 0.05	0.020	----
10/23/07	11:40	42	S	----	18.0	9.7	310	6.6	----	1,100	170	0.025	0.488	0.68	0.72	< 0.05	< 0.05	< 0.01	----

Location key: S = surface; B = bottom
Nutrients calculated as N or P

Sampling Date	Time	Station No.	Location	Secchi	Temperature	Dissolved Oxygen	Conductivity	pH	Salinity	Total Coliform	Fecal Coliform	Ammonia	Nitrate + Nitrite	Total Nitrogen	Dissolved Nitrogen	Total Phosphorus	Dissolved Phosphorus	Ortho-Phosphate	Chloride
				(ft)	(C)	(mg/L)	(uS/cm)		(o/oo)	(MPN/100 ml)		(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
10/23/07	11:57	43	S	----	14.4	0.7	250	5.7	----	2,400	300	0.241	1.102	1.34	1.37	< 0.05	< 0.05	< 0.01	----
10/23/07	10:10	44	S	----	17.5	8.2	238	6.9	----	3,000	2,400	0.020	1.002	1.50	1.33	0.056	0.058	0.013	----
10/23/07	9:49	45	S	----	14.0	6.7	220	6.5	----	1,100	210	< 0.02	0.333	0.37	0.38	< 0.05	< 0.05	0.015	----
12/6/07	12:05	30	S	----	3.4	4.4	87	6.8	----	300	170	----	0.269	2.48	2.49	< 0.05	< 0.05	< 0.2	12.3
12/6/07	12:26	31	S	----	7.4	5.8	----	7.0	----	110	20	----	0.370	11.4	11.1	< 0.05	< 0.05	< 0.2	29.2
12/6/07	12:44	32	S	----	8.5	7.0	----	6.8	----	20	< 20	----	1.140	4.72	4.65	< 0.05	< 0.05	< 0.2	20.9
12/6/07	11:48	38	S	----	3.6	3.6	96	6.6	----	80	20	----	0.247	1.38	1.24	< 0.05	< 0.05	< 0.2	17.2
12/6/07	13:17	41	S	----	9.1	3.6	478	7.1	----	500	< 20	18.7	1.474	21.6	21.4	< 0.05	< 0.05	< 0.01	----
12/6/07	12:30	43	S	----	10.4	2.3	214	5.9	----	300	230	0.141	2.064	2.08	2.42	< 0.05	< 0.05	< 0.01	----
12/6/07	11:50	44	S	----	5.9	8.3	2,490	6.5	----	300	20	0.033	0.590	0.51	0.60	< 0.05	< 0.05	< 0.01	----
12/6/07	11:05	45	S	----	7.5	9.7	192	6.7	----	140	20	0.023	0.433	0.42	0.45	< 0.05	< 0.05	< 0.01	----
1/23/08	12:43	30	S	----	6.7	9.0	84	7.1	----	170	110	----	0.378	2.00	1.93	< 0.05	< 0.05	< 0.2	14.2
1/23/08	13:10	31	S	----	8.4	6.3	229	7.2	----	20	20	----	0.461	9.17	9.81	< 0.05	< 0.05	< 0.2	29.2
1/23/08	13:32	32	S	----	10.1	6.4	163	7.0	----	130	130	----	1.120	4.74	4.69	< 0.05	< 0.05	< 0.2	21.8
1/23/08	14:03	33	S	----	8.7	7.4	1,374	7.0	----	294	110	----	1.090	2.50	2.38	< 0.05	< 0.05	< 0.2	500
1/23/08	12:08	38	S	----	5.0	9.8	96	7.0	----	110	< 20	----	0.369	1.76	2.08	< 0.05	< 0.05	< 0.2	18.3
1/23/08	13:33	41	S	----	10.0	3.4	487	7.4	----	130	20	18.4	1.248	14.4	18.9	< 0.05	< 0.05	< 0.01	----
1/23/08	14:01	43	S	----	11.0	3.7	212	6.1	----	300	300	0.091	1.639	1.61	1.32	< 0.05	< 0.05	< 0.01	----
1/23/08	12:28	44	S	----	5.3	10.2	2,940	6.9	----	180	< 20	0.088	1.072	1.25	0.97	< 0.05	< 0.05	< 0.01	----

Location key: S = surface; B = bottom
Nutrients calculated as N or P

Appendix II. Beaver Bam Creek Historical Water Quality Data (Freshwater Sampling Sites)

Station No.	Sampling Date	Ammonia (mg/l)	Nitrite+Nitrate (mg/l)	Chloride (mg/l)	Sample Collected By
Station West of Old Town Road at Carman Blvd:					
BD4	11/14/89	7.17	0.53	58	CA/DB
BD4	1/31/91	4.58	0.58	33	CA/DB
BD4	2/21/91	6.7	0.58	31	CA/DB
BD4	3/27/91	5.06	0.02	24	CA/DB
BD4	4/22/91	4.25	0.20	25	CA/DB
BD4	4/20/95	2.43	0.24	14	CA/DB
BD4	4/4/97	8.25	0.42	35	CA/DB
BD4	6/26/98	6.2	0.25	41	CA/DB
BD4	11/10/98	4.1	1.30	28	CA/DB
BD4	10/25/99	0.38	0.00	10	CA/DB
BD4	7/13/00	2.7	0.50	24	CA/DB
BD4	7/25/01	3.17	1.88	18	CA/DB
BD4	10/4/01	0.63	0.59	8	CA/DB
BD4	7/8/03	4.75	0.43	30	CA/DB
BD4	10/23/03	39.8	2.27	50	CA/DB
BD4	7/16/04	1.66	0.09	14	CA/DB
38	10/26/04	0.35	0.23	19	SCDHS
BD4	11/2/04	nd	nd	----	CA/DB
38	12/22/04	0.40	0.25	18	SCDHS
38	1/11/05	0.37	0.50	14	SCDHS
BD4	5/6/05	1.01	2.24	----	CA/DB
BD4	11/2/05	1.23	2.65	----	CA/DB
BD4	5/9/06	5.22	3.01	----	CA/DB
38	5/31/06	40.6	0.98	92	SCDHS
38	6/29/06	10.3	0.30	48	SCDHS
38	4/10/07	7.47	0.59	41	SCDHS
38	10/23/07	2.41	0.27	20	SCDHS
38	12/6/07	----	0.25	17	SCDHS
38	1/23/08	----	0.37	18	SCDHS
Montauk Highway Station:					
OWR20	3/16/70	0.16	0.153	14	SCDHS
OWR20	8/3/70	0.30	0.511	23	SCDHS
OWR20	12/16/70	0.04	0.404	13	SCDHS
OWR20	5/25/71	0.39	0.330	11	SCDHS
OWR20	12/6/71	0.29	0.050	8	SCDHS

Station No:
BD1 - BD4: Cashin Associates (CA) and/or Dvirka & Bartilucci (DB) sampling station
30-33, 38: SCDHS Office of Ecology sampling station
OWR2, 5, 20 – SCDHS Office of Water Resources sampling station
nd = not detected
---- = not analyzed

Station No.	Sampling Date	Ammonia (mg/l)	Nitrite+Nitrate (mg/l)	Chloride (mg/l)	Sample Collected By
OWR20	4/25/72	0.08	0.218	10	SCDHS
BD3	10/28/82	0.04	nd	10	USGS
BD3	11/14/89	7.78	0.6	58	USGS
BD3	1/31/91	12.72	1.43	60	CA/DB
BD3	2/21/91	13.4	0.16	59	CA/DB
BD3	3/27/91	16	1.26	67	CA/DB
BD3	4/22/91	10.8	0.66	53	CA/DB
BD3	5/20/91	19.5	1.1	67	CA/DB
BD3	6/19/91	14.3	1.42	62	CA/DB
BD3	7/28/91	9.2	1.63	41	CA/DB
BD3	8/14/91	6.05	1.64	38	CA/DB
BD3	9/11/91	6.82	1.38	33	CA/DB
BD3	10/9/91	7.02	1.06	32	CA/DB
BD3	11/6/91	5.26	0.68	27	CA/DB
BD3	12/13/91	4.64	0.89	27	CA/DB
BD3	1/5/92	3.18	0.92	25	CA/DB
BD3	5/27/92	1.71	0.93	18	CA/DB
BD3	9/22/92	2.53	1.81	26	CA/DB
BD3	1/27/93	0.2	1.19	76	CA/DB
BD3	2/24/93	7.98	0.6	39	CA/DB
BD3	7/22/94	11.3	1.47	40	CA/DB
BD3	4/13/95	1.48	0.75	20	CA/DB
BD3	4/20/95	0.93	0.83	19	CA/DB
BD3	12/18/95	nd	0.37	16	CA/DB
BD3	4/4/97	16.2	0.81	70	CA/DB
BD3	11/10/97	2.5	0.77	22	CA/DB
BD3	6/26/98	17.4	0.36	65	CA/DB
BD3	11/10/98	12	2.6	54	CA/DB
BD3	7/14/99	7.4	3.63	28	CA/DB
BD3	10/25/99	1.6	1.1	18	CA/DB
BD3	7/13/00	16.8	1.6	57	CA/DB
BD3	11/6/00	0.77	0.17	12	CA/DB
BD3	7/25/01	20.2	3.2	53	CA/DB
BD3	10/4/01	nd	4.99	21	CA/DB
30	10/31/02	0.12	0.07	11	SCDHS
BD3	11/7/02	nd	0.13	15	CA/DB
30	11/27/02	0.33	0.32	----	SCDHS
30	03/26/03	18.7	0.63	61	SCDHS
30	04/22/03	27.0	0.70	----	SCDHS

Station No:
BD1 - BD4: Cashin Associates (CA) and/or Dvirka & Bartilucci (DB) sampling station
30-33, 38: SCDHS Office of Ecology sampling station
OWR2, 5, 20 – SCDHS Office of Water Resources sampling station
nd = not detected
---- = not analyzed

