

APPENDIX A
VISUAL ASSESSMENT PROJECT PLAN



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Metedeconk River
Watershed Protection & Restoration Plan
Grant Identifier: RP09-058

Visual Assessment Project Plan

Version 1
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1.0 Distribution List

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2.0 Project Background/Problem Definition

The Brick Township Municipal Utilities Authority (Brick Utilities) has been awarded CBT grant funding by the New Jersey Department of Environmental Protection (NJDEP) for the development of a Metedeconk River Watershed Protection and Restoration Plan (WPRP) and the implementation of several of the highest priority restoration projects that will be identified during the planning process. The plan will build upon previous watershed characterization and protection work completed by Brick Utilities and partner organizations. The Metedeconk River WPRP will cover the drainage areas of the North Branch, South Branch and main stem of the Metedeconk River. The planning area encompasses eleven (11) HUC14 drainage basins and a total area of 78.3 square miles.

Brick Utilities relies on the Metedeconk River to supply raw water to both its William Miller Water Treatment Plant and Brick Reservoir. In total, the Metedeconk provides approximately 80% of Brick Utilities' raw water supply. The entire fresh water area of the Metedeconk River has been designated a Category One (C1) waterway due to its exceptional water supply significance. The watershed encompasses portions of Millstone, Freehold, Howell and Wall Townships in Monmouth County, and Jackson, Lakewood and Brick Townships in Ocean County. The Metedeconk watershed is the northernmost sub-watershed draining to the Barnegat Bay, one of 28 Congressionally-designated National Estuary Program estuaries throughout the United States. Brick Utilities and the Barnegat Bay Estuary Program share common goals with respect to the management of the Metedeconk River and its watershed.

The New Jersey Department of Environmental Protection's (NJDEP's) 2006 Integrated Water Quality Monitoring and Assessment Report shows each HUC14 watershed in the project area exhibits water quality impairments. HUC14 watershed and lake assessment units are non-attaining (listed on Sublist 5) for several designated uses, including aquatic life, primary contact recreation and fish consumption. The specific water quality parameters associated with the non-attainment status are dissolved oxygen, pH, phosphorus, temperature, total suspended solids, mercury, and pathogens. Total Maximum Daily Loads (TMDL's) have been developed for various areas of the watershed. TMDL's address fecal coliform and phosphorus in stream segments, pathogens in two lakes, and total coliform for shellfish-impaired waters in the estuarine portion of the project area. Previous studies show that water quality and quantity problems in the Metedeconk River basin are primarily the result of nonpoint source (NPS) pollution and stormwater impacts brought on by the conversion of watershed lands to more intensive uses.

The goals of the Metedeconk River WPRP are to protect the Metedeconk River for future potable water supply, support the long-term health of the Barnegat Bay estuary, and meet NJDEP's priorities of addressing TMDL's, eliminating water quality impairments and maintaining the Category One non-degradation standard.

A key source of information for the WPRP will be stream visual assessments conducted throughout the Metedeconk River watershed. The assessments will document the physical characteristics of numerous segments of the Metedeconk River and its tributaries. They will evaluate opportunities for both watershed protection and restoration. The assessment methodology employed will identify potential problem areas causing near-stream NPS pollution, and include the inspection and location of

nearby sanitary sewer and stormwater infrastructure to reinforce source tracking efforts. Brick Utilities staff will draw upon its knowledge of the watershed to conduct the visual assessments. In addition, assistance may be sought from the NJDEP Watershed Ambassador Program and/or AmeriCorps volunteers. No water sampling or water chemistry measurements will be conducted during the visual assessments. However, Brick Utilities maintains a comprehensive watershed monitoring program and this water quality data will serve as another important data source for the WPRP.

In addition to providing critical information for the development of the Metedeconk River WPRP, stream visual assessment data may be used for evaluating the effectiveness of BMP or restoration projects that are completed. It will be available for use by local government, state and county agencies, non-profit groups and the private sector for various water resource management purposes, including point and nonpoint pollution source tracking, monitoring program design, conservation efforts, and the identification of stormwater infrastructure.

3.0 Project/Task Description and Organization

Visual assessments of the Metedeconk River and its tributaries will be conducted at roughly ninety (90) locations that are representative of the range of riparian conditions throughout the project area. Locations have been selected based upon Brick Utilities watershed monitoring program information, staff experience, expected accessibility and a GIS screening process that utilized the following data layers:

- Surface Waterways (NJDEP)
- Surface Water Quality Standards-Edition 200905 (NJDEP)
- Municipal and County Boundaries (NJDEP)
- Landuse/Landcover 2002 (NJDEP)
- HUC11 Watersheds (NJDEP)
- HUC14 Watersheds (NJDEP)
- Aerial Photography 2002 & 2008 (NJDEP)
- Open Space (NJDEP)
- Tiger Roads (NJDEP)
- Sewer Service Areas (NJDEP)
- NJPDES Surface and Ground Water Discharges (NJDEP)
- Known Contaminated Site List 2005 (NJDEP)
- Total Maximum Daily Loads (NJDEP)
- Water Quality Monitoring and Assessment Report (Integrated List) 2006 (NJDEP)
- Aquatic Pesticide Application Sites (NJDEP)
- Shellfish Classification (NJDEP)
- Landscape Project Ver. 2.1 (NJDEP)
- Riparian Zones in New Jersey Coastal Watersheds (Rutgers/CRSSA; GIS data from Lathrop, R.; Haag, S. 2007, Assessment of Land Use Change and Riparian Zone Status in the Barnegat Bay and Little Egg Harbor Watershed: 1995-2002-2006, CRSSA, Rutgers University)

Appendix A contains a listing and map of the pre-selected assessment sites. The visual assessments will be performed during the fall and winter 2009. Assessment information will be documented by way of field worksheets, digital photographs and Global Positioning System (GPS). The field worksheets were designed using the following standardized and accepted methodologies:

- NJDEP Volunteer Monitoring Program Visual Assessment Protocol, 2008-2009
- Rutgers Cooperative Extension Water Resources Program Stream Visual Assessment Protocol, 2008
- USDA NWCC Technical Note 99–1, Stream Visual Assessment Protocol, December 1998
- Center for Watershed Protection Unified Stream Assessment: A User's Manual, Manual 10, Version 2.0, February 2005.
- Center for Watershed Protection Unified Subwatershed and Site Reconnaissance: A Users' Manual, Manual 11, Version 2, February 2005.

