

DRAFT
Appendix B:
Stormwater Structure Data Collection/Submission
Suggested Protocol

Abstract

This document provides instructions for the collection of municipal-wide stormwater structure data and subsequent submission to the Highlands Council. The collection and reporting of this data supports the requirements of the New Jersey Stormwater Management Rules (N.J.A.C. 7:8), the NJDEP Municipal Stormwater Permit (MS4) program and the Highlands Council funded Stormwater Management Program elements. This protocol is intended to be used by Highlands municipalities that have opted not to utilize the Highlands Council mobile application and desktop web interface for stormwater structure mapping.

This document is included as Appendix B of the overall Highlands Region Stormwater Management Program Guidance document. For complete documentation, contact your Highlands Council Liaison (<http://www.nj.gov/njhighlands/planconformance/liasons.html>).

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Statutory Platform, Purpose and Funding

Through the passage of the New Jersey Highlands Water Protection and Planning Act in 2004, the NJ Highlands Water Protection and Planning Council (the Highlands Council) was created and charged with developing a Regional Master Plan (RMP). Adopted in 2008, the RMP serves as the guiding document for the long-term protection and restoration of the region's critical resources. Stormwater management activities, including the collection and submission of stormwater structure data, include but are not limited to the following RMP Goals: 1D, 1K, 2D, 2E, 2G and 6N.¹

The Highlands Council Stormwater Management Program has four main components, listed below. This document supports the first Program component.

- 1. GIS Mapping of Stormwater Structure Locations and Conditions Assessment**
2. Adoption of Highlands Area Stormwater Control Ordinance Amendments
3. Review and Update of Municipal Stormwater Mitigation Plan
4. Stormwater Management Training

This document is intended to be used by Stormwater Coordinators, stormwater professionals and municipal public works members who will be actively engaged in conducting stormwater structure inventories. This work is one component of the overall Highlands Stormwater Management Program. Materials related to the complete Stormwater Management Program are available on the Highlands Council website at www.nj.gov/njhighlands/planconformance/#storm.

Funding to support this work within a municipality is provided through the Highlands Plan Conformance process. Municipalities with approved Plan Conformance Petitions are eligible for grant funding to cover the reasonable expenses of planning activities associated with the Conformance process and should contact their Highlands Council Municipal Liaison² for additional information.

¹ Copies of the Highlands Regional Master Plan are available in most municipal offices and can be obtained by contacting the Highlands Council office and found at www.nj.gov/njhighlands/master/.

² www.nj.gov/njhighlands/planconformance/liasons.html

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1. Introduction

To ensure a comprehensive and coordinated approach to stormwater management throughout the Highlands Region, the Highlands Council requires conforming municipalities to conduct an assessment of existing stormwater structure locations. This is required for all Tier A and Tier B municipalities in the Highlands Region.

In lieu of using the Highlands Council mobile application and desktop web interface for stormwater structure mapping, municipalities may collect stormwater structure data (location and conditions) by alternative methods. The collected data must be submitted to the Highlands Council for inclusion in our centralized GIS database and formatted so that it can be easily uploaded to our interactive mapping website. The collection of this data also supports existing NJDEP 7:8 Municipal Stormwater Regulations (MS4 Permit).

This document outlines the requirements for collecting and submitting stormwater structure data to the Highlands Council.

2. Requirements

2.1 Scope of Work

Grant funding to support the collection of stormwater structure data is available to conforming Highlands municipalities with approved petitions for Plan Conformance. Prior to commencing project activities, municipalities must have an approved scope of work (SOW), developed in collaboration with their Highlands Council staff liaison. A listing of liaisons can be found at www.highlands.state.nj.us/njhighlands/planconformance/liaisons.html. A model SOW as well as the Grant Program SOW Requirements form is included with the Stormwater Management Program Guidance Materials on the Highlands Council website at www.nj.gov/njhighlands/planconformance/#storm.