Station No.	Sampling Date	Ammonia (mg/l)	Nitrite+Nitrate (mg/l)	Chloride (mg/l)	Sample Collected By
30	05/05/03	40.0	0.52	----	SCDHS
30	06/18/03	17.4	1.5	51	SCDHS
BD3	7/8/03	21.7	0.34	60	CA/DB
30	07/30/03	28.0	0.88	70	SCDHS
30	08/29/03	31.6	1.4	67	SCDHS
30	09/30/03	25.6	1.4	60	SCDHS
30	10/14/03	22.4	1.9	56	SCDHS
30	10/15/03	6.7	3.1	56	SCDHS
30	10/16/03	11.3	1.7	----	SCDHS
BD3	10/23/03	20.4	1.4	50	CA/DB
30	11/19/03	6.6	1.5	49	SCDHS
BD3	07/16/04	19.9	0.2	44	CA/DB
30	10/26/04	1.8	0.11	16	SCDHS
BD3	11/02/04	nd	0.03	10	CA/DB
30	12/22/04	1.4	0.37	18	SCDHS
30	1/11/2005	1.62	0.58	19	SCDHS
BD3	5/6/2005	0.71	2.11	----	CA/DB
BD3	11/2/2005	7.18	3.59	----	CA/DB
BD3	5/9/2006	17.4	2.41	----	CA/DB
30	5/31/06	24.0	0.59	56	SCDHS
30	6/29/06	20.2	0.37	54	SCDHS
30	4/10/07	16.3	0.62	47	SCDHS
30	10/23/07	4.51	0.28	17	SCDHS
30	12/6/07	----	0.27	12	SCDHS
30	1/23/08	----	0.38	14	SCDHS
Trout Ponds Court Station:					
BD2	10/10/82	0.04	nd	----	USGS
BD2	11/14/89	3.61	0.8	28	CA/DB
BD2	5/20/91	13.1	0.81	54	CA/DB
BD2	6/19/91	8.81	0.91	48	CA/DB
BD2	7/28/91	3.93	0.98	29	CA/DB
BD2	8/14/91	2.59	0.95	25	CA/DB
BD2	9/11/91	3.2	0.92	26	CA/DB
BD2	10/9/91	2.94	0.69	25	CA/DB
BD2	10/9/91	2.89	0.72	25	CA/DB
BD2	11/6/91	2.47	0.5	23	CA/DB
BD2	12/13/91	2.03	0.6	22	CA/DB
BD2	1/5/92	1.99	0.7	23	CA/DB
BD2	9/22/92	0.73	1.07	25	CA/DB

Station No:
BD1 - BD4: Cashin Associates (CA) and/or Dvirka & Bartilucci (DB) sampling station
30-33, 38: SCDHS Office of Ecology sampling station
OWR2, 5, 20 – SCDHS Office of Water Resources sampling station
nd = not detected
---- = not analyzed

Station No.	Sampling Date	Ammonia (mg/l)	Nitrite+Nitrate (mg/l)	Chloride (mg/l)	Sample Collected By
BD2	1/27/93	3.01	0.31	31	CA/DB
BD2	2/24/93	4.79	0.6	36	CA/DB
BD2	7/22/94	4.1	0.94	38	CA/DB
BD2	7/22/94	3.95	1.04	36	CA/DB
BD2	4/13/95	1.14	0.6	33	CA/DB
BD2	10/10/95	0.986	0.53	16	CA/DB
BD2	4/4/97	12.5	0.73	63	CA/DB
BD2	11/10/97	6.1	0.36	53	CA/DB
BD2	6/26/98	17	0.38	66	CA/DB
BD2	11/10/98	9.2	5.8	59	CA/DB
BD2	11/10/98	10.2	2.8	57	CA/DB
BD2	7/14/99	11.5	2.2	57	CA/DB
BD2	10/25/99	10.5	0.81	53	CA/DB
BD2	7/13/00	16.1	1.43	70	CA/DB
BD2	11/6/00	14	0.53	55	CA/DB
BD2	7/25/01	16.8	4.95	64	CA/DB
BD2	10/4/01	2.34	11.6	52	CA/DB
BD2	7/25/02	----	0.555	62	CA/DB
31	09/26/02	20.3	0.62	----	SCDHS
31	10/31/02	14.0	0.33	52	SCDHS
BD2	11/7/02	----	0.025	53	CA/DB
31	11/27/02	8.0	0.38	----	SCDHS
31	03/26/03	13.9	0.54	59	SCDHS
31	04/22/03	21.0	0.57	----	SCDHS
31	05/05/03	25.0	0.46	----	SCDHS
31	05/12/03	2.0	2.5	53	SCDHS
31	06/18/03	10.8	0.11	35	SCDHS
BD2	7/8/03	19.7	0.502	40	CA/DB
31	07/30/03	22.9	0.77	68	SCDHS
31	08/29/03	25.5	1.1	67	SCDHS
31	09/30/03	19.4	0.96	57	SCDHS
31	10/14/03	16.8	1.1	53	SCDHS
31	10/15/03	6.8	2.0	57	SCDHS
31	10/16/03	9.2	1.0	----	SCDHS
BD2	10/23/03	15.4	0.88	40	CA/DB
31	11/19/03	6.7	0.97	50	SCDHS
BD2	07/16/04	17.1	0.16	64	CA/DB
31	10/26/04	14.1	0.32	43	SCDHS
BD2	11/02/04	13.8	0.09	60	CA/DB

Station No:
BD1 - BD4: Cashin Associates (CA) and/or Dvirka & Bartilucci (DB) sampling station
30-33, 38: SCDHS Office of Ecology sampling station
OWR2, 5, 20 – SCDHS Office of Water Resources sampling station
nd = not detected
---- = not analyzed

Station No.	Sampling Date	Ammonia (mg/l)	Nitrite+Nitrate (mg/l)	Chloride (mg/l)	Sample Collected By
31	12/22/04	11.5	0.36	42	SCDHS
31	01/11/05	10	0.54	40	SCDHS
BD2	05/06/05	13.5	2.46	----	CA/DB
BD2	11/02/05	12.5	3.1	----	CA/DB
BD2	05/09/06	13.9	2.74	----	CA/DB
31	5/31/06	20.3	0.466	55	SCDHS
31	6/29/06	18.6	0.382	53	SCDHS
31	4/10/07	14.6	0.575	47	SCDHS
31	10/23/07	10.6	0.426	30	SCDHS
31	12/6/07	----	0.37	29	SCDHS
31	1/23/08	----	0.46	29	SCDHS
South Country Road Station:					
OWR5	10/31/72	0.08	0.311	10	SCDHS
OWR5	2/5/73	0.07	0.206	10	SCDHS
OWR5	4/16/73	0.05	0.004	9	SCDHS
OWR5	7/9/73	0.14	1.202	9	SCDHS
OWR5	10/16/73	0.08	0.100	8	SCDHS
OWR5	1/24/74	0.13	0.390	2	SCDHS
OWR5	3/26/74	0.28	0.350	5	SCDHS
OWR5	6/19/74	0.10	0.238	12	SCDHS
OWR5	2/18/75	0.10	0.134	18	SCDHS
OWR5	5/27/75	0.10	0.110	15	SCDHS
OWR5	7/28/80	0.10	----	34	SCDHS
OWR5	12/19/84	0.10	----	10	SCDHS
OWR5	7/2/85	0.05	0.282	11	SCDHS
OWR5	7/10/86	0.10	0.383	11	SCDHS
OWR5	7/22/87	0.09	0.343	14	SCDHS
OWR5	8/2/90	2.40	----	24	SCDHS
OWR5	5/6/92	0.02	----	14	SCDHS
OWR5	8/2/93	0.59	----	17	SCDHS
OWR5	8/9/94	0.27	0.830	20	SCDHS
OWR5	10/18/95	0.24	0.320	18	SCDHS
OWR5	10/1/96	1.17	0.830	26	SCDHS
OWR5	9/18/97	1.18	----	24	SCDHS
32	09/26/02	3.9	0.75	----	SCDHS
32	10/31/02	5.2	0.66	27	SCDHS
32	11/27/02	4.3	0.58	----	SCDHS
32	03/26/03	7.5	0.77	49	SCDHS
32	04/22/03	11.0	0.49	----	SCDHS

Station No:
BD1 - BD4: Cashin Associates (CA) and/or Dvirka & Bartilucci (DB) sampling station
30-33, 38: SCDHS Office of Ecology sampling station
OWR2, 5, 20 – SCDHS Office of Water Resources sampling station
nd = not detected
---- = not analyzed

Station No.	Sampling Date	Ammonia (mg/l)	Nitrite+Nitrate (mg/l)	Chloride (mg/l)	Sample Collected By
32	05/05/03	13.0	0.63	----	SCDHS
32	05/12/03	1.3	0.60	45	SCDHS
32	06/18/03	8.0	0.78	33	SCDHS
32	07/30/03	13.5	1.0	53	SCDHS
32	08/29/03	11.8	1.2	46	SCDHS
32	09/30/03	8.0	1.1	38	SCDHS
32	10/14/03	6.6	1.1	35	SCDHS
32	10/15/03	6.2	1.6	39	SCDHS
32	10/16/03	3.7	1.0	----	SCDHS
32	11/19/03	6.0	1.1	33	SCDHS
32	10/26/04	4.5	0.76	27	SCDHS
32	12/22/04	5.0	0.85	29	SCDHS
32	1/11/2005	5.2	0.99	29	SCDHS
32	5/31/06	12.3	0.70	42	SCDHS
32	6/29/06	10.5	0.70	41	SCDHS
32	4/10/07	8.7	0.90	36	SCDHS
32	10/23/07	3.43	1.16	21	SCDHS
32	12/6/07	----	1.14	21	SCDHS
32	1/23/08	----	1.12	22	SCDHS
Beaverdam Road Station:					
OWR2	3/16/70	0.11	0.232	28	SCDHS
OWR2	7/29/70	0.23	0.305	17	SCDHS
OWR2	12/16/70	0.09	0.406	230	SCDHS
OWR2	5/25/71	0.26	0.050	2,900	SCDHS
OWR2	12/6/71	0.21	0.008	480	SCDHS
OWR2	4/25/72	0.09	0.416	129	SCDHS
OWR2	4/22/85	0.06	----	460	SCDHS
BD1	2/21/91	2.06	0.09	50	CA/DB
BD1	3/27/91	2.32	1.36	756	CA/DB
BD1	4/22/91	3.33	0.75	230	CA/DB
BD1	5/20/91	1.57	1.23	154	CA/DB
BD1	6/19/91	0.76	1.33	214	CA/DB
BD1	7/28/91	0.22	1.37	52	CA/DB
BD1	8/14/91	0.14	0.57	3,220	CA/DB
BD1	9/11/91	0.31	0.67	296	CA/DB
BD1	10/9/91	0.28	0.66	1,430	CA/DB
BD1	11/6/91	0.24	0.68	247	CA/DB
BD1	12/13/91	0.24	0.55	40	CA/DB
BD1	1/5/92	0.14	1	119	CA/DB

