Watershed Inventory Report

Phase 1 of the Watershed Improvement Plan

Borough of Mendham
County of Morris

December 30, 2025

Permit Number: NJG0151483

Stormwater Program Coordinator: Paul W. Ferriero, PE, CME

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Acronyms & Definitions

1. *Acronyms*
    - i. *"BMP" – Best Management Practice*
    - ii. *"DO" – Dissolved Oxygen*
    - iii. *"EPA" – U.S. Environmental Protection Agency*
    - iv. *"GIS" – Geographic Information System*
    - v. *"HUC 14" – Hydrologic Unit Code 14*
    - vi. *"MS4" – Municipal Separate Storm Sewer System*
    - vii. *"MTD" – Manufactured Treatment Device*
    - viii. *"NJPDES" – New Jersey Pollutant Discharge Elimination System*
    - ix. *"NJ-WET" – New Jersey Watershed Evaluation Tool*
    - x. *"TDS" – Total Dissolved Solids*
    - xi. *"TMDL" – Total Maximum Daily Load*
    - xii. *"TSS" – Total Suspended Solids*
    - xiii. *"WIP" – Watershed Improvement Plan*
2. *Definitions*
    - i. *"HUC 14" or "hydrologic unit code 14" means an area within which water drains to a particular receiving surface water body, also known as a subwatershed, which is identified by a 14-digit hydrologic unit boundary designation, delineated within New Jersey by the United States Geological Survey. (N.J.A.C. 7:9B)*
    - ii. *"Municipal separate storm sewer" (or MS4 conveyance) means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains) as defined in more detail at N.J.A.C. 7:14A-1.2.*
    - iii. *"Outfall" means any point source which discharges directly to waters of the United States and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream or other waters of the United States and are used to convey waters of the United States.*
    - iv. *"Storm drain inlet" means the point of entry into the storm sewer system.*
    - v. *"Stormwater" means water resulting from precipitation (including rain and snow) that runs off the land's surface, is transmitted to the subsurface, is captured by separate storm sewers or other sewerage or drainage facilities or is conveyed by snow removal equipment.*
    - vi. *"Stormwater facility" means stormwater infrastructure including, but not limited to, catch basins, infiltration basins, detention basins, green infrastructure (GI), filter strips, riparian buffers, infiltration trenches, sand filters, constructed wetlands, wet basins, bioretention systems, low flow bypasses, Manufactured Treatment Devices (MTDs), and stormwater conveyances.*
    - vii. *"Stormwater management basin" means a stormwater management basin as defined in N.J.A.C. 7:8.*
    - viii. *"Stormwater management measure" means a stormwater management measure as defined in N.J.A.C. 7:8.*
    - ix. *"Stormwater runoff" means water flow on the surface of the ground or in storm sewers, resulting from precipitation.*
    - x. *"Total maximum daily load" or "TMDL" means a total maximum daily load formally established pursuant to Section 7 of the Water Quality Planning Act (N.J.S.A. 58:11A-7) and Section 303(d) of the Clean Water Act, 33 U.S.C. §§12512 et seq. A TMDL is the sum of individual wasteload allocations for point sources, load allocations for nonpoint sources of pollution, other sources such as tributaries or adjacent segments, and allocations to a reserve or margin of safety for an individual pollutant.*
    - xi. *"Waters of the State" means the ocean and its estuaries, all springs, streams and bodies of surface or ground water, whether natural or artificial, within the boundaries of the State of New Jersey or subject to its jurisdiction" (see N.J.A.C. 7:9B-1.4).*

Data Requirements & Resources

Field work using Trimble Global Positioning System (GPS) TDC6 units to collect data for the Watershed Inventory Report was conducted by AQUALIS in 2025, with additional data retrieved from NJDEP-provided resources such as:

New Jersey Watershed Evaluation Tool (NJ-WET)

https://experience.arcgis.com/experience/f40f65d807bb4372bd92b48bb98f1972

NJDEP Open Data

https://gisdata-njdep.opendata.arcgis.com/

TMDL Lookup Tool

https://dep.nj.gov/njpdes-stormwater/municipal-stormwater-regulation-program/tmdl/

New Jersey's Integrated Water Quality Assessment Reports – 303(d) List

https://dep.nj.gov/wms/bears/water-quality-assessment/

New Jersey Environmental Justice Mapping, Assessment, and Protection Tool (EJMAP)

https://experience.arcgis.com/experience/548632a2351b41b8a0443cfc3a9f4ef6

The New Jersey Hydrologic Modeling Database, or "H&H Database,"

https://hydro.rutgers.edu/about/

MS4 WIP Guidance Webpage

https://dep.nj.gov/njpdes-stormwater/municipal-stormwater-regulation-program/watershed-improvement-...