2.2 Desktop Review

Prior to initiating field work, a desktop review should be performed. This will allow for a more systematic approach to data collection and will likely reduce errors and save the inspector time. The following tasks are recommended:

1. Identify the Stormwater Team members, timeframe and approach for field activities.
2. Review existing data and maps of stormwater structures and conditions (if available).
3. Determine if a structure naming convention has already been established. If so, these IDs should be used for the assessment. Please note, however, that each structure ID should be unique. Additionally, hyphens are acceptable but no other special characters should be included in the ID.
4. The approximate street address should be determined for each structure to allow for easier navigation to the structure.
5. A Stormwater Outfall Inspection Form is included as Appendix B-1 of this document. Please consider this a model document that can be used as-is or customized to suit local needs. Completing the known information on these forms prior to field work can be a time saver and help to keep the survey team organized. Also included as Appendix B-2 is a glossary to be used with the inspection form.

2.3 Stormwater Structure³ Data

2.3.1 Stormwater Structure Locations

Stormwater structure locations must be collected using Global Positioning System (GPS) receivers. GPS coordinates must be collected in accordance with N.J.A.C. 7:1D-Appendix A and the NJ GIS

³ Under the existing permit (expired at this time), only storm sewer outfall pipes are required to be mapped under the NJPDES Tier A permit. Municipalities, however, are encouraged to include any/all stormwater structure data that is currently available in their inventories.

Data Collection Standards⁴ to ensure data quality and consistency. GPS can be used to provide location accuracy from a few centimeters to tens of meters. **The horizontal accuracy standard for locations determined through the use of GPS is within 5 meters of truth, with a 95% level of confidence.**

2.3.2 Stormwater Structure Conditions

A conditions inspection must be conducted. The Stormwater Outfall Inspection Form as well as Stormwater Outfall Survey Glossary (Appendices B-1 and B-2) are included as model documents to be used in the field. The provided form can be modified to suit local needs; however, it is important to note that there are several required fields that will need to be submitted. The proposed inspection form must be submitted with the SOW document and approved by the Highlands Council in order to be eligible for funding through the Highlands Plan Conformance Grant Program.

2.3.3 Photographic Data

Digital photographs of each structure must be submitted. Up to five (5) photographs of each structure will be accepted. Each photo should be date/time stamped and named to reflect the naming convention of the structure. Acceptable file types are .JPG and .PNG.

2.4 Submission Requirements

No paper forms will be accepted. Acceptable file types for submitting stormwater structure data include: .shp, .xls, and .mdb. All field names must be Arc compatible (no special characters or spaces-underscore only). All data must be certified by the designated municipal Stormwater Coordinator that it meets the required standards. A certification form is included in Appendix B-3. Stormwater structure data shall be submitted on a compact disc (CD) by mail to the following address:

New Jersey Highlands Council
Attn: GIS Manager
100 North Road
Chester, NJ 07930

Or the data may be submitted electronically to the Highlands Council GIS Manager at: Nathan.McLean@highlands.nj.gov. (Please note that some file sizes may be too large to email.)

⁴ http://www.nj.gov/dep/gis/assets/NJDEP_GIS_Spatial_Data_Standards_2013.pdf

References

Highlands Water Protection and Planning Council. 2008. *Highlands Regional Master Plan*. Highlands Council. Chester, NJ.

New Jersey Department of Environmental Protection, Office of Information Resources Management- Bureau of Geographic Information Systems. October 2013. *Mapping and Digital Data Standards*. NJDEP. Trenton, NJ.

New Jersey Department of Environmental Protection, Office of Information Resources Management- Bureau of Geographic Information Systems. June 8, 2011. *NJDEP GPS Data Collection Standards for GIS Data Development*. NJDEP. Trenton, NJ.