Station No:
BD1 - BD4: Cashin Associates (CA) and/or Dvirka & Bartilucci (DB) sampling station
30-33, 38: SCDHS Office of Ecology sampling station
OWR2, 5, 20 – SCDHS Office of Water Resources sampling station
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Station No.	Sampling Date	Ammonia (mg/l)	Nitrite+Nitrate (mg/l)	Chloride (mg/l)	Sample Collected By
BD1	9/22/92	0.19	0.52	85	CA/DB
BD1	1/27/93	6.31	0.7	30	CA/DB
BD1	2/24/93	0.54	0.55	119	CA/DB
BD1	7/22/94	1.07	0.76	110	CA/DB
BD1	4/13/95	nd	0.48	148	CA/DB
33	9/26/02	1.1	0.76	----	SCDHS
33	10/31/02	1.6	0.90	505	SCDHS
33	11/27/02	1.8	0.75	----	SCDHS
33	3/26/03	2.1	1.2	107	SCDHS
33	4/22/03	3.5	0.93	----	SCDHS
33	5/5/03	0.89	1.7	----	SCDHS
33	6/18/03	0.70	1.0	41	SCDHS
33	7/30/03	2.6	1.5	147	SCDHS
33	8/29/03	3.3	1.7	328	SCDHS
33	9/30/03	2.4	1.3	292	SCDHS
33	10/14/03	1.4	1.3	344	SCDHS
33	10/15/03	2.5	0.92	1,374	SCDHS
33	10/16/03	1.3	1.2	----	SCDHS
33	11/19/03	2.6	1.2	167	SCDHS
33	10/26/04	1.9	0.75	927	SCDHS
33	12/22/04	1.3	1.4	109	SCDHS
33	1/11/05	1.13	1.64	345	SCDHS
33	5/31/06	1.82	1.42	60	SCDHS
33	6/29/06	2.88	1.19	34	SCDHS
33	4/10/07	5.0	1.13	32	SCDHS
33	10/23/07	0.96	1.06	185	SCDHS
33	1/23/08	----	1.09	500	SCDHS

Station No:
BD1 - BD4: Cashin Associates (CA) and/or Dvirka & Bartilucci (DB) sampling station
30-33, 38: SCDHS Office of Ecology sampling station
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Appendix III. Beaver Dam Creek Water Quality Monitoring Organic Analytes

Methyl Carbamate Pesticides (EPA Method 531.1):		
3-Hydroxycarbofuran	A-Naphthol	Methomyl
Aldicarb	Carbaryl	Oxamyl
Aldicarb sulfone	Carbofuran	Propoxur
Aldicarb sulfoxide	Methiocarb	
Chlorinated Pesticides (EPA Method 505):		
4,4 DDD	Dacthal	Gamma - BHC
4,4 DDE	Delta - BHC	Heptachlor
4,4 DDT	Dieldrin	Heptachlor epoxide
Alachlor	Endosulfan I	Methoxychlor
Aldrin	Endosulfan II	
Alpha - BHC	Endosulfan Sulfate	
Beta - BHC	Endrin	
Chlordane	Endrin aldehyde	
Microextractables (EPA Method 504.1):		
1,2-dibromo-3-chloropropane		
1,2-dibromoethane		
Dacthal Metabolites (Suffolk County Method 1):		
Monomethyltetrachloroterephthalate	Tetrachloroterephthalic Acid	
Herbicide Metabolites (Suffolk County Method 2):		
2-Hydroxyatrazine	Didealkylatrazine	Metolachlor Metabolite (CGA-40172)
Alachlor ESA	Imidacloprid	Metolachlor Metabolite (CGA-41638)
Alachlor OA	Malaoxon	Metolachlor Metabolite (CGA-67125)
Deisopropylatrazine	Metolachlor ESA (CGA-354743)	Metolachlor OA (CGA-51202)
Desethylatrazine	Metolachlor Metabolite (CGA-37735)	
Semi-Volatile Organic Compounds (EPA Method 525.2):		
Acenaphthene	bis(2-ethylhexyl) phthalate	Cypermethrin
Acenaphthylene	Bisphenol A	Deltamethrin
Acetochlor	Bloc	Diazinon
Allethrin	Bromacil	Dibenzo(a,h)anthracene
Anthracene	Butachlor	Dibutyl phthalate
Atrazine	Butylated Hydroxyanisole	Dichlorbenil
Azoxystrobin	Butylated Hydroxytoluene	Dichlorvos
Benfluralin	Caffeine	Diethyl phthalate
Benzo(a)anthracene	Carisoprodol	Diethyltoluamide (DEET)
Benzo(b)fluoranthene	Chlorofenvinphos	Dimethyl phthalate
Benzo(ghi)perylene	Chlorothalonil	Dinoseb
Benzo(k)fluoranthene	Chloroxylenol	Dioctyl phthalate
Benzo-a-pyrene	Chlorpyriphos	Disulfoton
Benzophenone	Chrysene	Disulfoton sulfone
Benzyl butyl phthalate	Cyanazine	EPTC
bis(2-ethylhexyl) adipate	Cyfluthrin	Ethofumesate

Semi-Volatile Organic Compounds (EPA Method 525.2):		
Ethyl parathion	Methyl parathion	Pyrene
Fluoranthene	Metolachlor	Resmethrin
Fluorene	Metribuzin	Siduron
Gemfibrozil	Naled (Dibrom)	Simazine
Hexachlorobenzene	Napropamide	Sumithrin
Hexachlorocyclopentadiene	Pendimethalin	Tebuthiuron
Ibuprofen	Pentachlorobenzene	Terbacil
Indeno(1,2,3-cd)pyrene	Pentachloronitrobenzene	Terbufos
Iodofenphos	Permethrin	Triadimefon
Iprodione	Phenanthrene	Trichlorfon
Isofenphos	Piperonyl butoxide	Triclosan
Kelthane	Prometon	Trifluralin
Malathion	Prometryne	Vinclozolin
Metalaxyl	Propachlor	
Methoprene	Propiconazole	
Volatile Organic Compounds (EPA Method 524.2):		
1,1,1,2-Tetrachloroethane	Allyl chloride	Methacrylonitrile
1,1,1-Trichloroethane	Benzene	Methyl isothiocyanate
1,1,2,2-Tetrachloroethane	Bromobenzene	Methyl sulfide
1,1,2-Trichloroethane	Bromochloromethane	Methylene chloride
1,1-Dichloroethane	Bromodichloromethane	Methylmethacrylate
1,1-Dichloroethene	Bromoform	Methyl-tertiary-butyl-ether
1,1-Dichloropropene	Bromomethane	m-Xylene
1,2,3-Trichlorobenzene	Carbon disulfide	Naphthalene
1,2,3-Trichloropropane	Carbon tetrachloride	n-Butylbenzene
1,2,4,5-Tetramethylbenzene	Chlorobenzene	n-Propylbenzene
1,2,4-Trichlorobenzene	Chlorodibromomethane	o-Xylene
1,2,4-Trimethylbenzene	Chlorodifluoromethane	p-Diethylbenzene
1,2-Dichlorobenzene (o)	Chloroethane	p-Isopropyltoluene
1,2-Dichloroethane	Chloroform	p-Xylene
1,2-Dichloropropane	Chloromethane	sec-Butylbenzene
1,3,5-Trimethylbenzene	cis-1,2-Dichloroethene	tert-Amyl-Methyl-Ether
1,3-Dichloropropane	cis-1,3-Dichloropropene	tert-Butylbenzene
1,4 -Dichlorobenzene	Dibromomethane	tert-Butyl-Ethyl-Ether
1,4-Dichlorobutane	Dichlorodifluoromethane	Tetrachloroethene
1-Bromo-2-chloroethane	Diethyl ether	Tetrahydrofuran
2,2-Dichloropropane	Dimethyldisulfide	Toluene
2,3-Dichloropropene	d-Limonene	Total Chlorotoluene
2-Bromo-1-chloropropane	Ethenylbenzene (Styrene)	Total Xylene
2-Butanone (MEK)	Ethylbenzene	trans-1,2-Dichloroethene
2-Chlorotoluene	Ethylmethacrylate	trans-1,3-Dichloropropene
3-Chlorotoluene	Freon 113	Trichloroethene
4-Chlorotoluene	Hexachlorobutadiene	Trichlorofluoromethane
Acrylonitrile	Isopropylbenzene	Vinyl chloride

Appendix IV. Beaver Dam Creek Organic Compound Detects (ug/l)