All stream assessment data will be archived in a relational database to facilitate its evaluation. The GIS data produced will meet NJDEP mapping and digital data standards. **Appendix B** includes a copy of the stream assessment protocol/field worksheet.

The length of the stream reaches will be a minimum of twelve times the active channel width (stream width x 12) and a maximum of two-hundred (200) yards, depending on site and access constraints. The majority of stream assessment sites will be accessed via public rights-of-way (primarily road crossings). Where sites must be accessed via private property, permission will first be obtained from the property owner. In cases where the property owner cannot be contacted or permission is denied, a suitable substitute site will be selected.

All staff performing the stream assessments will be knowledgeable in the field assessment methods. Training will be provided as necessary by Brick Utilities. Each assessment will be conducted by a minimum of two (2) individuals. Adherence to Brick Utilities safety policies will be mandatory.

If regulated pollution incidents are observed by assessors during their surveys, they will be instructed to immediately report the pollution incident to Brick Utilities' WPRP Project Manager, the NJDEP hotline (1-877-WARN DEP) and any other appropriate agencies.

4.0 Quality Objectives and Criteria for Measurement Data

The stream assessments to be performed are qualitative in nature and quantitative data collection is limited to the logging of locations via GPS, measuring distances and outfalls/pipes, and calculating stream velocity through the use of a floating object and stopwatch. GPS will be used to mark start/stop points, outfalls, water infrastructure, point and nonpoint pollution sources, important environmental features, etc. The GPS unit to be used will be WAAS-enabled or capable of data processing to achieve a horizontal accuracy (sensitivity) of <10 feet. The unit will be tested prior to performing any visual assessments to ensure it is functioning properly and collecting accurate data. If problems with the WAAS system are encountered in the field, the data will undergo post-processing and correction upon return of staff to the office. All data will be imported into a GIS and checked for accuracy.

Potential problems involving precision, bias and comparability will be addressed by dedicating staff to the project that has been trained in the assessment protocol and through the use of consistent data collection methods and procedures (via field protocol/worksheets). As such, the degree of variability that is inherent in qualitative

investigations such as this will be minimized. Representativeness will be addressed through the selection of a broad range of stream assessment sites that are characteristic of the variety of land use and environmental conditions that exist throughout the watershed. The stream assessment process will be deemed complete once the target number of assessments has been conducted and the information has undergone the necessary quality reviews.

Corrective actions may be necessary if a target visual assessment reach cannot be accessed. In such cases, a new stream assessment site with similar characteristics to the original will be selected as a replacement. In the event that incomplete or erroneous data is identified, efforts will be made to determine the source of the oversight/error, with supplemental training provided as necessary. In addition, the site will be revisited to ascertain the correct information.

5.0 Training Requirements

All staff performing the visual assessments will have studied the stream visual assessment protocol, including the reference materials from NJDEP, USDA and CWP that were used in its development. Further, individuals will be required to demonstrate a level of expertise in the riparian characteristics they will be evaluating and proficiency in carrying out the stream assessments in the field. Staff will also be trained in the operation of the GPS unit and in the use of GIS for pre- and post-fieldwork evaluations. Each person performing visual assessments will be evaluated for competency by the Brick Utilities WPRP project manager and NJDEP project manager (if available) prior to collecting data in the field. In addition, the quality and acceptability of the completed field sheets will be evaluated through the duration of the project.

6.0 Documentation and Records

The finalized version of this Visual Assessment Project Plan will be distributed to each project partner prior to commencement of work. Any updates will be tracked and documented by way of version numbering. Updated versions of the plan will be redistributed to the project partners.

Stream visual assessment field sheets will be completed at the time the assessment occurs. The field sheets will be supplemented with digital photographs and the logged GPS locations. All raw data will be kept on file for a minimum of three (3) years following the completion and close-out of the Metedeconk River WPRP project, in accordance with the terms and conditions of the WPRP grant agreement. The data will also be entered into a database to facilitate its use and evaluation. GIS data generated will meet NJDEP mapping and digital data standards. A final report summarizing the stream visual assessment project and findings will be prepared and included in the overall WPRP project final report.

7.0 Field Monitoring/Assessment Process Design

The assessment sites were pre-selected by Brick Utilities using the data sources listed in Section 3.0. The table in Appendix A lists each assessment reach and the data that was used to support its selection for evaluation. The assessments will take place between fall and winter 2009. Each site will be evaluated in the field one time and will only be revisited in cases where the field sheets contain missing or erroneous data. If a target

visual assessment reach cannot be accessed, a new stream assessment site with similar characteristics to the original will be selected as a replacement. The parameters to be monitored through this stream visual assessment project are found in Appendix B.

8.0 Field Monitoring/Assessment Method Requirements

The methods used for conducting these qualitative stream visual assessments will follow the protocol/field worksheet found in Appendix B. A pre-assessment GIS survey will be performed by field staff prior to conducting the actual stream assessment using the data layers outlined in Section 3.0. No water sampling or water chemistry measurements will be undertaken, and the use of field instrumentation is limited to GPS.

9.0 Sample Handling and Custody Procedures

No water sampling or water chemistry measurements will be conducted. All field collected data will be managed by Brick Utilities WPRP project manager and designated staff.

10.0 Analytical Methods Requirements

The methods used for conducting these qualitative stream visual assessments will follow the protocol/field worksheet found in Appendix B. The field worksheets were designed using the standardized and accepted methodologies listed in Section 3.0. A Thales Mobilmapper GPS unit will be utilized to collect location information in the field, and all staff performing stream visual assessments will have been trained on the proper operation of the unit. Other field equipment will include a clip board, field worksheets and maps, digital camera, extra batteries, stopwatch, floating object (e.g. orange) for determining velocity, waterproof measuring tape and personal protective equipment.