Appendix B-1: Stormwater Outfall Inspection Form

*Type: Outfall		*Outfall ID:		*Inspector(s):	
*Date:			*Time:		
*County:			*Municipality:		
Block:		Lot:		Tax Map Number:	
Road Name:			Owner:		
Precip. last 24hrs: Y / N			Snow Melt Last 24hrs: Y / N		
Time of Last Rain: (circle one)		*Outfall Description:			
<input type="checkbox"/> <24 Hours		<input type="checkbox"/> Pipe		<input type="checkbox"/> Flared end Section	
<input type="checkbox"/> <48 Hours		<input type="checkbox"/> Pipe in Headwall		<input type="checkbox"/> Ditch	
<input type="checkbox"/> >48 Hours		<input type="checkbox"/> Concrete Headwall		<input type="checkbox"/> Grass Swale	
<input type="checkbox"/> >72 Hours		<input type="checkbox"/> Winged Headwall		Other:	
*Outfall Condition:		*Pipe Material:			
<input type="checkbox"/> Good		<input type="checkbox"/> Concrete		<input type="checkbox"/> Brick	
<input type="checkbox"/> Fair		<input type="checkbox"/> Metal		Other:	
<input type="checkbox"/> Poor		<input type="checkbox"/> Plastic			
<input type="checkbox"/> Unknown		<input type="checkbox"/> PVC			
*Pipe Shape:		*Pipe Height:			
<input type="checkbox"/> Circular		<input type="checkbox"/> Rectangular			
<input type="checkbox"/> Elliptical		<input type="checkbox"/> Pipe Arch		*Pipe Width:	
<input type="checkbox"/> Square		Other:			
*Headwall Condition:		Headwall Structure:			
<input type="checkbox"/> No Headwall		<input type="checkbox"/> Abutment Wall		<input type="checkbox"/> Steel Bulkhead	
<input type="checkbox"/> Good		<input type="checkbox"/> Brick Culvert Wall		<input type="checkbox"/> Stone	
<input type="checkbox"/> Fair		<input type="checkbox"/> Bridge Abutment		<input type="checkbox"/> Wood Bulkhead	
<input type="checkbox"/> Poor		<input type="checkbox"/> Cinder Block			
BMP Present: Y / N					
BMP Structure:		Other:			
<input type="checkbox"/> None		<input type="checkbox"/> Concrete			
<input type="checkbox"/> Rip-Rap		<input type="checkbox"/> Gabion Basket			

**Highlands required field*

Red Text = MS4 required field

BMP Comments:	
Scouring Present: Y / N	
Scouring Comment:	
Area Receiving: <input type="checkbox"/> Stormwater Basin <input type="checkbox"/> Wetland <input type="checkbox"/> Swale <input type="checkbox"/> Stream/River <input type="checkbox"/> Woodland Other: <input type="checkbox"/> Lake/Pond <input type="checkbox"/> Field <input type="checkbox"/> Canal <input type="checkbox"/> Ditch	
Flowing: Y / N	Dry Weather Flow: Y / N
Flow Color: <input type="checkbox"/> Clear <input type="checkbox"/> Turbid	Flow Odor: Y / N
Flow Foam: Y / N	Solid Floatables: Y / N
Flow Comments:	
Photos Taken: Y/N	Comments:
General Comments:	

Appendix B-2: Stormwater Outfall Survey Glossary

Type: This entry will be **Outfall**. According to the NJDEP, stormwater outfalls are “part of all development where impervious surfaces shed water during storm events and channel water into a subsurface drainage system and/or detention basin.” Consult with your Highlands Council liaison should you require additional categories. *Required by Highlands Council (HC)*

Outfall ID: Unique ID for to identify the outfall. *Required by HC*

Inspector: A unique employee identifier. Example: initials, employee number, etc. *Required by HC*

Date: The date the data was collected. *Required by HC*

Time: The time the data was collected. *Required by HC*

County: Name of county where outfall is located. *Required by HC*

Municipality: Name of municipality where outfall is located. *Required by HC*

Block: Indicate the block number where the outfall is located. *MS4 required field (if applicable).*

Lot: Indicate the lot number where the outfall is located. *MS4 required field (if applicable).*

Tax Map Number: Indicate the tax map number of where the outfall is located. *MS4 required field.*

Road Name: Indicate the road name closest to the outfall. Leave blank if outfall is not near any road. *MS4 required field (if applicable).*

Owner: Indicate the owner of the land on which the outfall is located. *MS4 required field.*

Precip. last 24hrs: Indicate if it has rained or snowed (collectively precipitation) in the past 24 hours. (Y/N)

Time of Last Rain: Indicate when the last rain/snowfall was.