Required Data	Data Source
1. *All stormwater outfalls owned/operated by the permittee*	*MS4 Infrastructure Map*
2. *Drainage area for each permittee owned/operated outfall*	*Topography* *ArcGIS Solutions/ArcHydro*
3. *Receiving waterbodies of those outfalls*	*NJ-WET* *NJDEP Open Data*
4. *Water quality classification of all receiving waterbody segments*	*NJ-WET* *NJDEP Open Data*
5. *All stormwater interconnections from the permittee's MS4 system into another entities' storm or sanitary sewer system*	*MS4 to MS4 interconnections acquired in MS4 Infrastructure Map, private interconnection(s) needed*
6. *The drainage area for each interconnection into another entities' storm or sanitary sewer system*	*Topography* *ArcGIS Solutions/ArcHydro*
7. *All stormwater interconnections into the permittee's system from another entities' storm sewer system*	*MS4 to MS4 interconnections acquired in MS4 Infrastructure Map, private interconnection(s) needed*
8. *All storm drain inlets owned/operated by the permittee*	*MS4 Infrastructure Map*
9. *Area associated with each TMDL for waters that lie within or bordering the permittee's property(s)/jurisdiction*	*NJ-WET* *NJDEP Open Data*
10. *Area associated with each water quality impairment for waters that lie within or bordering the permittee's property(s)/jurisdiction*	*NJ-WET* *NJDEP Open Data*

11. Overburdened communities	*NJ-WET* *NJDEP Open Data* *EJMAP*
12. Impervious areas	*NJ-WET* *NJDEP Open Data*
13. Location and ownership of all stormwater infrastructure not owned or operated by the permittee	*H&H Database*

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Acknowledgements

The Borough of Mendham Watershed Inventory Report is a collaborative report prepared by AQUALIS, stormwater management consultant for the Borough, with contributions from the Mendham Borough Stormwater Pollution Prevention Team, and data collected from New Jersey Highlands Water Protection and Planning Council, Raritan Headwaters Association, and the Rutgers Cooperative Extension (RCE) Water Resources Program.

Funding for this project has been provided in part by New Jersey Department of Environmental Protection (NJDEP) 2023 Municipal Stormwater Assistance Grant, and with funding allocated for stormwater management purposes by the Mendham Borough Council in annual municipal budgets. Prior to completing the Watershed Inventory Report, it was necessary to complete the Municipal Separate Storm Sewer System (MS4) Infrastructure Map, a requirement under the 2023 NJDEP Tier A MS4 Municipal Stormwater Permit. The MS4 Infrastructure Map serves as a base map upon which Watershed Improvement Inventory features have been added. The MS4 Infrastructure Map was completed by AQUALIS and approved by the NJDEP in July 2025. Funding for the MS4 Infrastructure Map was provided in part by the NJDEP Municipal Stormwater Assistance Grant and from allocations within the 2023-2025 Mendham Borough Municipal Budgets.

Introduction – Watershed Improvement Plan

New Jersey municipalities operating Municipal Separate Storm Sewer Systems (MS4s) systems were introduced to new requirements in 2023 when the New Jersey Department of Environmental Protection Agency (NJDEP) issued a revised Tier A Municipal Stormwater General Permit (NJPDES: NJ0141852) for the period beginning January 1, 2023 through December 31, 2027. The 2023 Tier A permit acknowledges a changing climate by addressing stormwater quality issues relating to both new and existing development, increases preventative measures and inspection/reporting requirements, and expands community engagement to collectively reduce the discharge of pollutants into waterways. The 2023 permit – and amendments to the Stormwater Rules (N.J.A.C. 7:8) – address water quality and flooding issues in municipal stormwater systems to a greater extent than in prior versions in response to the increased frequency and intensity of severe storms that elevate flooding risks.

One major component of the 2023 Tier A MS4 Municipal Stormwater Permit is the development of a Watershed Improvement Plan (WIP) to inventory stormwater features in the permitted areas, evaluate data to identify potential improvement projects that will address water quality and quantity issues, and determine which projects can be implemented and on what schedule. The multi-year Watershed Improvement Plan project is designed to improve water quality by reducing the contribution of pollutant parameters for all receiving waters within and bordering the municipality that have percent reductions listed for stormwater in the Total Maximum Daily Loads (TMDLs) and water quality impairments, and reduce or eliminate flooding within the municipality by prioritizing areas of flooding for corrective actions based on human health and safety, environmental impacts, and frequency of occurrence. Since watersheds do not follow municipal boundaries, hydrological systems are interconnected, and stormwater (and pollutants) flow downstream, it is necessary to consider subwatersheds and regions when planning water quality initiatives to determine cumulative benefits – and impacts.

The WIP is structured as a three-phase project with staggered completion dates due in years three, four, and five of the permit term. This report is known as the **Watershed Inventory Report (Phase I).** The three phases of the Watershed Improvement Plan and their corresponding deadlines are:

Watershed Inventory Report (Phase I) – The development of an electronic map that delineates stormwater features that affect subwatersheds by adding mapping layers to the MS4 Infrastructure Map.