			Station Number													
			Beaver Dam Creek Freshwater Sites					Beaver Dam Creek Tidal Sites				Little Neck Run			Yaphank Creek	
	Compound Name	**Sampling Date**	**38**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**41**	**42**	**43**	**44**	**45**
Semi-Volatile Organic Compounds (SVOCs)	Acenaphthene	03/26/03	---	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	**0.2**	*nd*	---	---	---	---	---
	Bisphenol-A	5/31/06	**3.6**	**3.4**	**2.5**	*nd*	*nd*	---	---	---	---	---	---	---	---	---
		6/29/06	*nd*	**3.1**	**2.3**	*nd*	*nd*	---	---	---	---	---	---	---	---	---
		4/10/07	*nd*	**2.1**	**2.0**	*nd*	*nd*	---	---	---	---	---	---	---	---	---
		10/23/07	*nd*	*nd*	*nd*	*nd*	*nd*	---	---	---	---	**2.8**	*nd*	*nd*	*nd*	*nd*
		1/23/08	*nd*	*nd*	*nd*	*nd*	*nd*	---	---	---	---	**4.5**	---	*nd*	*nd*	---
	Carisoprodol	10/31/02	---	*nd*	**0.3**	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	---	---	---	---	---
	Diethyltoluamide (DEET)	10/31/02	---	*nd*	**1.4**	**0.6**	**0.3**	*nd*	*nd*	*nd*	*nd*	---	---	---	---	---
		03/26/03	---	**0.7**	**0.9**	**0.7**	**0.3**	**0.4**	*nd*	*nd*	*nd*	---	---	---	---	---
		09/30/03	---	**0.7**	**1.1**	**0.5**	**0.2**	---	---	---	---	---	---	---	---	---
		05/31/06	**1.3**	**0.7**	**0.7**	**0.6**	*nd*	---	---	---	---	---	---	---	---	---
		06/29/06	**0.4**	**0.7**	**0.9**	**0.5**	**0.2**	---	---	---	---	---	---	---	---	---
		4/10/07	**0.3**	**0.5**	**0.7**	**0.5**	**0.3**	---	---	---	---	---	---	---	---	---
		10/23/07	*nd*	*nd*	**0.6**	*nd*	*nd*	---	---	---	---	**1.1**	*nd*	*nd*	*nd*	*nd*
		12/6/07	*nd*	*nd*	**0.5**	*nd*	---	---	---	---	---	**1.3**	---	*nd*	*nd*	*nd*
		1/23/08	*nd*	*nd*	**0.5**	**0.2**	*nd*	---	---	---	---	**1.6**	---	*nd*	*nd*	---
	Ibuprofen	10/31/02	---	*nd*	**1.3**	**0.6**	**0.2**	*nd*	*nd*	*nd*	*nd*	---	---	---	---	---
		03/26/03	---	**0.8**	**1.0**	**0.7**	**0.3**	**0.3**	*nd*	*nd*	*nd*	---	---	---	---	---
		09/30/03	---	**1.5**	**1.9**	**1.0**	**0.3**	---	---	---	---	---	---	---	---	---
		06/29/06	*nd*	**0.3**	**0.4**	**0.3**	*nd*	---	---	---	---	---	---	---	---	---
Volatile Organic Compounds (VOCs)	1,1-Dichloroethane	03/26/03	---	**0.6**	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	---	---	---	---	---
		04/22/03	---	**0.8**	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	---	---	---	---	---
		08/29/03	---	**0.6**	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	---	---	---	---	---
		09/30/03	---	**0.6**	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	---	---	---	---	---
		05/31/06	**0.6**	**0.6**	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	---	---	---	---	---
	1,2,4-Trimethylbenzene	10/31/02	---	*nd*	*nd*	*nd*	*nd*	**3.0**	*nd*	*nd*	*nd*	---	---	---	---	---
	1,3,5-Trimethylbenzene	10/31/02	---	*nd*	*nd*	*nd*	*nd*	**0.8**	*nd*	*nd*	*nd*	---	---	---	---	---

nd = not detected
--- = not sampled

	Compound Name	Sampling Date	Station Number													
			Beaver Dam Creek Freshwater Sites					Beaver Dam Creek Tidal Sites				Little Neck Run			Yaphank Creek	
			38	30	31	32	33	34	35	36	37	41	42	43	44	45
Volatile Organic Compounds (VOCs)	1,4-Dichlorobenzene	10/31/02	---	nd	**0.8**	nd	nd	nd	nd	nd	nd	---	---	---	---	---
		03/26/03	---	nd	**0.6**	nd	nd	nd	nd	nd	nd	---	---	---	---	---
		07/30/03	---	**0.9**	**0.8**	**0.5**	nd	nd	nd	nd	nd	---	---	---	---	---
		08/29/03	---	**0.8**	**0.8**	nd	nd	nd	nd	nd	nd	---	---	---	---	---
		09/30/03	---	**0.8**	**0.6**	nd	nd	nd	nd	nd	nd	---	---	---	---	---
		10/15/03	---	**0.6**	nd	nd	nd	nd	nd	nd	nd	---	---	---	---	---
		10/26/04	nd	nd	**0.9**	nd	nd	---	---	---	---	---	---	---	---	---
		12/22/04	nd	nd	**0.6**	nd	nd	---	---	---	---	---	---	---	---	---
		01/11/05	nd	nd	**0.6**	nd	nd	---	---	---	---	---	---	---	---	---
		05/31/06	**1.4**	**0.7**	**0.7**	nd	nd	nd	nd	nd	nd	---	---	---	---	---
		06/29/06	---	**0.5**	**0.5**	nd	nd	nd	nd	nd	nd	---	---	---	---	---
		10/23/07	nd	nd	**0.8**	nd	nd	---	---	---	---	**0.6**	nd	nd	nd	nd
		12/6/07	nd	nd	**0.7**	nd	---	---	---	---	---	**0.6**	---	nd	nd	nd
		1/23/08	nd	nd	**0.5**	nd	nd	---	---	---	---	**0.5**	---	nd	nd	---
	Benzene	10/31/02	---	nd	nd	nd	nd	**0.8**	nd	nd	nd	---	---	---	---	---
	Chlorobenzene	07/30/03	---	**0.5**	nd	nd	nd	nd	nd	nd	nd	---	---	---	---	---
		08/29/03	---	**0.6**	**0.5**	nd	nd	nd	nd	nd	nd	---	---	---	---	---
		05/31/06	**2.8**	**0.6**	**0.5**	nd	nd	nd	nd	nd	nd	---	---	---	---	---
		06/29/06	**0.5**	nd	nd	nd	nd	nd	nd	nd	nd	---	---	---	---	---
	Chlorodifluoromethane	05/31/06	**0.5**	nd	nd	nd	nd	nd	nd	nd	nd	---	---	---	---	---
		10/23/07	nd	nd	nd	nd	nd	---	---	---	---	**0.7**	nd	nd	nd	nd
	Chloroform	07/30/03	---	nd	nd	nd	**0.7**	nd	nd	nd	nd	---	---	---	---	---
		08/29/03	---	nd	nd	nd	**0.5**	nd	nd	nd	nd	---	---	---	---	---
	Diethyl ether	10/31/02	---	nd	**3.0**	**1.0**	nd	nd	nd	nd	nd	---	---	---	---	---
		11/27/02	---	nd	**1.0**	**1.0**	nd	nd	nd	nd	nd	---	---	---	---	---
		04/22/03	---	**1.0**	**1.0**	**1.0**	nd	nd	nd	nd	nd	---	---	---	---	---
		06/18/03	---	**1.0**	**0.9**	**1.0**	nd	**0.6**	**0.7**	nd	nd	---	---	---	---	---
		07/30/03	---	**1.0**	**2.0**	**1.0**	nd	**0.7**	**0.6**	nd	nd	---	---	---	---	---
		08/29/03	---	nd	**2.0**	**1.0**	nd	nd	nd	nd	nd	---	---	---	---	---
		09/30/03	---	**1.0**	**2.0**	**1.0**	nd	nd	nd	nd	nd	---	---	---	---	---

nd = not detected
--- = not sampled

			Station Number													
			Beaver Dam Creek Freshwater Sites					Beaver Dam Creek Tidal Sites				Little Neck Run			Yaphank Creek	
	Compound Name	Sampling Date	38	30	31	32	33	34	35	36	37	41	42	43	44	45
Volatile Organic Compounds (VOCs)	Diethyl ether	11/19/03	---	0.6	1.0	0.8	nd	nd	nd	nd	nd	---	---	---	---	---
		10/26/04	nd	nd	2.0	0.7	nd	---	---	---	---	---	---	---	---	---
		12/22/04	nd	nd	1.0	0.9	nd	---	---	---	---	---	---	---	---	---
		01/11/05	nd	nd	2.0	1.0	nd	---	---	---	---	---	---	---	---	---
		05/31/06	1.2	0.6	0.9	0.9	nd	nd	nd	nd	nd	---	---	---	---	---
		06/29/06	nd	nd	0.8	0.7	nd	nd	nd	nd	nd	---	---	---	---	---
		4/10/07	nd	nd	0.6	nd	nd	---	---	---	---	---	---	---	---	---
		10/23/07	nd	nd	0.7	nd	nd	---	---	---	---	1.9	nd	nd	nd	nd
		12/6/07	nd	nd	nd	nd	---	---	---	---	---	2.1	---	nd	nd	nd
		1/23/08	nd	nd	0.7	nd	nd	---	---	---	---	2.2	---	nd	nd	---
	Ethylbenzene	10/31/02	---	nd	nd	nd	nd	2.0	nd	nd	nd	---	---	---	---	---
	Methyl sulfide	03/26/03	---	nd	nd	nd	nd	0.8	4.0	1.0	0.5	---	---	---	---	---
		06/18/03	---	nd	nd	nd	nd	nd	nd	nd	0.9	---	---	---	---	---
		08/29/03	---	nd	nd	nd	nd	1.0	0.7	nd	nd	---	---	---	---	---
		09/30/03	---	nd	nd	nd	nd	0.5	1.0	2.0	nd	---	---	---	---	---
		12/22/04	nd	nd	nd	nd	0.6	---	---	---	---	---	---	---	---	---
		05/31/06	nd	nd	nd	nd	nd	nd	1.3	1.9	1.0	---	---	---	---	---
	Methyl-tertiary-butyl-ether (MTBE)	10/31/02	---	nd	nd	nd	nd	21.0	0.8	0.8	0.6	---	---	---	---	---
		11/27/02	---	nd	nd	nd	nd	3.0	nd	nd	nd	---	---	---	---	---
		03/26/03	---	0.7	nd	nd	nd	1.0	3.0	2.0	12.0	---	---	---	---	---
		04/22/03	---	0.7	0.5	nd	nd	5.0	nd	1.0	7.0	---	---	---	---	---
		06/18/03	---	nd	0.7	nd	nd	0.8	0.7	0.7	0.7	---	---	---	---	---
		07/30/03	---	nd	0.6	nd	nd	0.9	0.9	2.0	1.0	---	---	---	---	---
		08/29/03	---	0.9	0.6	nd	nd	0.8	1.0	3.0	2.0	---	---	---	---	---
		09/30/03	---	0.6	nd	nd	nd	0.5	0.7	1.0	0.6	---	---	---	---	---
		10/15/03	---	nd	nd	nd	nd	0.5	0.7	2.0	nd	---	---	---	---	---
		11/19/03	---	nd	2.0	0.5	nd	nd	3.0	1.0	nd	---	---	---	---	---
		12/6/07	nd	nd	nd	nd	---	---	---	---	---	0.7	---	nd	nd	nd
		1/23/08	nd	nd	nd	nd	nd	---	---	---	---	nd	---	nd	nd	---