<24 Hours: Precipitation occurred less than 24 hours ago.

<48 Hours: Precipitation occurred less than 48 hours ago.

>48 Hours: Precipitation occurred more than 48 hours ago.

>72 Hours: Precipitation occurred more than 72 hours ago.

Snow Melt Last 24 Hours: Indicate if snowmelt occurred within the last 24 hours. (Y/N)

Outfall Description: Construction description of outfall. *Required by HC*

Pipe: Outfall consists of a pipe only.

Pipe in Headwall: Outfall consists of a pipe set in a headwall of any type.

Concrete Headwall: Outfall consists of a pipe set in a concrete headwall.



Source: US Environmental Protection Agency

Winged Headwall: Outfall consists of a pipe set in a headwall with supports coming off of the headwall on both sides at an angle.



Source: Pennsylvania DEP

Flared end Section: Outfall pipe is cut off at the end on an angle, allowing the bottom portion of the pipe to be longer than the top portion.



Source: New York State DOT, Region 5 Maintenance Division

Ditch: A long, narrow man-made hole that is dug along a road, field or other feature that is used to hold or move water.



Source: Federal Highway Administration

Grass Swale: EPA defines this as a grassed “open-channel management practice designed specifically to treat and attenuate stormwater runoff for a specified water quality volume.” The grass swale consists of a ditch-like feature that is grassed over.



Source: US Environmental Protection Agency

Other: Construction does not match one of the above descriptions.

Outfall Condition: Overall condition of the outfall. *Required by HC*

Good: Outfall is in good condition and does not need any repair or other attention.

Fair: Outfall is in decent condition and should be repaired soon.

Poor: Outfall is in disrepair and needs to be repaired immediately or replaced to ensure continuity of proper functioning.

Unknown: Outfall pipe cannot be seen or location is taken from a source that does not indicate current condition.

Pipe Material: Material that the pipe is constructed of. This is the material of the pipe only. *Required by HC*

Concrete: Pipe is made entirely of concrete.



Source: Massachusetts Water Resources Authority

Metal: Pipe is made entirely of corrugated metal



Source: US Forest Service

Plastic: Pipe is made out of plastic.



Source: USGS

PVC: Pipe is made out of PVC.



Source: California Department of Transportation

Clay: Pipe is made out of clay or terra cotta.

Brick: Pipe is made out of brick.

Other: Pipe is made out of a material not listed above.

Pipe Shape: The intended shape of the pipe. *Required by HC*

Circular: A pipe having a perfectly round intended shape.



Source: Massachusetts Water Resources Authority

Elliptical: Pipe is shaped like a flattened circle or an oval.



Source: Alaska Department of Fish and Game

Square: A four-sided shape that is made up of four straight sides that are of the same length and meet at four right angles.

Rectangular: A four-sided shape that is made up of two pairs of parallel lines (each set of different length) and that has four right angles.

Pipe Arch: Pipe is not a full cylinder and is bottomless.



Source: Alaska Department of Fish and Game

Other: Pipe shape does not match one of the above.

Pipe Height: The height of the inside of the pipe from top to bottom, reported in inches (in). *Required by HC*

Pipe Width: The width of the inside of the pipe from left to right, reported in inches (in). *Required by HC*

Headwall Condition: Overall condition that the headwall is in. *Required by HC*

No Headwall: Select if headwall is not present.