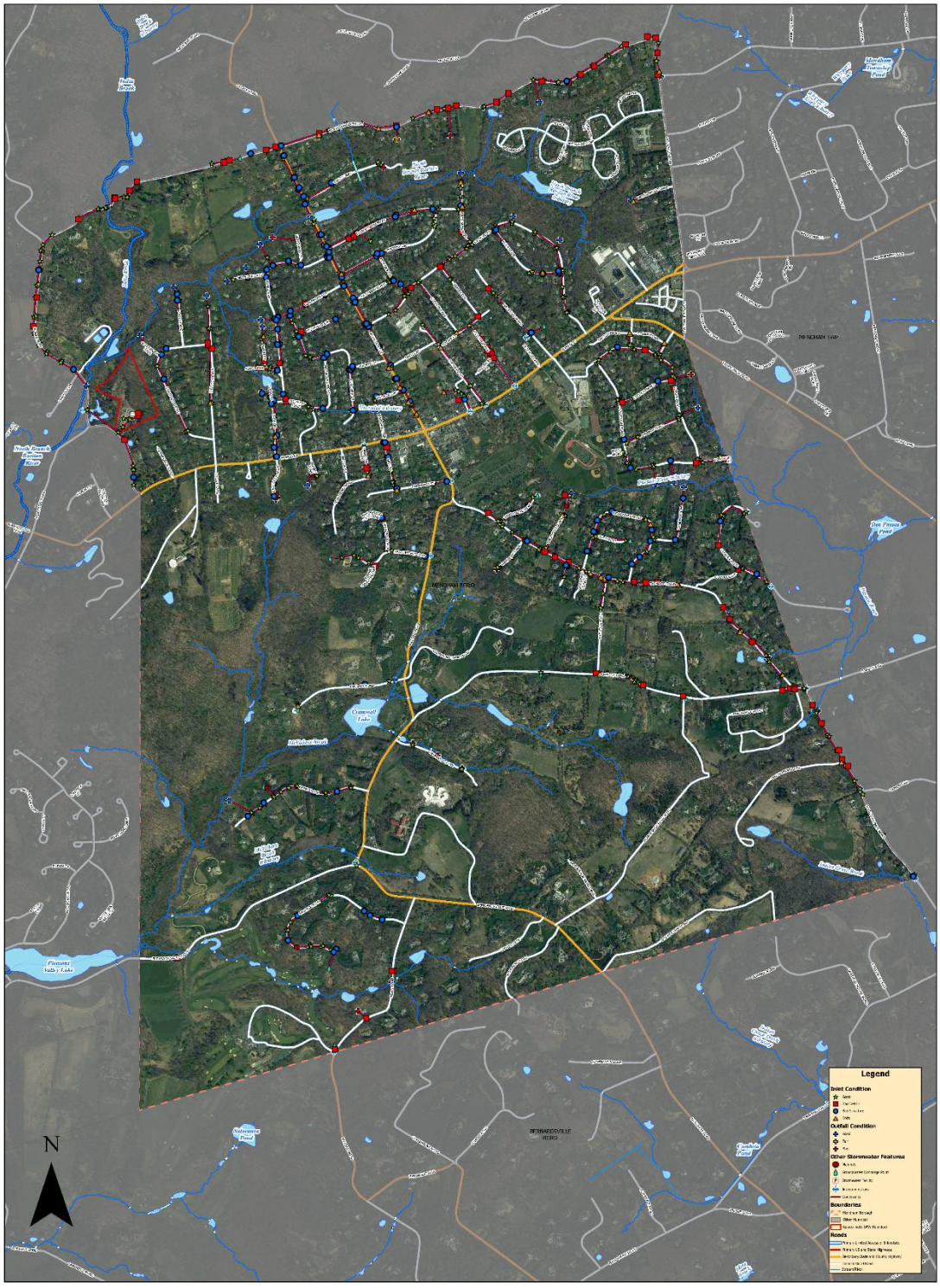
Due by January 1, 2026

Watershed Assessment Report (Phase II) – An evaluation of data to identify potential projects (and necessary funding) that can address water quality and quantity issues.
Due by January 1, 2027

Watershed Improvement Plan (Phase III) – A summary of proposed projects, comments received from stakeholders, estimated costs, coordination of other programs (as appropriate), and planned implementation schedules.
Due by December 1, 2027

In its entirety, the Watershed Improvement Plan is a regional plan intended to improve water quality and quantity issues by focusing on the MS4 contribution of pollutants to waterbodies with listed impairments, Total Maximum Daily Loads (TMDLs) of pollutants that can enter a waterbody and maintain water quality standards. By identifying water quality and quantity issues that affect subwatersheds, a determination of the regional impact of the MS4 contributions to the issues can be analyzed and targeted for reduction.

Figure 1: Mendham Borough Infrastructure Map 2025



Spatial Reference
Name: NAD 1983 HARN StatePlane New Jersey FIPS 2900 Feet
GCS: GCS North American 1983 HARN
Datum: North American 1983 HARN
Projection: Transverse Mercator
Map Units: Foot US
Date: September 2025

Prepared by:
STORMWATER COMPLIANCE SOLUTIONS LLC

2025 Stormwater Infrastructure Map

Mendham Borough
Morris County
New Jersey

Mendham Borough General Demographic Information

The Borough of Mendham is in south central Morris County, encompassing 6.02 square miles. It is regulated as a Tier A MS4 municipality under the NJPDES program under permit number NJG0151483. It is located in the North and South Branch Raritan River Watershed Management Area (WMA 08) and the Upper Passaic, Whippany and Rockaway River Watershed Management Area (WMA 06). The entirety of Mendham Borough is within the NJ Highlands Region Planning Area.

The Borough of Mendham is bounded to the south by the Borough of Bernardsville and surrounded by Mendham Township at all other boundaries. A central commercial core provides a small-town village character. Residential development surrounds the business area and decreases in density away from the commercial core, largely due to topography and the lack of public sewer and water infrastructure. The prevalence of riparian corridors, wetlands, and floodplains in the undeveloped areas assist with providing important ecological, water quality, and flood storage functions.