11.0 Quality Control Requirements

Staff performing the visual assessments will be required to demonstrate expertise in the riparian characteristics they will be evaluating and proficiency in carrying out the stream assessments in the field. Each individual performing visual assessments will be evaluated for competency by the Brick Utilities WPRP project manager and NJDEP project manager (if available) prior to collecting data in the field. All information compiled during the stream visual assessment and entered into the database will be reviewed by the Brick Utilities WPRP project manager (and be available for review by the project team) to ensure data quality objectives are met through the duration of the project.

12.0 Instrument/Equipment Testing, Inspection and Maintenance Requirements

The GPS unit to be used for the stream visual assessments requires no testing or maintenance other than replacing batteries and ensuring there is sufficient space on the memory card. Staff will have the user manual available in the event it is needed in the field. The GPS data will be checked for accuracy via GIS and aerial photography upon return from the field. Aerial photos showing applicable GIS features (from pre-assessment GIS survey) will also be brought into the field so that the locations of GPS sites and important features can be noted. No other equipment will have maintenance requirements. A field equipment checklist will help ensure staff has all the tools and materials necessary prior to leaving the office.

13.0 Instrument/Equipment Calibration and Frequency

The GPS unit does not require calibration. The unit is WAAS-enabled and staff will ensure this feature is available when positions are being logged. If the WAAS feature is unavailable, additional processing/post-correction will be used to improve the positional accuracy of the data. All data will be exported in NJSP NAD83 format.

14.0 Inspection/Acceptance Requirements

Field equipment will include the GPS unit, field sheets and maps, a clip board, digital camera, extra batteries, stopwatch, floating object (e.g. orange) for determining velocity, waterproof measuring tape and personal protective equipment. A field equipment checklist will help ensure staff has all the tools necessary prior to leaving the office.

15.0 Data Acquisition Requirements

Aerial photos showing applicable GIS features (from pre-assessment GIS survey) will be brought into the field to facilitate staff's completion of the reach assessment and provide additional information on the surrounding area.

16.0 Data Management

All information collected through the stream visual assessments, including field worksheets, logged GPS points and digital photographs, will be checked for accuracy by the Brick Utilities WPRP project manager on a regular basis. This procedure will allow problems to be immediately identified and addressed. Missing or incomplete data will be gathered through a follow up visit to the assessment site.

A database will be developed to house the field assessment data and facilitate its use and evaluation. The database will be designed so it can be easily linked to a GIS. All database entry will be validated by the Brick Utilities WPRP project manager.

17.0 Assessments/Oversight

Data compiled through the stream visual assessment project will be checked for accuracy on an ongoing basis by the Brick Utilities WPRP project manager. If incomplete or erroneous data is identified, efforts will be made to determine the source of the oversight/error, with supplemental training provided as necessary. In addition, the site(s) will be revisited to ascertain the correct information. In the event that a target visual assessment reach cannot be accessed, a new stream assessment site with similar characteristics to the original will be selected as a replacement and the site list updated and redistributed.

18.0 Reporting

A report summarizing the stream visual assessment process and findings will be prepared. The report will serve as a key source of information for identifying areas in need of protection and/or restoration for the Metedeconk River Watershed Protection and Restoration Plan. The report will be formatted so that it can serve as a stand-alone

document and be included as a section in the final report for the overall NJDEP grant-funded project.

19.0 Data Review, Verification, and Validation

Data compiled through the stream visual assessment project will be checked for accuracy on an ongoing basis by the Brick Utilities WPRP project manager. Problems with incomplete or erroneous data will be addressed. In the event such problems cannot be addressed, the assessment reach information will be flagged as preliminary or unverified data. This verification process will ensure all data collected is accurate, complete and usable for meeting project objectives.

20.0 Verification and Validation Methods

All of the data compiled through the stream visual assessment project will be validated and verified on an ongoing basis by the Brick Utilities WPRP project manager. This data includes the field worksheets, GPS points, digital photographs and data entered into the database. Any problems with incomplete or erroneous data will be documented and corrected. Efforts will also be made to determine the source of the oversight/error, with supplemental training provided as necessary. This verification and validation process will ensure all data collected is accurate, complete and usable for meeting project objectives. Major limitations of the project will be documented in the stream visual assessment final report.