nd = not detected
--- = not sampled

			Station Number													
			Beaver Dam Creek Freshwater Sites					Beaver Dam Creek Tidal Sites				Little Neck Run			Yaphank Creek	
	Compound Name	**Sampling Date**	**38**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**41**	**42**	**43**	**44**	**45**
Volatile Organic Compounds (VOCs)	Naphthalene	10/31/02	---	*nd*	*nd*	*nd*	*nd*	**0.7**	*nd*	*nd*	*nd*	---	---	---	---	---
		03/26/03	---	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	**0.3**	*nd*	---	---	---	---	---
		05/31/06	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	**3.2**	---	---	---	---	---
	tert-Amyl-Methyl-Ether	10/31/02	---	*nd*	*nd*	*nd*	*nd*	**1.0**	*nd*	*nd*	*nd*	---	---	---	---	---
	Toluene	10/31/02	---	*nd*	*nd*	*nd*	*nd*	**8.0**	*nd*	*nd*	*nd*	---	---	---	---	---
		03/26/03	---	*nd*	*nd*	*nd*	*nd*	*nd*	**1.0**	*nd*	**2.0**	---	---	---	---	---
		04/22/03	---	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	*nd*	**1.0**	---	---	---	---	---
		11/19/03	---	*nd*	*nd*	*nd*	*nd*	*nd*	**0.8**	*nd*	*nd*	---	---	---	---	---
	Total Xylene	10/31/02	---	*nd*	*nd*	*nd*	*nd*	**9.0**	*nd*	*nd*	*nd*	---	---	---	---	---
		03/26/03	---	*nd*	*nd*	*nd*	*nd*	*nd*	**0.8**	*nd*	**1.0**	---	---	---	---	---
		04/22/03	---	*nd*	*nd*	*nd*	*nd*	**0.6**	*nd*	*nd*	**0.9**	---	---	---	---	---
		11/19/03	---	*nd*	*nd*	*nd*	*nd*	*nd*	**0.6**	*nd*	*nd*	---	---	---	---	---

nd = not detected
--- = not sampled

Appendix V. Beaver Dam Creek Metal Results (Dissolved)

Date	Station	Aluminum (ug/l)	Antimony (ug/l)	Arsenic (ug/l)	Barium (ug/l)	Beryllium (ug/l)	Cadmium (ug/l)	Calcium (mg/l)	Chromium (ug/l)	Cobalt (ug/l)	Copper (ug/l)	Iron (mg/l)	Lead (ug/l)	Magnesium (mg/l)	Manganese (mg/l)	Mercury (ug/l)	Molybdenum (ug/l)	Nickel (ug/l)	Potassium (mg/l)	Selenium (ug/l)	Silver (ug/l)	Sodium (mg/l)	Thallium (ug/l)	Thorium (ug/l)	Titanium (ug/l)	Uranium (ug/l)	Vanadium (ug/l)	Zinc (ug/l)
10/31/02	30	67.9	3.95	< 2	78.3	< 1	< 1	9.0	< 1	< 1	1.41	0.25	< 1	3.47	----	< 0.4	< 1	2.16	3.3	< 2	< 5	10.7	< 0.5	< 1	< 1	< 1	< 1	< 50
11/27/02	30	130	< 1	< 2	108	< 1	1.71	5.0	3.43	< 1	6.40	0.21	< 1	2.44	2.22	< 0.4	< 1	17.10	2.9	< 2	< 5	8.4	< 0.5	< 1	1.65	< 1	< 1	85
3/26/03	30	41.7	< 1	< 2	87.1	< 1	< 1	8.2	1.90	1.07	2.77	< 0.1	< 1	4.96	2.67	< 0.4	< 1	5.29	19.5	< 2	< 5	43.1	< 0.5	< 1	< 1	< 1	< 1	57
4/22/03	30	68.3	< 1	< 2	64.1	< 1	< 1	7.8	2.43	1.28	1.75	< 0.1	< 1	4.95	2.96	< 0.4	< 1	5.19	19.2	< 2	< 5	39.0	0.51	< 1	< 1	< 1	1.00	< 50
6/18/03	30	113	< 1	< 2	56.1	< 1	< 1	18.1	< 1	1.90	2.40	0.23	1.50	5.42	3.16	< 0.4	< 1	6.50	20.1	< 4	< 5	41.2	< 0.5	< 4	1.60	< 1	< 1	< 50
7/30/03	30	29.9	< 1	< 2	101	< 1	< 1	16.1	3.40	2.80	1.50	0.56	< 1	6.98	8.90	< 0.4	< 1	8.80	29.2	< 4	< 5	47.7	< 0.5	< 4	1.90	< 1	1.00	< 50
8/29/03	30	92.0	< 1	< 2	144	< 1	< 1	18.5	9.10	4.10	< 1	1.48	< 1	7.69	9.91	< 0.4	< 1	9.90	29.3	< 4	< 5	52.7	< 0.5	< 4	< 1	< 1	2.90	154
9/30/03	30	97.7	< 1	< 2	135	< 1	< 1	13.3	1.90	4.10	2.40	0.60	1.20	6.61	8.83	< 0.4	1.20	8.50	27.9	< 4	< 5	47.2	0.74	< 4	1.50	< 1	< 1	186
10/14/03	30	32.2	< 1	< 2	133	< 1	< 1	9.0	1.90	2.22	1.25	0.49	< 1	5.71	7.28	< 0.4	< 1	6.11	23.5	< 4	< 5	45.2	< 0.5	< 4	< 1	< 1	< 1	< 50
10/15/03	30	47.2	< 1	< 2	134	< 1	< 1	10.3	< 1	2.49	< 1	0.66	1.23	6.03	7.28	< 0.4	< 1	6.56	23.7	< 4	< 5	45.4	----	< 4	< 1	< 1	< 1	66
10/16/03	30	36.5	< 1	< 2	132	< 1	< 1	8.6	< 1	2.26	< 1	0.44	< 1	5.64	7.12	< 0.4	< 1	6.59	21.0	< 4	< 5	43.8	< 0.5	< 4	< 1	< 1	< 1	< 50
11/19/03	30	47.5	< 1	< 2	106	< 1	< 1	7.9	< 1	2.13	< 1	0.33	< 1	5.03	5.87	< 0.4	< 1	5.04	19.0	< 4	< 5	38.5	0.54	< 4	< 1	< 1	< 1	56
10/26/04	30	27.4	< 1	< 2	95.9	< 1	< 1	4.7	< 1	< 1	< 1	0.65	< 1	1.84	2.67	< 0.4	< 1	1.24	3.7	< 4	< 5	10.1	< 0.5	< 4	< 1	< 1	< 1	< 50
12/22/04	30	25.3	< 1	< 2	67.2	< 1	< 1	3.6	< 1	< 1	< 1	0.24	< 1	1.92	2.02	< 0.4	< 1	< 1	4.4	< 4	< 5	12.3	< 0.5	< 4	< 1	< 1	< 1	< 50
1/11/05	30	50.2	< 1	< 2	65.5	< 1	< 1	3.8	< 1	< 1	1.77	0.27	< 1	1.93	1.98	< 0.4	< 1	< 1	4.4	< 4	< 5	12.4	< 0.5	< 4	< 1	< 1	< 1	< 50
05/31/06	30	21.6	< 1	< 2	114	< 1	< 1	14.2	2.25	4.03	< 1	1.47	1.14	5.64	5.18	< 0.4	< 1	6.12	23.6	< 4	< 5	39.5	< 0.5	< 4	< 1	< 1	< 1	< 50
06/29/06	30	25.2	< 1	< 2	118	< 1	< 1	14.0	1.23	4.00	< 1	1.61	< 1	5.34	5.54	< 0.4	< 1	5.96	19.6	< 4	< 5	38.9	< 0.5	< 4	< 1	< 1	< 1	< 50
10/23/07	30	26.2	< 1	< 2	101	< 1	< 1	16.1	< 1	1.39	< 1	0.685	< 1	2.45	2.62	< 0.4	< 1	1.27	6.22	< 4	< 5	14	< 0.5	< 4	< 1	< 1	< 1	< 50
12/6/07	30	12.1	< 1	< 2	61.4	< 1	< 1	3.75	< 1	< 1	< 1	0.369	< 1	1.69	1.72	< 0.4	< 1	< 1	4.31	< 4	< 5	9.99	< 0.5	< 4	< 1	< 1	< 1	< 50

Results that exceed NYS standards for Class C waters (6NYCRR 703.5) are shaded yellow