Based on the 2020 U.S. Census, Mendham Borough has a population of 4,981. According to published data confirmed in December 2025, Mendham Borough does not contain any NJDEP-designated Overburdened Communities areas.

Land use type(s):
https://www.nj.gov/njhighlands/planning/rmp/monitoring/files/factbook_2025.pdf?utm_source

Table 1: Land Use Category Percentage

Land Use Category	Percentage (%)
Agricultural Land	8.3%
Forest / Woodlands	26.6%
Developed / Urban	57.5%
Water Bodies	0.9%
Other (e.g., wetlands, barren)	6.7%
Total	100%

Watershed Overview

Mendham Borough is within the North and South Branch Raritan River Watershed Management Area (WMA 08) and the Upper Passaic, Whippany and Rockaway River Watershed Management Area (WMA 06). These watersheds contain a mix of preserved open space, residential development, agricultural lands, roadways, and commercial areas. These combined land uses influence local stormwater runoff and water quality.

Several Category I waterways are within Mendham Borough, including There are several waterways within Mendham Borough that are classified as Category I waterways, including the India Brook, the North Branch of the Raritan River, the Passaic River, the McVickers Brook, and the Indian Grove Brook. According to NJDEP, these waters “are classified as Category 1 for the protection from measurable changes in water quality characteristics because of their clarity, color, scenic setting, other characteristics of aesthetic value, exceptional ecological significance (i.e., habitat for threatened/endangered species such as wood turtle, bog turtle), exceptional recreational species, exceptional water supply, or exceptional fisheries resource (i.e., trout production)."

Table 2: Subwatersheds within or bordering Mendham Borough

HUC-14	Sub-Watershed Name
02030103010010	Passaic R Upr (above Osborn Mills)
02030105060010	Raritan R NB (above/incl India Bk)
02030105060030	Raritan R NB(incl McVickers to India Bk)
02030105060040	Raritan R NB(Peapack Bk to McVickers Bk)
02030103020010	Whippany R (above road at 74d 33m)

Area(s) Prone to Flooding

- India Brook corridor
- North Branch Raritan River Headwaters and Tributaries
- McVickers Brook drainage area
- Upper Passaic River Headwaters
- Older residential neighborhoods with shallow roadside swales and low-lying areas

Public Participation

Public participation is a critical component of the Watershed Improvement Plan (WIP) for Mendham Borough, Morris County, New Jersey, and is essential to achieving the State's water quality objectives under the New Jersey Pollutant Discharge Elimination System (NJPDES) program. The Borough's objectives for stormwater management are consistent with the State's; that is, to reduce stormwater pollution and the adverse effects of stormwater runoff. This Watershed Inventory Report lays the groundwork for community discussion for Phases II and III of the Watershed Inventory Plan that identify potential improvement projects and establish costs and timelines for approved watershed improvement projects.

By engaging with the public and community stakeholders, the Borough ensures that watershed restoration strategies reflect local conditions, municipal priorities, and New Jersey Department of Environmental Protection (NJDEP) regulatory objectives. Stakeholder input offers valuable local knowledge regarding drainage patterns, recurring roadway and neighborhood flooding, streambank erosion, and potential sources of pollution, including illicit discharges, failing infrastructure, and nonpoint source runoff. Incorporating this local information improves the accuracy of watershed assessments and supports the identification and prioritization of targeted, cost-effective Best Management Practices (BMPs) consistent with NJDEP stormwater management standards and municipal planning initiatives. Input obtained during public information sessions are recorded to be made part of the Watershed Improvement Plan.

Stormwater Outfall(s)

Outfalls are a critical component to a stormwater infrastructure network. An outfall is a point source where the municipal separate storm sewer system discharges directly to Waters of the State, which can mean the ocean and its estuaries, all springs, streams, and bodies of surface or ground waters whether natural or artificial, within the boundaries of the State of New Jersey (or subject to its jurisdiction)." A "point source," refers to the discharge point from which pollutants are or may be discharged from the stormwater conveyance system. As final discharge points for stormwater runoff, outfalls are optimal sites for pollutant sampling, detecting illicit discharges, and assessing Total Maximum Daily Load (TMDL) requirements. Outfalls must be inspected and maintained to detect erosion, blockages, structural damage, identify pollutant sources, etc.

Mendham Borough has identified 53 outfalls that are municipally owned and operated. A minimum of 20% of the total outfall number are visually inspected each year to determine if dry weather flow (flow occurring 72 hours after a rain event) or other evidence of illicit discharge is present. Reports containing outfall conditions and illicit discharge investigations are maintained in the office of the Superintendent of Public Works.

The outfall inventory was initially determined in 2007 from field inspections conducted during 2006 and 2007, updated annually and condition recorded. MS4 Infrastructure Map fieldwork conducted in June 2025 using Trimble TDC6 GIS units in 2023-2025 have been made part of the annual update totals. The data for stormwater outfalls was collected through fieldwork conducted in June 2025. Existing stormwater infrastructure maps prepared by AQUALIS were utilized to assist field crews navigate municipally owned roadways and properties and to locate and field verify each municipally owned/operated outfall using a mapping grade Trimble GPS capable of centimeter accuracy. Visual analysis was performed to ensure that the observed conditions were accurately recorded, and each data parameter was captured pursuant to the Tier A Municipal Stormwater, Section G1i.