21.0 Reconciliation with Data Quality Objectives

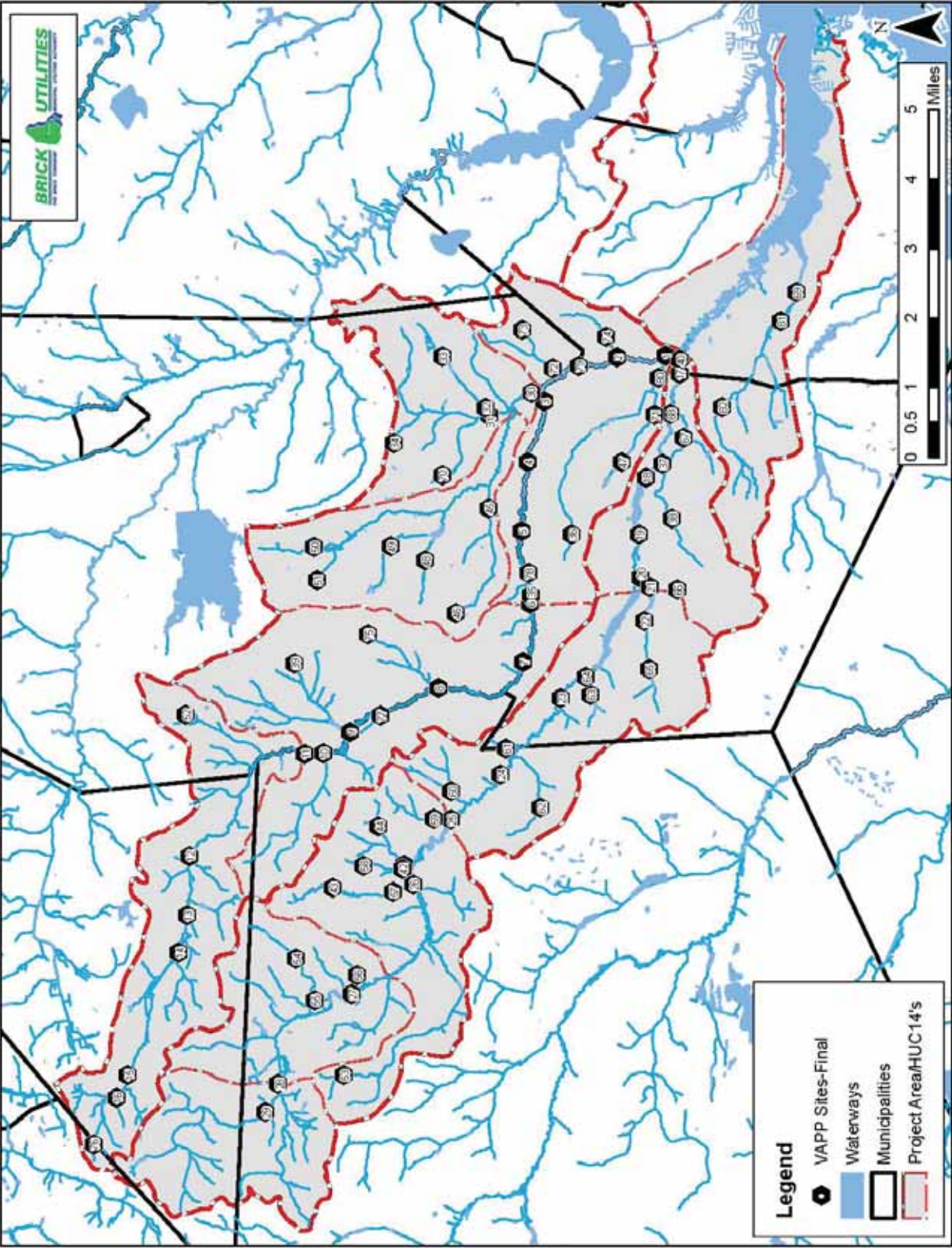
The stream visual assessment protocol was developed with careful consideration of the project objectives. Specifically, the assessments will serve as a key means of identifying watershed areas that need protection and/or restoration, with particular focus placed on locating sources of stormwater/NPS pollution problems. The project design and data verification/validation procedures outlined herein will ensure that the appropriate qualitative data is collected and that it meets quality standards and is accurately documented. Major limitations of the data or its use will be documented in the stream visual assessment final report.

APPENDIX A

Visual Assessment Sites

ID	Segment_ID	Basis	HUC14
1	NA	BTMUA site, landuse, stormwater, TMDL(shellfish), Integrated Rpt 2006/2008	02040301020050
2	NB	BTMUA site, landuse, stormwater, riparian, TMDL(shellfish), Integrated Rpt 2006/2008	02040301020050
3	NC	BTMUA site, landuse, stormwater, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020050
4	ND	BTMUA site, stormwater, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020050
5	NE	BTMUA site, landuse, stormwater, riparian, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020050
6	NF	BTMUA site, landuse, stormwater, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020020, 50
7	NG	BTMUA site, landuse, stormwater, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020020
8	NH	BTMUA site, landuse, stormwater, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020020
9	NI	BTMUA site, landuse, stormwater (lake?), TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020020
10	NJ	BTMUA site, landuse, stormwater, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020020
11	NK	BTMUA site, landuse, stormwater, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020010, 20
12	NL	BTMUA site, landuse, stormwater, TMDL(shellfish, streamfecal, TP), Integrated Rpt 2006/2008	02040301020010
13	NM	BTMUA site, landuse, stormwater, TMDL(shellfish, streamfecal, TP), Integrated Rpt 2006/2008	02040301020010
14	NN	BTMUA site, landuse, stormwater, riparian, TMDL(shellfish, streamfecal, TP), Integrated Rpt 2006/2008	02040301020010
15	NO	BTMUA site, stormwater, TMDL(shellfish, streamfecal, TP), Integrated Rpt 2006/2008	02040301020010
16	NP	BTMUA site, landuse, stormwater, riparian, TMDL(shellfish, streamfecal, TP), Integrated Rpt 2006/2008	02040301020010
18	SB1	BTMUA site, landuse, lake, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301030050
17	SA	BTMUA site, landuse, stormwater, njpdes, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301030050
19	SC	BTMUA site, landuse, lake, kcsl, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301030050
20	SD	BTMUA site, landuse, stormwater, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301030050
21	SE	BTMUA site, landuse, stormwater, lake, kcsl, aquapest, njpdes, riparian, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301030040, 50
22	SF	BTMUA site, landuse, stormwater, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301030040
23	SG	BTMUA site, landuse, stormwater, TMDL(shellfish, lakepathogens, streamfecal), Integrated Rpt 2006/2008	02040301030040
24	SH	BTMUA site, landuse, stormwater, TMDL(shellfish, lakepathogens, streamfecal), Integrated Rpt 2006/2008	02040301030040
25	SI	BTMUA site, landuse, stormwater, lake, riparian, TMDL(shellfish, lakepathogens, streamfecal), Integrated Rpt 2006/2008	02040301030030, 40
26	SJ	BTMUA site, landuse, stormwater, aquapest (upstream), njpdes, TMDL(shellfish, lakepathogens, streamfecal), Integrated Rpt 2006/2008	02040301030030
27	SK	BTMUA site, landuse, stormwater, lake, aquapest(upstr), riparian, TMDL(shellfish, lakepathogens, streamfecal), Integrated Rpt 2006/2008	02040301030020
28	SL	BTMUA site, landuse, stormwater, TMDL(shellfish, lakepathogens, streamfecal), Integrated Rpt 2006/2008	02040301030010, 20
29	SM	BTMUA site, stormwater, TMDL(shellfish, lakepathogens), Integrated Rpt 2006/2008	02040301030010
30	MF1	BTMUA site, landuse, stormwater, riparian, TMDL(shellfish), Integrated Rpt 2006/2008	02040301020040
31	MF2	BTMUA site, landuse, stormwater, kcsl, riparian, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020040
32	SHB1	BTMUA site, landuse, stormwater, kcsl, riparian, TMDL(shellfish), Integrated Rpt 2006/2008	02040301020040
33	SHB2	BTMUA site, landuse, stormwater, kcsl, riparian, TMDL(shellfish), Integrated Rpt 2006/2008	02040301020040
34	MF3	BTMUA site, landuse, stormwater, kcsl, riparian, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020040
35	NF14	BTMUA site, landuse, stormwater, kcsl, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020050
36	CB5	BTMUA site, landuse, stormwater, kcsl, njpdes, TMDL(shellfish), Integrated Rpt 2006/2008	02040301020050
37	CTB1	BTMUA site, landuse, stormwater, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301030050
38	CTB2	BTMUA site, landuse, stormwater, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301030050
39	STM1	BTMUA site, landuse, stormwater, kcsl, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020020
40	POND6	BTMUA site, landuse, kcsl, riparian, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301030050
41	TR13-1	BTMUA site, landuse, stormwater, kcsl, riparian, TMDL(shellfish, lakepathogens, streamfecal), Integrated Rpt 2006/2008	02040301030030
42	TR13-2	BTMUA site, landuse, stormwater, kcsl, riparian, TMDL(shellfish, lakepathogens, streamfecal), Integrated Rpt 2006/2008	02040301030030
43	TR12-2	BTMUA site, landuse, stormwater, kcsl, TMDL(shellfish, lakepathogens, streamfecal), Integrated Rpt 2006/2008	02040301030030
44	TR13-3	BTMUA site, landuse, stormwater, kcsl, TMDL(shellfish, lakepathogens, streamfecal), Integrated Rpt 2006/2008	02040301030030
45	DB-1	landuse, stormwater, riparian buffer, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020030