Date	Station	Aluminum (ug/l)	Antimony (ug/l)	Arsenic (ug/l)	Barium (ug/l)	Beryllium (ug/l)	Cadmium (ug/l)	Calcium (mg/l)	Chromium (ug/l)	Cobalt (ug/l)	Copper (ug/l)	Iron (mg/l)	Lead (ug/l)	Magnesium (mg/l)	Manganese (mg/l)	Mercury (ug/l)	Molybdenum (ug/l)	Nickel (ug/l)	Potassium (mg/l)	Selenium (ug/l)	Silver (ug/l)	Sodium (mg/l)	Thallium (ug/l)	Thorium (ug/l)	Titanium (ug/l)	Uranium (ug/l)	Vanadium (ug/l)	Zinc (ug/l)
1/23/08	30	15.1	< 1	< 2	59.1	< 1	< 1	3.87	< 1	< 1	< 1	0.342	< 1	1.83	1.84	< 0.4	< 1	< 1	4.41	< 4	< 5	10.3	< 0.5	< 4	< 1	< 1	< 1	< 50
10/31/02	31	26.1	< 1	< 2	165	< 1	< 1	16.4	< 1	4.64	1.05	0.13	< 1	9.50	----	< 0.4	< 1	7.20	16.5	< 2	< 5	39.0	< 0.5	< 1	< 1	< 1	< 1	< 50
11/27/02	31	153	< 1	< 2	206	< 1	1.58	12.1	11.5	4.36	2.30	0.17	3.76	5.65	2.09	< 0.4	< 1	21.10	10.7	< 2	< 5	159	0.76	< 1	4.36	< 1	< 1	86
3/26/03	31	28.7	< 1	< 2	97.7	< 1	< 1	12.9	3.54	2.11	1.57	< 0.1	< 1	6.88	0.55	< 0.4	< 1	5.62	16.3	< 2	< 5	42.7	< 0.5	< 1	< 1	< 1	1.15	< 50
4/22/03	31	88.8	< 1	< 2	74.4	< 1	< 1	12.8	3.21	1.62	2.02	0.11	1.30	5.84	2.78	< 0.4	< 1	5.24	14.9	< 2	< 5	37.6	< 0.5	< 1	< 1	< 1	1.34	70
6/18/03	31	95.3	< 1	< 2	58.8	< 1	< 1	12.1	2.49	1.45	3.00	0.22	2.89	3.89	2.13	< 0.4	< 1	4.21	11.6	< 4	< 5	27.5	< 0.5	< 4	1.78	< 1	< 1	86
7/30/03	31	40.9	< 1	< 2	105	< 1	< 1	18.4	3.00	3.00	1.70	0.43	< 1	7.49	7.90	< 0.4	< 1	8.50	25.0	< 4	< 5	46.3	< 0.5	< 4	1.50	< 1	1.00	< 50
8/29/03	31	237	< 1	< 2	134	< 1	< 1	27.1	4.30	3.90	1.10	0.95	< 1	9.39	7.70	< 0.4	< 1	10.10	24.0	< 4	< 5	52.0	< 0.5	< 4	< 1	< 1	1.60	384
9/30/03	31	63.1	< 1	< 2	115	< 1	< 1	18.0	2.00	4.20	2.20	0.38	1.40	7.95	6.21	< 0.4	< 1	8.40	20.4	< 4	< 5	44.0	< 0.5	< 4	< 1	< 1	< 1	129
10/14/03	31	19.7	< 1	< 2	112	< 1	< 1	14.8	1.42	2.44	1.50	0.34	1.19	7.82	4.89	< 0.4	< 1	5.98	16.8	< 4	< 5	42.3	< 0.5	< 4	< 1	< 1	< 1	< 50
10/15/03	31	34.0	< 1	< 2	121	< 1	< 1	14.7	< 1	2.48	< 1	0.43	< 1	7.73	----	< 0.4	< 1	6.93	17.6	< 4	< 5	44.1	----	< 4	< 1	< 1	< 1	< 50
10/16/03	31	----	----	----	----	----	----	16.1	----	----	----	0.38	----	8.02	----	----	----	----	17.0	----	----	43.0	----	----	----	----	----	----
11/19/03	31	80.3	< 1	< 2	100	< 1	< 1	22.5	< 1	2.81	< 1	0.30	< 1	6.91	4.26	< 0.4	< 1	6.94	14.0	< 4	< 5	34.3	< 0.5	< 4	< 1	< 1	< 1	155
10/26/04	31	33.5	< 1	< 2	121	< 1	< 1	18.2	2.30	3.44	1.90	0.17	< 1	8.35	3.73	< 0.4	< 1	6.98	11.7	< 4	< 5	32.2	< 0.5	< 4	< 1	< 1	< 1	< 50
12/22/04	31	16.1	< 1	< 2	120	< 1	< 1	16.8	2.72	2.84	< 1	0.11	< 1	6.89	4.21	< 0.4	< 1	5.28	10.9	< 4	< 5	30.8	< 0.5	< 4	< 1	< 1	< 1	< 50
1/11/05	31	132	< 1	< 2	116	< 1	< 1	16.1	2.64	2.67	1.40	0.15	< 1	6.23	4.03	< 0.4	< 1	5.45	10.7	< 4	< 5	28.8	< 0.5	< 4	1.19	< 1	1.03	239
05/31/06	31	17.6	< 1	< 2	112	< 1	< 1	15.3	2.18	3.81	< 1	0.73	< 1	6.47	5.32	< 0.4	< 1	6.28	19.9	< 4	< 5	38.3	< 0.5	< 4	< 1	< 1	< 1	< 50
06/29/06	31	25.2	< 1	< 2	118	< 1	< 1	22.3	1.19	3.74	< 1	0.90	< 1	6.21	5.31	< 0.4	< 1	5.97	17.3	< 4	< 5	38.4	< 0.5	< 4	< 1	< 1	< 1	< 50
10/23/07	31	27.8	< 1	< 2	110	< 1	< 1	25.3	< 1	3.24	< 1	0.436	< 1	5.76	4.69	< 0.4	< 1	4.6	10.4	< 4	< 5	26.2	< 0.5	< 4	< 1	< 1	< 1	< 50
12/6/07	31	8.71	< 1	< 2	96.6	< 1	< 1	14.6	< 1	3.31	< 1	0.32	< 1	5.38	4.84	< 0.4	< 1	5.05	9.58	< 4	< 5	24.7	< 0.5	< 4	< 1	< 1	< 1	< 50

Results that exceed NYS standards for Class C waters (6NYCRR 703.5) are shaded yellow

Date	Station	Aluminum (ug/l)	Antimony (ug/l)	Arsenic (ug/l)	Barium (ug/l)	Beryllium (ug/l)	Cadmium (ug/l)	Calcium (mg/l)	Chromium (ug/l)	Cobalt (ug/l)	Copper (ug/l)	Iron (mg/l)	Lead (ug/l)	Magnesium (mg/l)	Manganese (mg/l)	Mercury (ug/l)	Molybdenum (ug/l)	Nickel (ug/l)	Potassium (mg/l)	Selenium (ug/l)	Silver (ug/l)	Sodium (mg/l)	Thallium (ug/l)	Thorium (ug/l)	Titanium (ug/l)	Uranium (ug/l)	Vanadium (ug/l)	Zinc (ug/l)
1/23/08	31	11.5	< 1	< 2	83	< 1	< 1	11.5	1.36	2.77	1.3	0.23	2.24	4.99	5.07	< 0.4	< 1	3.63	9.17	< 4	< 5	23.5	< 0.5	< 4	< 1	< 1	< 1	< 50
10/31/02	32	19.1	< 1	< 2	69.3	< 1	< 1	11.9	1.02	1.47	< 1	0.27	< 1	5.95	1.22	< 0.4	< 1	3.28	5.1	< 2	< 5	19.4	< 0.5	< 1	< 1	< 1	< 1	< 50
11/27/02	32	75.9	< 1	< 2	122	< 1	< 1	10.7	7.35	2.47	1.17	0.26	1.24	5.39	2.20	< 0.4	< 1	18.3	5.0	< 2	< 5	39.1	0.84	< 1	1.66	< 1	< 1	77
3/26/03	32	24.7	< 1	< 2	73.1	< 1	< 1	13.2	4.74	1.59	1.26	0.29	< 1	6.56	1.72	< 0.4	< 1	4.19	8.7	< 2	< 5	29.8	< 0.5	< 1	< 1	< 1	1.42	< 50
4/22/03	32	69.4	< 1	< 2	60.6	< 1	< 1	13.1	2.94	1.29	2.36	0.31	2.32	5.36	1.71	< 0.4	< 1	4.48	8.8	< 2	< 5	29.9	< 0.5	< 1	1.79	< 1	< 1	59
6/18/03	32	74.4	< 1	< 2	52.0	< 1	< 1	11.3	1.70	1.50	2.80	0.28	2.20	4.08	1.59	< 0.4	< 1	3.90	9.0	< 4	< 5	25.5	< 0.5	< 4	1.30	< 1	< 1	67
7/30/03	32	103	< 1	2.10	77.8	< 1	< 1	19.1	2.50	1.90	< 1	0.24	< 1	6.65	4.53	< 0.4	< 1	8.50	15.3	< 4	< 5	34.9	< 0.5	< 4	1.50	< 1	1.00	< 50
8/29/03	32	172	< 1	< 2	83.4	< 1	< 1	21.8	3.00	1.90	< 1	0.78	2.80	7.10	3.85	< 0.4	< 1	6.40	11.5	< 4	< 5	33.5	< 0.5	< 4	1.90	< 1	1.10	171
9/30/03	32	25.1	< 1	< 2	71.8	< 1	< 1	13.9	1.60	2.40	1.60	0.24	1.20	6.16	3.04	< 0.4	< 1	5.30	9.5	< 4	< 5	28.8	< 0.5	< 4	< 1	< 1	< 1	< 50
10/14/03	32	34.9	< 1	< 2	74.5	< 1	< 1	13.4	< 1	1.31	< 1	0.28	< 1	6.02	2.84	< 0.4	< 1	3.60	7.9	< 4	< 5	26.7	< 0.5	< 4	< 1	< 1	< 1	72
10/15/03	32	31.6	< 1	< 2	84.6	< 1	< 1	11.8	< 1	< 1	< 1	0.32	< 1	5.94	2.52	< 0.4	< 1	4.02	8.4	< 4	< 5	28.5	< 0.5	< 4	< 1	< 1	< 1	< 50
10/16/03	32	59.2	< 1	< 2	76.2	< 1	< 1	13.6	< 1	1.03	< 1	0.21	1.54	5.95	2.32	< 0.4	< 1	3.48	7.2	< 4	< 5	26.2	< 0.5	< 4	< 1	< 1	< 1	88
11/19/03	32	13.6	< 1	< 2	63.0	< 1	< 1	13.3	< 1	1.33	< 1	0.23	< 1	5.09	2.22	< 0.4	< 1	3.71	6.3	< 4	< 5	22.0	< 0.5	< 4	< 1	< 1	< 1	< 50
10/26/04	32	23.8	< 1	< 2	74.9	< 1	< 1	11.6	1.87	1.26	< 1	0.23	< 1	5.11	1.56	< 0.4	< 1	3.38	4.4	< 4	< 5	18.5	< 0.5	< 4	< 1	< 1	< 1	< 50
12/22/04	32	20.0	< 1	< 2	68.9	< 1	< 1	12.9	1.96	1.30	< 1	0.15	< 1	5.43	1.62	< 0.4	< 1	3.34	5.8	< 4	< 5	22.2	< 0.5	< 4	< 1	< 1	< 1	< 50
1/11/05	32	14.8	< 1	< 2	67.5	< 1	< 1	11.1	1.80	1.39	< 1	0.19	< 1	5.00	1.72	< 0.4	< 1	3.16	5.4	< 4	< 5	20.7	< 0.5	< 4	< 1	< 1	< 1	< 50
05/31/06	32	17.4	< 1	< 2	77.3	< 1	< 1	14.5	1.31	2.36	< 1	0.39	1.20	6.03	3.00	< 0.4	< 1	4.72	11.8	< 4	< 5	29.9	< 0.5	< 4	< 1	< 1	< 1	< 50
06/29/06	32	22.9	< 1	< 2	79.4	< 1	< 1	13.8	< 1	2.24	< 1	0.43	< 1	5.45	3.20	< 0.4	< 1	4.30	10.3	< 4	< 5	28.9	< 0.5	< 4	< 1	< 1	< 1	< 50
10/23/07	32	106	< 1	< 2	63.7	< 1	< 1	14.9	< 1	1.31	< 1	0.313	< 1	4.13	2.05	< 0.4	< 1	2.37	4.98	< 4	< 5	16.7	< 0.5	< 4	< 1	< 1	< 1	331
12/6/07	32	8.87	< 1	< 2	55.1	< 1	< 1	10.7	< 1	1.11	< 1	0.289	< 1	3.96	1.85	< 0.4	< 1	1.91	4.67	< 4	< 5	16.3	< 0.5	< 4	< 1	< 1	< 1	< 50