The 53 outfalls that discharge to surface waterbodies and corresponding subwatersheds are identified in the chart below:

Table 3: Number of Outfalls That Discharge to Each Subwatershed

Subwatershed	**# of Outfalls**
Passaic R Upr (above Osborn Mills)	11
Raritan R NB (above/incl India Bk)	28
Raritan R NB(incl McVickers to India Bk)	14
Raritan R NB(Peapack Bk to McVickers Bk)	0
Whippany R (above road at 74d 33m)	0

Receiving Surface Waters

Under the **Clean Water Act (CWA),** receiving water is: “Any surface water body into which pollutants are, or may be, discharged.” Discharges from outfalls are considered direct, and not indirect, such as from storm drains or ditches.

The identification of receiving surface waters was based on outfall data collected through fieldwork, combined with topographic analysis and GIS data. Fieldwork was conducted in June 2025 using GPS devices to record the coordinates and physical characteristics of visible and accessible outfall structures. These outfall locations were then analyzed alongside local topography and the Surface Water Quality Classification of New Jersey shapefiles to determine the receiving surface waters. The shapefiles were retrieved from the NJDEP Open Data portal in June 2025 from the Division of Information Technology, NJDEP Bureau of GIS website: https://gisdata-njdep.opendata.arcgis.com/

The receiving surface waters within Mendham Borough jurisdiction include Cromwell Lake, India Brook, McVickers Brook, North Branch Raritan River, North Branch Raritan River unnamed tributaries, Passaic River, Passaic River unnamed tributaries and uncoded tributaries.

The receiving waters within Mendham Borough jurisdiction and the percentage of outfalls that discharge to them are listed below, as accessed from the NJ-WET and NJDEP Open Data resources in July 2025:

Table 4: Percent of Outfalls That Discharge to Each Receiving Surface Water

Receiving Surface Water	Percentage
Cromwell Lake	1.89%
India Brook	3.77%
McVickers Brook	5.66%
McVickers Brook UNT	16.98%
North Branch Raritan River	28.30%
North Branch Raritan River UNT	16.98%
Passaic River	7.55%
Passaic River UNT	13.21%
Uncoded Tributary	5.66%

Water Quality Classifications

The State of New Jersey has established Surface Water Quality Standards (SWQS) under the New Jersey Administrative Code at N.J.A.C. 7:9B to set forth water quality criteria based on designated uses (e.g. drinking water supply, recreation, etc.) to protect the surface waters for those uses.

The SWQS rules and policies for protecting water quality include general, technical, antidegradation, nutrients, and mixing zones. The SWQS contains procedures for establishing and modifying water quality-based effluent limitations for New Jersey Pollutant Discharge Elimination System (NJPDES) point sources as well as Surface Water Quality Standards Variance and procedures for reclassifying specific stream segments. (https://dep.nj.gov/wms/bears/surface-water-quality-standards-swqs).

Antidegradation policies are established in the SWQS to require that all surface waters and designated uses are maintained and protected, and that impaired waters are restored to meet SWQS. There are also three (3) tiers of antidegradation designations: Outstanding Natural Resource Waters (ONRW), classified as FW1 or nondegradation waters, and PL waters (Pinelands), which must be maintained in their natural state, Category One (C1) Waters that have exceptional ecological, recreational, water supply, or fisheries resources significance, and Category Two (C2), which are all surface waters not designated as ONRW or C1. While C2 waters may have a lower existing water quality than ONRW or C1, all existing and designated uses must be maintained in accordance with SWQS standards.

Surface water quality classifications are based on the type of waterbody, its designated use, and if saline or fresh. Within the freshwater category, there are three (3) trout classifications in surface water classification categories based on their ability to support trout production (FW2-TP), trout maintenance (FW2-TM), and non-trout (FW2-NT).

The applicable water quality classifications of the freshwaters of Mendham Borough are FW2-NT, FW2-TP, and FW2-TPC1.

The chart below lists the percentage of outfalls that discharge to each water quality classification within the jurisdiction of Mendham Borough. The information contained in the chart was collected in July 2025 from the NJDEP resources at NJWET (https://experience.arcgis.com/experience/f40f65d807bb4372bd92b48bb98f1972/page/Home/)