46	DB-5	landuse, stormwater, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020030
47	SH-3	landuse, lake, TMDL(shellfish), Integrated Rpt 2006/2008	02040301020050
48	PB-2	landuse, stormwater, lake, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020030
49	GH-1	landuse, stormwater, Aqpestupst, riparian buffer, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020030
50	HS-6	landuse, stormwater, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020030
51	SPC-1	landuse, stormwater, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020030
52	TUR-2	landuse, stormwater, njpdes, kcsl, riparian buffer, TMDL(shellfish, streamfecal, TP), Integrated Rpt 2006/2008	02040301020010
53	TR7-1	landuse, stormwater, TMDL(shellfish, lake pathogens, streamfecal), Integrated Rpt 2006/2008	02040301030030
54	TR26-1	landuse, stormwater, TMDL(shellfish, lake pathogens, streamfecal), Integrated Rpt 2006/2008	02040301030020
55	TR27-2	landuse, stormwater, riparian buffer, TMDL(shellfish, lake pathogens, streamfecal), Integrated Rpt 2006/2008	02040301030020
56	TR10-1	landuse, stormwater, riparian buffer, TMDL(shellfish, lake pathogens, streamfecal), Integrated Rpt 2006/2008	02040301030020
57	TR12-1	landuse, stormwater, riparian buffer, TMDL(shellfish, lake pathogens, streamfecal), Integrated Rpt 2006/2008	02040301030030
58	TR13-5	landuse, stormwater, TMDL(shellfish, lake pathogens, streamfecal), Integrated Rpt 2006/2008	02040301030030
59	TR14-1	landuse, stormwater, TMDL(shellfish, lake pathogens, streamfecal), Integrated Rpt 2006/2008	02040301030030
60	TR15-1	landuse, stormwater, TMDL(shellfish, lake pathogens, streamfecal), Integrated Rpt 2006/2008	02040301030040
61	TR17-1	landuse, stormwater, TMDL(shellfish, lake pathogens, streamfecal), Integrated Rpt 2006/2008	02040301030040
62	TR16-1	landuse, stormwater, njpdes, TMDL(shellfish, lake pathogens, streamfecal), Integrated Rpt 2006/2008	02040301030040
63	CP-3	landuse, stormwater, lake, TMDL(shellfish, lake pathogens, streamfecal), Integrated Rpt 2006/2008	02040301030040
64	TR21-2	landuse, stormwater, TMDL(shellfish, lake pathogens, streamfecal), Integrated Rpt 2006/2008	02040301030040
65	WP-3	landuse, stormwater, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301030040
66	SE-P	landuse, stormwater, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301030050
67	TR4-1	landuse, stormwater, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301030050
68	SA-DEN	landuse, stormwater, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301030050
69	CBB-1	landuse, stormwater, kcsl, riparian buffer, TMDL(shellfish), Integrated Rpt 2006/2008	02040301040020
70	TKL-1	landuse, stormwater, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020040
71	SH-1	landuse, stormwater, TMDL(shellfish), Integrated Rpt 2006/2008	02040301020050
72	GR-4	landuse, stormwater, TMDL(shellfish), Integrated Rpt 2006/2008	02040301020050
73	GR-2	landuse, stormwater, TMDL(shellfish), Integrated Rpt 2006/2008	02040301020050
74	TR1-2	landuse, stormwater, TMDL(shellfish), Integrated Rpt 2006/2008	02040301020050
75	TM-8	landuse, stormwater, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020020
76	NQ	landuse, stormwater, riparian buffer, TMDL(shellfish, streamfecal, TP), Integrated Rpt 2006/2008	02040301020010
77	TR23-1	landuse, stormwater, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020020
78	CVS-1	landuse, TMDL(shellfish, streamfecal), Integrated Rpt 2006/2008	02040301020050
79	NBC	landuse, TMDL(shellfish), Integrated Rpt 2006/2008	02040301020050
80	CB-1	landuse, stormwater, riparian buffer, TMDL(shellfish), Integrated Rpt 2006/2008	02040301020050
81	CBB-3	landuse, stormwater, aquapest (upstream), TMDL(shellfish), Integrated Rpt 2006/2008	02040301040020
82	CBB-5	landuse, stormwater, njpdes, TMDL(shellfish), Integrated Rpt 2006/2008	02040301040020



APPENDIX B

Metedeconk River Watershed Protection & Restoration Plan Stream Visual Assessment Field Sheet

IF REGULATED POLLUTION INCIDENTS ARE OBSERVED DURING THIS SURVEY, IMMEDIATELY REPORT TO THE NJDEP HOTLINE 1-877-WARN DEP AND BTMUA WATER QUALITY DEPARTMENT (732-458-7000).