Good: Headwall is in good condition and does not need any repair or other attention.

Fair: Headwall is in decent condition and should be repaired soon.

Poor: Headwall is in disrepair and needs to be repaired immediately or replaced to ensure continuity of proper functioning.

Headwall Structure: If a headwall is present, indicate of which material it is constructed.

Abutment wall: A retaining wall that supports a vertical weight

Brick culvert wall: Headwall is constructed of bricks

Bridge abutment: A retaining wall that supports a bridge

Cinder block: Headwall is constructed of cinderblocks

Steel bulkhead: Headwall is constructed of steel

Stone: Headwall is constructed of stone

Wood bulkhead: Headwall is constructed of wood

BMP Present: Indicate if a BMP (Best Management Practice) is present. Defined by SMRC as “a structural or non-structural device designed to temporarily store or treat urban stormwater runoff in order to mitigate flooding, reduce pollution and provide other amenities.” (Y/N)

BMP Structure: Indicate which structure is present.

None: No BMP structure is present.

Rip-rap: Defined by SMRC as “broken rock, cobbles, or boulders placed on earth surfaces, such as the face of a dam or the bank of a stream, for protection against the action of water (waves); also applies to brush or pole mattresses, or brush and stone, or similar materials used for soil erosion control.” Defined by the DVRPC as “a foundation or sustaining wall of stones thrown together without order.”



Source: Pennsylvania DEP

Concrete: Defined by the DVRPC as “flared wings off of a headwall.”

Gabion Basket: Defined by SMRC as “a flexible woven-wire basket composed of two to six rectangular cells filled with small stones. Gabions may be assembled into many types of structures such as revetments, retaining walls, channel liners, drop structures and groins.” Defined by the DVRPC as a “rectangular steel wire mesh basket filled with stones.”



Source: Pennsylvania DEP

Other: BMP structure not listed above is present. Indicate type in BMP Comment field.

BMP Comment: Indicate any comments regarding the BMP structure. Include type of BMP if other is listed.

Scouring Present: Indicate if scouring is present. Scouring is the removal of soil, rock, sand or debris by a powerful flow originating from the outfall (i.e. a channel or gorge in the earth that originates at the pipe and leading away from it). This can lead to erosion, but does not include erosion. (Y/N)

Scouring Comment: Indicate any comments regarding the scouring at the outfall (severity, amount, old/recent, etc.).

Area Receiving: Indicate the type of receiving area. (What is the outfall leading/draining into?)

Stormwater Basin: Defined by the NJDEP as “an excavation or embankment and related areas designed to retain stormwater runoff. A stormwater management basin may either be normally dry (that is, a detention basin or infiltration basin), retain water in a permanent pool (a retention basin), or be planted mainly with wetland vegetation (most constructed stormwater wetlands).” (Also called a stormwater management basin.)

Stream/River: A natural flow of freshwater of various sizes.

Lake/Pond: A natural or man-made body of fresh water or various sizes.

Canal: A man-made channel filled with water

Wetland: Defined by the NJDEP as “an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation.”

Woodland: A primarily forested area.

Field: An area with no trees, can be actively farmed, pasture/hayfield, meadow or other area without trees.

Ditch: A long, narrow man-made hole that is dug along a road, field or other feature that is used to hold or move water.

Swale: Defined by SMRC as “an open drainage channel or depression explicitly designed to detain and promote the filtration of stormwater runoff.”

Other: Area that the outfall leads into does not fit one of the above descriptions.

Flowing: Indicate if water is actively flowing through the outfall. (Y/N)

Dry Weather Flow: Indicate if flow is present when there has been no rain within the last 72 hours (3 days). (Y/N)

Flow Color: Indicate if flow is clear or turbid.

Clear: Defined by DVRPC as “can see to bottom.”

Turbid: Defined by DVRPC as “clouded from silt.”