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Date	Station	Aluminum (ug/l)	Antimony (ug/l)	Arsenic (ug/l)	Barium (ug/l)	Beryllium (ug/l)	Cadmium (ug/l)	Calcium (mg/l)	Chromium (ug/l)	Cobalt (ug/l)	Copper (ug/l)	Iron (mg/l)	Lead (ug/l)	Magnesium (mg/l)	Manganese (mg/l)	Mercury (ug/l)	Molybdenum (ug/l)	Nickel (ug/l)	Potassium (mg/l)	Selenium (ug/l)	Silver (ug/l)	Sodium (mg/l)	Thallium (ug/l)	Thorium (ug/l)	Titanium (ug/l)	Uranium (ug/l)	Vanadium (ug/l)	Zinc (ug/l)
1/23/08	32	9.87	< 1	< 2	49.5	< 1	< 1	10	< 1	1.12	< 1	0.272	< 1	4.1	2.07	< 0.4	< 1	1.86	4.11	< 4	< 5	16.4	< 0.5	< 4	< 1	< 1	< 1	< 50
10/31/02	33	18.3	< 1	< 2	39.0	< 1	< 1	19.4	< 1	< 1	< 1	0.17	< 1	34.8	0.47	0.44	< 1	2.96	20.9	< 2	< 5	268	< 0.5	< 1	3.33	< 1	< 1	< 50
11/27/02	33	16.8	< 1	< 2	36.2	< 1	< 1	8.5	1.27	< 1	< 1	0.15	< 1	11.4	0.46	< 0.4	< 1	2.42	6.8	< 2	< 5	79.2	< 0.5	< 1	< 1	< 1	< 1	< 50
3/26/03	33	52.3	< 1	< 2	64.4	< 1	< 1	10.6	2.57	< 1	< 1	< 0.1	< 1	9.46	0.55	< 0.4	< 1	1.61	6.1	< 2	< 5	63.1	< 0.5	< 1	< 1	< 1	< 1	94
4/22/03	33	62.3	< 1	< 2	31.3	< 1	< 1	10.8	1.13	< 1	< 1	0.13	1.16	11.5	0.45	< 0.4	< 1	2.06	7.5	< 2	< 5	81.6	< 0.5	< 1	1.49	< 1	< 1	< 50
6/18/03	33	137	< 1	< 2	17.0	< 1	< 1	11.5	< 1	< 1	2.30	0.30	4.00	3.74	0.17	< 0.4	< 1	1.50	2.8	< 4	< 5	27.5	< 0.5	< 4	2.40	< 1	1.20	117
7/30/03	33	156	< 1	< 2	33.5	< 1	< 1	16.1	1.12	< 1	< 1	0.15	< 1	10.3	0.70	< 0.4	< 1	2.83	8.5	< 4	< 5	78.4	< 0.5	< 4	1.78	< 1	< 1	321
8/29/03	33	73.1	< 1	< 2	41.0	< 1	< 1	18.2	1.10	< 1	2.50	0.42	1.40	21.1	1.26	< 0.4	< 1	2.60	13.5	< 4	< 5	177	< 0.5	< 4	2.10	< 1	< 1	100
9/30/03	33	60.5	< 1	< 2	36.6	< 1	< 1	15.0	2.60	1.0	1.50	0.16	< 1	19.8	1.02	< 0.4	< 1	2.80	13.7	< 4	< 5	164	< 0.5	< 4	2.20	< 1	< 1	62
10/14/03	33	85.0	< 1	< 2	41.5	< 1	< 1	17.2	< 1	< 1	< 1	0.11	< 1	24.3	0.80	< 0.4	< 1	2.24	13.7	< 4	< 5	214	< 0.5	< 4	1.05	< 1	< 1	177
10/16/03	33	68.5	< 1	< 2	39.0	< 1	< 1	13.4	< 1	< 1	< 1	0.12	< 1	15.2	0.97	< 0.4	< 1	2.37	8.9	< 4	< 5	123	< 0.5	< 4	< 1	< 1	< 1	126
11/19/03	33	31.6	< 1	< 2	39.3	< 1	< 1	13.5	1.17	< 1	< 1	0.16	< 1	13.3	0.80	< 0.4	< 1	2.20	8.2	< 4	< 5	92.3	< 0.5	< 4	< 1	< 1	< 1	72
10/26/04	33	41.6	< 1	< 2	62.9	< 1	< 1	28.7	1.83	< 1	1.00	0.15	< 1	56.0	0.59	< 0.4	< 1	3.94	30.7	< 4	< 5	459	< 0.5	< 4	4.59	< 1	< 1	55
12/22/04	33	14.5	< 1	< 2	34.6	< 1	< 1	10.9	1.16	< 1	< 1	< 0.1	< 1	9.04	0.43	< 0.4	< 1	1.43	5.7	< 4	< 5	64.1	< 0.5	< 4	< 1	< 1	< 1	< 50
1/11/05	33	16.0	< 1	< 2	58.5	< 1	< 1	12.2	1.11	< 1	< 1	< 0.1	< 1	21.40	0.39	< 0.4	< 1	1.51	12.4	< 4	< 5	193	< 0.5	< 4	1.78	< 1	< 1	< 50
05/31/06	33	18.8	< 1	< 2	30.0	< 1	< 1	7.8	< 1	< 1	< 1	< 0.1	< 1	5.28	0.45	< 0.4	< 1	1.30	4.5	< 4	< 5	34.0	< 0.5	< 4	< 1	< 1	< 1	< 50
06/29/06	33	38.8	< 1	< 2	46.4	< 1	< 1	10.7	< 1	< 1	< 1	0.22	< 1	3.80	0.91	< 0.4	< 1	1.51	4.7	< 4	< 5	22.4	< 0.5	< 4	< 1	< 1	< 1	< 50
10/23/07	33	12.4	< 1	< 2	32.4	< 1	< 1	23.7	< 1	< 1	< 1	0.114	< 1	13.9	0.55	< 0.4	< 1	< 1	8.84	< 4	< 5	119	< 0.5	< 4	< 1	< 1	< 1	< 50
1/23/08	33	7.12	< 1	< 2	38.5	< 1	< 1	16.6	< 1	< 1	< 1	0.136	< 1	32.4	0.78	< 0.4	< 1	1.12	19	< 4	< 5	297	< 0.5	< 4	< 1	< 1	< 1	< 50
10/26/04	38	29.0	< 1	< 2	50.7	< 1	< 1	3.3	< 1	< 1	< 1	0.45	< 1	1.85	2.03	< 0.4	< 1	< 1	2.4	< 4	< 5	9.3	< 0.5	< 4	< 1	< 1	< 1	< 50