Evaluator #1: _____ **Evaluator #2:** _____

Date: _____ **Time:** _____ **Watershed Management Area:** 13

Municipality: _____ **County:** _____

Segment ID#: _____ **Waterbody Name:** _____

Nearest BTMUA Sample Site(s): _____ **USGS N. Br. Metedeconk AM Gage Ht:** _____

<u>Reach GPS Data:</u>	<u>Latitude (Northing – Y)</u>	<u>Longitude (Easting – X)</u>	<u>GPS Ref. #</u>
Beginning at _____	_____	_____	_____
Ending at _____	_____	_____	_____

Weather Conditions: 1. Clear 2. Partly Cloudy 3. Overcast 4. Light rain/showers
 5. Steady Rain 6. Heavy rain 7. Snow 8. Heavy snow melt

Weather (Use number from above categories): Today: _____ Past 24 Hours: _____

Days since last precipitation event: _____ Last precipitation event > 1 week ago? YES NO

Air Temperature: °C: _____ °F: _____ Water Temperature: °C: _____ °F: _____

Water Conditions (circle one for each category):

Odor: 1. Normal 2. Sewage 3. Petroleum 4. Chemical 5. Anaerobic 6. Other _____

Color: 1. Clear 2. Tea 3. Milky 4. Muddy 5. Other _____

Surface Coating: 1. None 2. Oily 3. Foam 4. Scum 5. Other _____

Additional GPS Site Features:

Ref. # _____ Description: _____

Ref. # _____ Description: _____

Ref. # _____ Description: _____

Ref. # _____ Description: _____

Ref. # _____ Description: _____

Ref. # _____ Description: _____

Ref. # _____ Description: _____

Site Sketch:

Note flow direction, bridges/roads, stormwater infrastructure, stream characteristics, ditches, riprap, riffles, pools, runs, photo locations and GPS locations. Right and Left banks are determined facing upstream.



Photographs Referenced in Sketch:

Ref. # _____ Description: _____

Ref. # _____ Description: _____

Ref. # _____ Description: _____

Ref. # _____ Description: _____

Ref. # _____ Description: _____

Ref. # _____ Description: _____

***** Right and Left banks are determined facing upstream *****

Stream Width:	-For Non-Wadable Streams: <i>(circle one)</i> -----	1. Constant 4. Sharp constrictions	2. Widening 5. Narrowing	3. Mild constrictions
	-For Wadable Streams:	Stream Width Average (ft): _____		
Stream Depth:	Average Depth (ft): _____			
Stream Velocity:	Velocity average in feet per second: _____ <i>(V=D/T, where D=10' segment)</i>			
Stream Flows: <i>(circle one)</i>	1. Slow	2. Moderate	3. Swift	4. Combination
Stream Depth/Velocity Combinations: <i>(circle one)</i>	1. Slow, deep	2. Fast, deep	3. Fast, shallow	
	4. Slow, shallow	5. All of the above		
Channel Flow Status: <i>(circle one)</i>	1. Base of both lower banks	2. Water fills greater than 75%		
	3. Water fills 25-75%	4. Very little water (less than 25%)		
Channel Alteration: <i>(circle one)</i>	1. Stream with normal pattern			
	2. Some channelization present, usually in areas of bridges, etc.			
	3. Channelization extensive, 40-80% of the stream reach			
	4. Over 80% of stream channelized, gabion baskets and/or riprap and/or concrete present			
Stream Sinuosity: <i>(circle one)</i>	1. Sharp bends	2. Somewhat curvy	3. Mild curves	4. Straight
Sediment on Stream Bottom: <i>(circle one)</i>	1. Less than 20%	2. 20-50%	3. 50-80%	4. Greater than 80%
Embeddedness-Gravel, Cobble, etc. <i>(circle one)</i>	1. 0-25% surrounded by fine sediment		2. 26-25% surrounded by fine sediment	
	3. 51-75% surrounded by fine sediment		4. Greater than 75% surrounded by fine sediment	
	5. Does not apply		6. Indeterminate	
Stream Substrate: <i>(circle one)</i>	1. Mix with gravel and firm sand prevalent		2. Mix of soft sand, mud, clay or silt	
	3. All mud or clay or sand bottom		4. Hard-pan clay or bed rock	
Stream Substrate Stability: <i>(circle one)</i>	1. Loose	2. Stable	3. Does not apply	
Pools and Riffles: <i>(circle one)</i>	1. Frequent occurrence		2. Infrequent occurrence	
	3. Occasional occurrence		4. Flat water	
Pool Variability: <i>(circle one)</i>	1. Even mix of large-shallow, large-deep, small-shallow, small-deep pools present			
	2. Majority of pools large-deep; very few shallow			
	3. Shallow pools much more prevalent than deep pools			
	4. Majority of pools small-shallow or pool absent			
Epifaunal Substrate Available Cover: <i>(circle one)</i>	1. Greater than 50% stable habitat		2. 30-50% stable habitat	
	3. 10-30% stable habitat		4. 10% or less stable habitat	
Bank Stability: <i>(assign description for each bank)</i>	Right Bank _____	1. Stable, evidence of erosion or bank failure absent or minimal; <5% of bank affected		
	Left Bank _____	2. Moderately stable, small areas of erosion, mostly healed over; <5-30% of bank in reach has areas of erosion		
		3. Moderately unstable; 31-60% of bank in reach has areas of erosion, high erosion potential during flooding		
		4. Unstable, many eroded areas, "raw" areas frequent, obvious bank sloughing; 60% or greater of bank has erosional scars		