Table 5: Percent of Outfalls That Discharge to Each Water Quality Classification

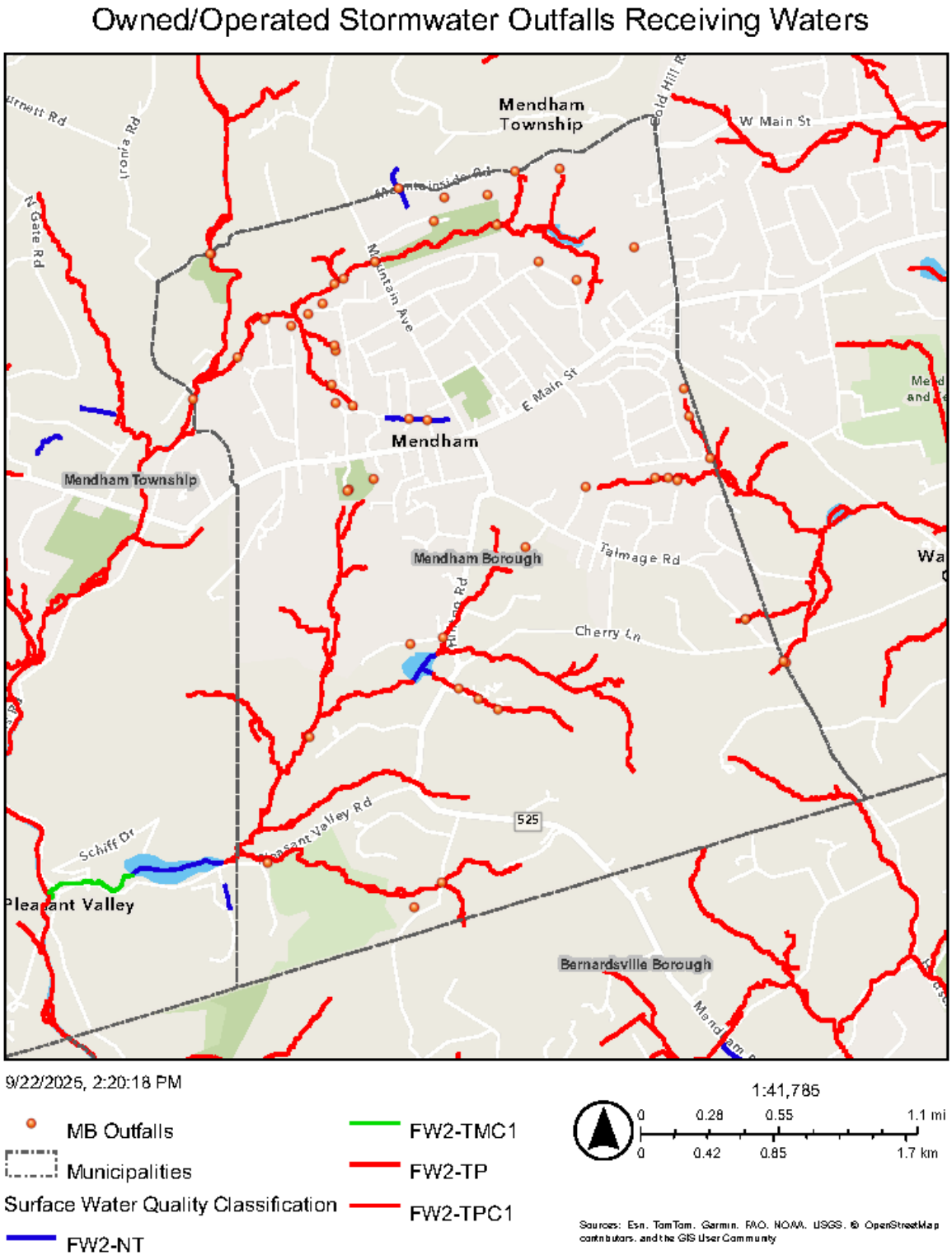
Water Quality Classification	Percentage
FW2-NT	7.55%
FW2-TP	13.21%
FW2-TPC1	79.25%

Table 6: Outfalls Receiving Surface Water Bodies & Water Quality Classifications

OUTFALL_ID	Receiving Surface Water	Water Quality Classification
PV OF1	McVickers Brook UNT	FW2-TPC1
TM OF1	Passaic River UNT	FW2-TP
TM OF2	Passaic River UNT	FW2-TP
IR OF1	North Branch Raritan River	FW2-TPC1
MTS OF1	India Brook	FW2-TPC1
MTS OF1A	India Brook	FW2-TPC1
WF OF2	McVickers Brook UNT	FW2-TPC1
MF OF1	North Branch Raritan River	FW2-TPC1
VL OF1	Uncoded Tributary	FW2-NT
FR OF1	Passaic River UNT	FW2-TP
DR OF1	Passaic River UNT	FW2-TP
DM OF1	Passaic River	FW2-TPC1
GA OF1	McVickers Brook UNT	FW2-TPC1
BL OF1	McVickers Brook	FW2-TPC1
CW OF2	McVickers Brook UNT	FW2-TPC1
CW OF3	McVickers Brook UNT	FW2-TPC1
CW OF1	McVickers Brook UNT	FW2-TPC1
WF OF1	McVickers Brook UNT	FW2-TPC1
FR OF2	Passaic River	FW2-TPC1
FR OF3	Passaic River	FW2-TPC1
MTS OF2	North Branch Raritan River	FW2-TPC1
MTS OF3	North Branch Raritan River	FW2-TPC1
VY OF1	North Branch Raritan River	FW2-TPC1
GB OF1	North Branch Raritan River	FW2-TPC1
GT OF1	Uncoded Tributary	FW2-NT
MP OF3	North Branch Raritan River	FW2-TPC1
AS OF1	North Branch Raritan River UNT	FW2-TPC1
MP OF1	North Branch Raritan River UNT	FW2-TPC1
QU OF1	McVickers Brook UNT	FW2-TPC1
TH OF1	McVickers Brook UNT	FW2-TPC1
KW OF1	North Branch Raritan River	FW2-TPC1
DN OF1	North Branch Raritan River UNT	FW2-TPC1