Flow Odor: Indicate if flow has a discernible odor. (Y/N)

Flow Foam: Indicate if foam is present within the flow. (Y/N)

Solid Floatables: Indicate if solids are present within the flow (leaves, twigs, litter, sewage, etc.). (Y/N)

Flow Comments: Indicate any other comments regarding the outfall’s flow. Include amount of flow (measure bottom of pipe to top of flow in inches), further comments on color (gray, tea-colored, etc.), type of odor (sewage, petroleum, chemical, anaerobic, etc.), color of foam, presence of sheen and type of floatables.

General Comments: Indicate any other comments about the outfall. If location is estimated due to a technical error (no cell service, out of battery, etc.), indicate that location is estimated along with an estimation of accuracy.

References

DVRPC (Delaware Valley Regional Planning Commission):

<http://www.dvrpc.org/Environment/water/pdf/OutfallDataCollectionGuidance.pdf>.

NJ DEP: <http://www.nj.gov/dep/landuse/activity/outfalls.html> or

http://www.nj.gov/dep/rules/rules/njac7_8.pdf or

<http://www.state.nj.us/dep/gis/digidownload/metadata/lulc02/anderson2002.html>.

SMRC (The Stormwater Manager's Resource Center): <http://www.stormwatercenter.net/>.

(Accessed through the US EPA's Municipal Separate Storm Sewer System (MS4) Main Page -

<http://water.epa.gov/polwaste/npdes/stormwater/Municipal-Separate-Storm-Sewer-System-MS4-Main-Page.cfm>.)

US EPA: http://water.epa.gov/infrastructure/greeninfrastructure/gi_what.cfm.

Photo Credits

Alaska Department of Fish and Game:

<http://www.adfg.alaska.gov/sf/reports/FishPassage/rptSite.cfm?site=20501410&surveyID=1250>

California Department of Transportation: <http://www.dot.ca.gov/hq/oppd/dib/dib83-02-6.htm>

Federal Highway Administration: http://safety.fhwa.dot.gov/local_rural/training/fhwas09024/

Massachusetts Water Resources Authority:

<http://www.mwra.state.ma.us/03sewer/html/sewco.htm>

New York State DOT, Region 5 Maintenance Division:

<https://www.dot.ny.gov/divisions/engineering/environmental-analysis/repository/OutfallMethodology.pdf>

Pennsylvania DEP: <http://www.elibrary.dep.state.pa.us/dsweb/GetRendition/Document-87860/html>

US Environmental Protection Agency: <http://water.epa.gov/polwaste/npdes/swbmp/Grassed-Swales.cfm> , http://www.epa.gov/caddis/ssr_sed_wtl.html

US Forest Service: <http://www.fs.fed.us/eng/dams/olt/index.html#41-problems>

USGS: <http://pubs.usgs.gov/sir/2012/5068/section6.html> ,
<http://il.water.usgs.gov/proj/nvalues/db/sites/03343200.shtm>

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Appendix B-3: Certification Form

New Jersey Highlands Council 100 North Road Chester, N.J. 07930 Phone: 908-879-6737 Website: www.nj.gov/njhighlands	Receipt Stamp - Highlands Council Use Only
Stormwater Structure Data Submittal Certification	
<p>Municipalities in the Highlands Region with approved Plan Conformance Petitions are required to submit stormwater structure data to the Highlands Council in accordance with the Highlands Stormwater Management Program. This form is to certify that the data being submitted is accurate and that the locational information provided adheres to the NJDEP Mapping and Digital Data Standards (October 2013) www.nj.gov/dep/gis/assets/NJDEP_GIS_Spatial_Data_Standards_2013.pdf.</p> <p>Should you have any questions about this submission process, please do not hesitate to call the Highlands Council at (908) 879-6737 and request to speak to your liaison.</p>	
Municipality:	
Project Description <i>(brief description of data being submitted)</i>	
Empty space for project description	
Certification	
Signature:	
Name:	
Title:	
Username or Certification (if applicable):	
Date:	
Phone #:	Fax #:
email:	