*** Right and Left banks are determined facing upstream ***

Riparian Vegetation: <i>(circle one for each bank)</i>	Right Bank	1. >50 ft. width	2. 35-50 ft width	3. 15-35 ft width	4. <15 ft width												
	Left Bank	1. >50 ft. width	2. 35-50 ft width	3. 15-35 ft width	4. <15 ft width												
Bank Vegetative Protection: <i>(circle one for each bank)</i>	Right Bank	1. > 90%	2. 70-90%	3. 50-70%	4. <50%												
	Left Bank	1. > 90%	2. 70-90%	3. 50-70%	4. <50%												
Coarse Particulate Organic Matter: <i>(circle one)</i>	1. Abundant 2. Moderate 3. Rare																
Woody Debris: <i>(circle one from each row)</i>	1. None 2. In spots 3. Heavy throughout reach																
	----- 1. Free floating 2. Attached 3. Both 4. Not applicable																
% Tree Canopy Above Stream: <i>(circle one)</i>	1. 0-25% 2. 26-50% 3. 51-75% 4. 76-100%																
Predominant Aquatic Vegetation <i>(circle all that apply)</i>	1. Rooted emergent 2. Rooted submergent 3. Rooted floating 4. Free floating 5. None																
Algae: <i>(circle one from each row)</i>	<u>Growth:</u> 1. Absent 2. Sparsely populated 3. Densely Populated																
	----- <u>Location:</u> 1. None 2. On streambed 3. On surface 4. Both																
	----- <u>Color:</u> 1. N/A 2. Light Green 3. Dark green 4. Brown 5. Other: _____																
Litter Conc.: <i>(circle all that apply)</i>	1. Flood plain accumulation 2. Water borne 3. From adjacent land use 4. Dumping																
Structures: <i>(indicate number of structures of each category)</i>	Right Bank	<u>Bridges</u>	<u>Culverts</u>	<u>Dams</u>	<u>Other</u>												
	Left Bank	<u>Bridges</u>	<u>Culverts</u>	<u>Dams</u>	<u>Other</u>												
Assessment Scores (1-Poor to 10-Excellent) *** (facing upstream) ***																	
Channel Condition	<input type="checkbox"/>	Pools	<input type="checkbox"/>														
Hydrologic Alteration <i>(Score only if Applicable)</i>	<input type="checkbox"/>	Invertebrate habitat	<input type="checkbox"/>														
Riparian Zone Left: <input type="checkbox"/> Right: <input type="checkbox"/>	<i>Score only if applicable</i>																
Bank Stability Left: <input type="checkbox"/> Right: <input type="checkbox"/>	Canopy Cover <input type="checkbox"/>																
Water Appearance	<input type="checkbox"/>	Manure presence <input type="checkbox"/>															
Nutrient Enrichment	<input type="checkbox"/>	Salinity <input type="checkbox"/>															
Barriers to fish movement	<input type="checkbox"/>	Riffle embeddedness <input type="checkbox"/>															
Instream fish cover	<input type="checkbox"/>	Macroinvertebrates <input type="checkbox"/>															
		Observed (optional) <input type="checkbox"/>															
<table border="1" style="margin: auto;"> <tr> <td>Overall Score</td> <td>< 6.0</td> <td>Poor</td> </tr> <tr> <td><i>(Total divided by number scored)</i></td> <td>6.1-7.4</td> <td>Fair</td> </tr> <tr> <td>Left: _____ Right: _____ Average: _____</td> <td>7.5-8.9</td> <td>Good</td> </tr> <tr> <td></td> <td>> 9.0</td> <td>Excellent</td> </tr> </table>						Overall Score	< 6.0	Poor	<i>(Total divided by number scored)</i>	6.1-7.4	Fair	Left: _____ Right: _____ Average: _____	7.5-8.9	Good		> 9.0	Excellent
Overall Score	< 6.0	Poor															
<i>(Total divided by number scored)</i>	6.1-7.4	Fair															
Left: _____ Right: _____ Average: _____	7.5-8.9	Good															
	> 9.0	Excellent															

Streamside Land Use

*** Right and Left banks are determined facing upstream ***

	Within 50 ft. of top of bank		Within 1/4 mile of site	
	Left Bank	Right bank	Left Bank	Right bank
Residential single-family housing				
Residential multifamily housing				
Residential lawns				
Residential pets				
Commercial/Institutional				
Commercial/Institutional lawns				
Roads paved				
Roads unpaved				
Construction underway for:				
-Housing development				
-Commercial development				
-Road/bridge construction or repair				
Agricultural grazing land				
Ag. feed lots/animal holding areas				
Agricultural cropland				
Inactive/fallow agricultural land or fields				
Recreational uses:				
-Golfing				
-Athletic fields or playgrounds				
-Swimming or other primary contact				
-Fishing, boating or other secondary contact				
-Hiking or jogging paths				
-Camping				
-Horse Trails				
-Other				
Waterfowl present (approx. # _____)				
Pets waste				
Preserved open space				
Woodland				
Wetlands				
Cemetery				
Recycling/waste facility				
Industrial				
Other				

Other than storm outfalls, any obvious sources of bacterial (i.e. fecal/pathogen) water quality impairment?

Yes No

If yes, describe: _____

Other than storm outfalls, any obvious sources of nutrient (i.e. phosphorus or nitrogen) water quality impairment?