DN OF2	North Branch Raritan River UNT	FW2-TPC1
KB OF1	McVickers Brook	FW2-TPC1
BF OF1	Passaic River	FW2-TPC1
HS OF3	Passaic River UNT	FW2-TP
HS OF4	Passaic River UNT	FW2-TP
DR OF2	Passaic River UNT	FW2-TP
LO OF1	North Branch Raritan River	FW2-TPC1
MP OF2	North Branch Raritan River UNT	FW2-TPC1
WW OF1	North Branch Raritan River UNT	FW2-TPC1
MTS OF4	North Branch Raritan River UNT	FW2-TPC1
MTS OF5	Uncoded Tributary	FW2-NT
MN OF2	North Branch Raritan River	FW2-TPC1
MN OF1	North Branch Raritan River	FW2-TPC1
BI OF1	North Branch Raritan River UNT	FW2-TPC1
BL-OF-2A	McVickers Brook	FW2-TPC1
LK OF1	North Branch Raritan River UNT	FW2-TPC1
LN OF1	North Branch Raritan River	FW2-TPC1
MR OF1	North Branch Raritan River	FW2-TPC1
MR OF2	North Branch Raritan River	FW2-TPC1
MS OF4	North Branch Raritan River	FW2-TPC1
TH OF3	Cromwell Lake	FW2-NT

Figure 2: Mendham Borough Owned/Operated Stormwater Outfalls Receiving Surface Waterbodies



Stormwater Interconnection(s)

Interconnections are points where the MS4 system connects to or receives stormwater from another entity's stormwater conveyance system such as adjacent municipal MS4s, county or state-owned drainage systems, public authorities, and private stormwater systems. Identifying the interconnections defines jurisdictional boundaries, clarifies ownership and maintenance responsibility, and supports watershed and TMDL stormwater management efforts.

The MS4 Infrastructure Mapping project identified interconnections between the Borough and public entities. The Watershed Inventory Report extends that identification effort to include private systems.

- Number of interconnections from Mendham Borough's MS4 into another entity's stormwater, sanitary, or combined sewer collection system: 23

Interconnections from Mendham Borough's MS4 into another entity

Stormwater interconnections were identified using data collected during fieldwork conducted in June 2025. Utilizing existing publicly available road maps that differentiate local, county, state, and private roads, field crews identified MS4 conveyance systems that intersected at these crossroads. Additionally, the field crew field-verified county and state roads by locating the blue pentagon-shaped shield with yellow lettering, and white shield with black numbers and letters, respectively. GIS staff also verified roadway ownership under the guidance of the Borough and from publicly available roadway data. Finally, any MS4 conveyance system that intersected a municipal boundary, as defined by publicly available data, is an MS4 interconnection. All data was collected using a mapping grade Trimble GPS capable of centimeter accuracy, and each data parameter was captured pursuant to the Tier A Municipal Stormwater, Section G1iii.

Table 7: Other Systems (MS4s, Sanitary Sewers, Combined Sewers) Receiving Stormwater Flow from Mendham Borough

From Mendham	To Other Systems	Type
Mendham Borough	Bernardsville	Pipe
Mendham Borough	Mendham Township	Pipe
Mendham Borough	Mendham Township	Pipe
Mendham Borough	Mendham Township	Pipe
Mendham Borough	County	Pipe
Mendham Borough	County	Pipe
Mendham Borough	County	Pipe
Mendham Borough	County	Pipe
Mendham Borough	Mendham Township	Pipe
Mendham Borough	County	Pipe
Mendham Borough	County	Pipe
Mendham Borough	County	Pipe
Mendham Borough	County	Pipe
Mendham Borough	County	Pipe
Mendham Borough	Mendham Township	Pipe

Mendham Borough	County	Pipe
Mendham Borough	County	Pipe
Mendham Borough	County	Pipe
Mendham Borough	County	Pipe
Mendham Borough	County	Pipe
Mendham Borough	County	Pipe
Mendham Borough	County	Pipe
Mendham Borough	Private	Pipe

Interconnection(s) into Mendham Borough's MS4 from another entity

Stormwater interconnections were identified using data collected during fieldwork conducted in June 2025. Utilizing existing publicly available road maps that differentiate local, county, state, and private roads, field crews identified MS4 conveyance systems that intersected at these crossroads. Additionally, the field crew field-verified county and state roads by locating the blue pentagon-shaped shield with yellow lettering, and white shield with black numbers and letters, respectively. GIS staff also verified roadway ownership under the guidance of the Borough and from publicly available roadway data. Finally, any MS4 conveyance system that intersected a municipal boundary, as defined by publicly available data, is an MS4 interconnection. All data was collected using a mapping grade Trimble GPS capable of centimeter accuracy, and each data parameter was captured pursuant to the Tier A Municipal Stormwater, Section G1iii.