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Date	Station	Aluminum (ug/l)	Antimony (ug/l)	Arsenic (ug/l)	Barium (ug/l)	Beryllium (ug/l)	Cadmium (ug/l)	Calcium (mg/l)	Chromium (ug/l)	Cobalt (ug/l)	Copper (ug/l)	Iron (mg/l)	Lead (ug/l)	Magnesium (mg/l)	Manganese (mg/l)	Mercury (ug/l)	Molybdenum (ug/l)	Nickel (ug/l)	Potassium (mg/l)	Selenium (ug/l)	Silver (ug/l)	Sodium (mg/l)	Thallium (ug/l)	Thorium (ug/l)	Titanium (ug/l)	Uranium (ug/l)	Vanadium (ug/l)	Zinc (ug/l)
12/22/04	38	28.7	< 1	< 2	37.9	< 1	< 1	3.8	< 1	< 1	< 1	0.21	< 1	2.19	1.13	< 0.4	< 1	1.02	2.8	< 4	< 5	11.0	< 0.5	< 4	< 1	< 1	< 1	< 50
1/11/05	38	38.2	< 1	< 2	30.8	< 1	< 1	3.7	< 1	< 1	< 1	0.20	< 1	1.86	0.96	< 0.4	< 1	1.02	2.3	< 4	< 5	7.3	< 0.5	< 4	1.10	< 1	< 1	< 50
05/31/06	38	28.2	< 1	2.04	215	< 1	< 1	35.2	4.74	11.8	< 1	21.1	2.01	14.3	7.45	< 0.4	< 1	11.9	39.9	< 4	< 5	55.9	< 0.5	< 4	1.08	< 1	1.39	52
06/29/06	38	24.2	< 1	< 2	78.0	< 1	< 1	18.1	< 1	3.76	< 1	3.44	< 1	5.12	4.44	< 0.4	< 1	3.60	11.9	< 4	< 5	28.9	< 0.5	< 4	< 1	< 1	< 1	< 50
10/23/07	38	32.3	< 1	< 2	74.6	< 1	< 1	5.48	< 1	1.77	< 1	1.24	< 1	2.23	2.35	< 0.4	< 1	1.18	4.93	< 4	< 5	14.5	< 0.5	< 4	< 1	< 1	< 1	91.5
12/6/07	38	5.45	< 1	< 2	49.2	< 1	< 1	5	< 1	1.16	< 1	0.818	< 1	2.15	1.53	< 0.4	< 1	< 1	3.86	< 4	< 5	12.4	< 0.5	< 4	< 1	< 1	< 1	< 50
1/23/08	38	6.74	< 1	< 2	50	< 1	< 1	5.63	< 1	1.57	< 1	0.985	< 1	2.44	1.73	< 0.4	< 1	< 1	4.97	< 4	< 5	12.5	< 0.5	< 4	< 1	< 1	< 1	< 50
10/23/07	41	29.3	< 1	< 2	114	< 1	< 1	25.6	1.81	3.62	2.22	0.139	< 1	9.74	4.16	< 0.4	< 1	9.67	14.7	< 4	< 5	48.5	< 0.5	< 4	< 1	< 1	< 1	82.6
12/6/07	41	5.96	< 1	< 2	112	< 1	< 1	26.2	< 1	3.45	1.46	0.117	< 1	10.2	4.84	< 0.4	< 1	8.77	17.2	< 4	< 5	48.7	< 0.5	< 4	< 1	< 1	< 1	< 50
1/23/08	41	< 5	< 1	< 2	112	< 1	< 1	27.2	3.66	3.97	1.73	0.211	< 1	10.7	4.97	< 0.4	< 1	10.5	18.1	< 4	< 5	51.9	< 0.5	< 4	< 1	< 1	1.26	< 50
10/23/07	42	12.8	< 1	< 2	59.9	< 1	< 1	10.3	< 1	< 1	< 1	< 0.1	< 1	3.59	0.11	< 0.4	< 1	< 1	2.89	< 4	< 5	48	< 0.5	< 4	< 1	< 1	< 1	< 50
10/23/07	43	15.4	< 1	< 2	33	< 1	< 1	8.02	< 1	< 1	< 1	< 0.1	< 1	2.23	0.32	< 0.4	< 1	< 1	2.34	< 4	< 5	39.8	< 0.5	< 4	< 1	< 1	< 1	< 50
12/6/07	43	11.9	< 1	< 2	39.3	< 1	< 1	8.38	< 1	< 1	< 1	< 0.1	< 1	2.41	0.46	< 0.4	< 1	< 1	2.87	< 4	< 5	36.6	< 0.5	< 4	< 1	< 1	< 1	< 50
1/23/08	43	13.5	< 1	< 2	38.9	< 1	< 1	7.56	< 1	< 1	< 1	< 0.1	< 1	2.57	0.39	< 0.4	< 1	< 1	2.65	< 4	< 5	37.6	< 0.5	< 4	< 1	< 1	< 1	< 50
10/23/07	44	9.95	< 1	2.53	64.9	< 1	< 1	19	< 1	< 1	1.39	< 0.1	< 1	42.4	0.09	< 0.4	< 1	< 1	28.9	< 4	< 5	409	< 0.5	< 4	1.26	< 1	< 1	< 50
12/6/07	44	74.5	< 1	2.43	28.2	< 1	< 1	19.9	< 1	< 1	< 1	< 0.1	< 1	48.4	0.11	< 0.4	< 1	1.32	27.1	< 4	< 5	508	< 0.5	< 4	1.11	< 1	< 1	< 50
1/23/08	44	40.2	< 1	2.56	28.7	< 1	< 1	22.6	< 1	< 1	1.8	< 0.1	< 1	65.9	0.13	< 0.4	< 1	1.14	34.2	< 4	< 5	597	< 0.5	< 4	< 1	< 1	< 1	< 50
10/23/07	45	11.9	< 1	< 2	29.1	< 1	< 1	6.17	< 1	< 1	< 1	0.105	< 1	2.13	0.037	< 0.4	< 1	< 1	1.58	< 4	< 5	41.7	< 0.5	< 4	< 1	< 1	< 1	63.5
12/6/07	45	12.1	< 1	< 2	29.6	< 1	< 1	6.13	< 1	< 1	< 1	< 0.1	< 1	2.3	0.027	< 0.4	< 1	< 1	1.71	< 4	< 5	44.1	< 0.5	< 4	< 1	< 1	< 1	< 50

Results that exceed NYS standards for Class C waters (6NYCRR 703.5) are shaded yellow

APPENDIX 2 - ANNUAL REPORT COMMENTS AND RESPONSES

CEQ and Public Comments on the 2009 Stormwater Annual Report

CEQ Comments

What is an MS4 and a SWPPP? (Eva Growney)

MS4 stands for municipal separate storm sewer system. An MS4 is basically a system that collects and conveys stormwater. Suffolk County is an MS4.

SWPPP stands for stormwater pollution prevention plan. A SWPPP is a document that has to be developed when construction activities must obtain coverage under the National Pollutant Discharge Elimination System (NPDES) permit for their stormwater discharges. The SWPPP describes practices that will be implemented at the construction site to reduce pollutants in stormwater discharges.

Is the Stormwater Management Program Plan available on the web? (Larry Swanson)

The stormwater management program plan (SWMPP) is not available on-line; however, the stormwater website does have multiple pages listing what the County is doing under each minimum control measure (MCM). The web address is www.suffolkstormwater.com

To view the SWMP Plan, you'll have to go to the Suffolk County Department of Public Works office in Yaphank.

What percentage of Suffolk County's storm sewer system is able to be maintained and does the County have the resources to maintain these structures so they remain operational? (Larry Swanson)

Catch basin/stormwater structure cleaning is based on input from field managers as well as public complaints.

Is there a phone number listed for complaints? (Larry Swanson)

Yes, contact numbers are displayed on the stormwater website for reporting suspected stormwater pollution. The Suffolk County DPW web page also has a "contact us" page and contact names and numbers for the different departments within DPW.

What percentage of storm sewer system maintenance occurs on roads and catch basins that lead into lakes/bays in sensitive areas? (Larry Swanson)

Prioritizing cleaning and maintenance efforts based on the potential of the road or catch basin to contribute pollutants to waterbodies is a component of the current permit. Suffolk County has a work group in place that is working with the department and individuals responsible for implementing this component.

I see your filing this year as a single MS4, not a partnership. Was it a decision on the County's side to stay independent and not work with other municipalities? Do you think the County would consider partnering in the future? (Thomas Gulbransen)

When the Phase II Stormwater Program started, the County was under the gun to get started. The County didn't have the time or money to implement the agreements and Memorandum of Understandings that would have been necessary if a partnership was created. It also may not be in the County's interest to partner, because the County is a different kind of MS4, they don't have authority over land use like Towns and Villages.

In the future, we need to work together, especially on the septic system requirements in the new permit. Working together on this will enable MS4s to comply with the permit requirements. (Thomas Gulbransen)

This is also something that the work group is looking at. This topic will be brought up in the work group.

Is the State of New York (e.g. NYSDOT) doing what their supposed to be doing in regards to the Phase II Stormwater Management Program? (Larry Swanson)

We haven't seen their annual reports or the NYS DEC's review of their reports, but to the best of our knowledge, they are doing what is required of them.

If there is an outfall pipe discharging to a waterbody and this discharge results in sedimentation of the waterbody, who is responsible? (Jim Bagg)

In this case, all the MS4's discharging to the waterbody should address sediment in their stormwater management program. Each MS4 should be taking measures to reduce pollutant loading of the "pollutants of concern". In this case, one of the pollutants of concern would be sediment and the MS4s should be working on ways to prevent sediment from getting into stormwater.

Your report says that you didn't find any illicit discharges or illicit connections, but it seems like you should have. (Thomas Gulbransen)

Suffolk County only monitors outfalls on County roads and properties. Thus far, we have not found any illicit connections or discharges. We have found pipes with "dry weather flow", which means that water discharges from the outfall pipe even though it has not rained for 2-3 days. After sampling this water and conducting water quality tests, it has been determined that the dry weather flow is likely due to groundwater, which is flowing into the pipe.