Yes No

If yes, describe: _____

Utility, Stormwater Outfall & Drainage Ditch Inventory

UTILITY – GENERAL

*** Right and Left banks are determined facing upstream ***

Type Of Utility: <i>(circle all that apply)</i>	1. Sanitary Sewer 4. Natural Gas	2. Water Main 5. Unknown/Other: _____	3. Electrical Power Lines
Utility Locations: <i>(circle all that apply)</i>	1. Floodplain 4. Crosses over stream	2. Right stream bank 5. Crosses under streambed	3. Left stream bank
Type of Utility Structures: <i>(circle all that apply)</i>	<u>Water/Wastewater:</u> 1. Exposed pipeline 2. Manhole 3. Pump/lift station ----- <u>Electrical:</u> 1. Wood Poles 2. Metal Towers 3. Pole transformers ----- <u>Natural Gas:</u> 1. Exposed pipeline 2. Valve/meter/blowoff station		
ROW/Easement & Access Roads: <i>(circle all that apply)</i>	ROW/easement present? Yes No If yes, location of ROW/easement is: 1. Along right bank 2. Along left bank 3. Along both banks 4. Across reach ----- Utility access road present? Yes No		
Concerns Specific to Utility Structures & ROW/Easements: <i>(circle all that apply)</i>	1. Excess trash 2. Dumping (bulk) 3. Bank erosion 4. Excessive sedimentation 4. Fish barrier 5. Other: _____		

UTILITY – SEWER ONLY

Utility Structure Condition: <i>(circle all that apply)</i>	<u>Structure:</u> 1. Pipe 2. Manhole 3. Pump/Lift station 4. Other: _____ ----- <u>Problems:</u> 1. Joint failure 2. Pipe corrosion/cracking 3. Protective covering broken 4. Manhole cover absent 5. Erosion/undermining 6. Housekeeping (station) 7. Other: _____		
Pipe Material-1: <i>(circle one)</i>	1. Concrete 5. Clay	2. Corrugated metal 6. Other: _____	3. Smooth metal 4. PVC/plastic
Pipe Dimensions-1:	Pipe diameter (in): _____ Exposed pipe length (ft): _____		
Pipe Material-2: <i>(circle one)</i>	1. Concrete 5. Clay	2. Corrugated metal 6. Other: _____	3. Smooth metal 4. PVC/plastic
Pipe Dimensions-2:	Pipe diameter (in): _____ Exposed pipe length (ft): _____		
Pipe Discharges: <i>(circle all that apply)</i>	1. None 2. Liquid 3. Stains 4. Oils 5. Solids/materials: _____ 6. Color: _____ 7. Odor: _____ 8. Other: _____		
Evidence of Septic Problems in Area?	Yes No	If yes, describe: _____	

STORMWATER OUTFALLS & DRAINAGE DITCHES

Stormwater Outfalls or Drainage Ditches Present?	1. Outfalls 2. Drainage ditch 3. Both 4. Neither
	Number of outfalls: _____ Number of drainage ditches: _____
Stormwater Wetland BMP Feasibility:	If either outfalls or drainage ditch are present, could wetlands feasibly be used/created to capture and filter stormwater (outfall elevation, sufficient riparian area)? Yes No Comments: _____

[Document each outfall and drainage ditch on Page 7]

STORMWATER OUTFALLS & DRAINAGE DITCHES (CONT.)
(use additional sheets as necessary)

OUTFALL

*** Right and Left banks are determined facing upstream ***

Outfall Ref. #:	_____
Outfall Location: (circle one from each row)	1. Right bank 2. Left bank ----- 1. In stream 2. Top of bank 3. In bank 4. Out of/under bridge 5. Other: _____
Outfall Dimensions:	Pipe inner diameter (in): _____ Exposed pipe length (ft): _____
Outfall Pipe Material: (circle one)	1. Concrete 2. Corrugated metal 3. Smooth metal 4. PVC/plastic 5. Clay 6. Other: _____
Outfall Pipe Condition: (circle all that apply)	1. Intact 2. Joint failure 3. Corrosion/cracking 4. Erosion/undermining 5. Other: _____
Outfall Headwall Present?	Yes No If yes, condition: _____
Outfall Discharge: (circle all that apply)	1. None 2. Liquid 3. Stains 4. Oils 5. Solids/materials: _____ 6. Color: _____ 7. Odor: _____ 8. Other: _____
Outfall Erosion:	At outfall? Yes No Downstream of outfall? Yes No
Outfall Source: (circle all that apply)	1. Roadway 2. Commercial/parking lot 3. Residential 4. Detention basin/pond 5. Unknown (large MS4 area) Other: _____
Outfall Flow: (circle one from each row)	1. None 2. Intermittent 3. Steady ----- 1. Clean 2. Turbid 3. Oily 4. Foamy 5. Colored Other: _____

DRAINAGE DITCH

Drainage Ditch Reference #:	_____
Drainage Ditch Stream Bank: (circle one)	1. Right bank 2. Left bank
Drainage Ditch Source: (circle all that apply)	1. Unknown 2. Outfall pipe 3. Parking lot 4. Settling basin/pond 5. Agricultural field 6. Livestock operation 7. Other: _____
Drainage Ditch Lining: (circle all that apply)	1. Stone 2. Vegetation 3. Concrete 4. Dirt 5. Other: _____
Drainage Ditch Condition: (circle one)	1. Stable 2. Eroding
Drainage Ditch Flow: (circle one from each row)	1. None 2. Intermittent 3. Steady ----- 1. Clean 2. Turbid 3. Oily 4. Foamy 5. Colored Other: _____
Drainage Ditch Erosion: (circle one from each row)	Within ditch? Stable Eroded Silted ----- Downstream of ditch? Stable Eroded Silted

Suspected causes of problems and recommendations (indicate locations on map): _____

Other Observations (including nearby lakes/ponds): _____

Additional Photos:

Ref. # _____ Description: _____

Ref. # _____ Description: _____

Ref. # _____ Description: _____

Ref. # _____ Description: _____

Ref. # _____ Description: _____

Ref. # _____ Description: _____

Ref. # _____ Description: _____

Ref. # _____ Description: _____

Ref. # _____ Description: _____

Additional GPS Locations:

Ref. # _____ Description: _____

Ref. # _____ Description: _____

Ref. # _____ Description: _____

Ref. # _____ Description: _____

Ref. # _____ Description: _____