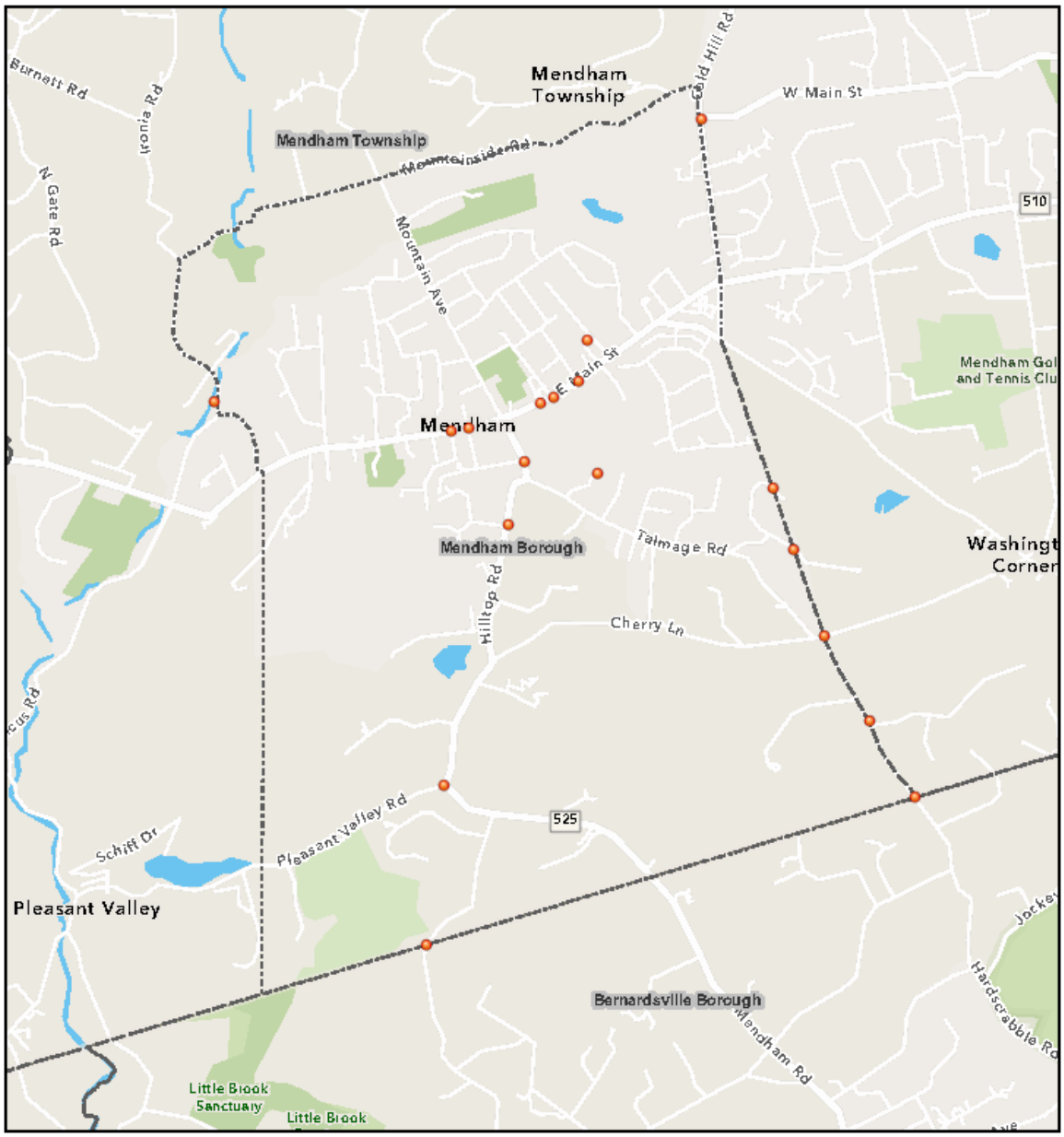
There are 3 interconnections from other entities into the Mendham Borough MS4.

Table 8: Other Systems (MS4s, Sanitary Sewers, Combined Sewers) Discharging into Mendham Borough

From Other Systems	**To Mendham Borough**	**Type**
Bernardsville	Mendham Borough	Pipe
Mendham Township	Mendham Borough	Pipe
Private	Mendham Borough	Pipe

Figure 3: Interconnections into and from Mendham Borough's MS4

Mendham Borough Interconnections



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MB Interconnection

Municipalities

1:44,860

0 0.28 0.55 1.1 mi

0 0.45 0.9 1.8 km

Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Drainage Area(s) for Stormwater Outfalls and Stormwater Interconnections

Stormwater runoff is conveyed through a combination of natural drainage features and engineered stormwater infrastructure that collectively direct stormwater to receiving surface waters through outfalls or groundwater discharge locations. Drainage areas contributing to individual outfalls were determined based on topographic mapping, land use data, and field observations. The drainage boundaries provided reflect flow patterns influenced by watershed topography and locations of stormwater conveyance systems. The proportion of impervious and pervious cover within each drainage area is an important factor influencing runoff volume, pollutant loading, and downstream water quality conditions. Stormwater interconnections convey runoff through shared storm sewer infrastructure prior to discharge and may cross property boundaries, roadway corridors, or municipal jurisdictions. These interconnections can consolidate runoff, and associated pollutant loads at downstream outfalls.

Storm Drain Inlets

The data for storm drain inlets was collected through fieldwork conducted in June 2025. Utilizing existing stormwater infrastructure maps prepared by our firm and/or the Permittee, field crews navigated municipally owned roadways and properties to locate, and field verify each storm drain inlet. Visual analysis was performed to ensure that the observed conditions were accurately recorded, and each data parameter was captured pursuant to the Tier A Municipal Stormwater, Section G1iv. There are 757 storm drain inlets installed in the Borough of Mendham.

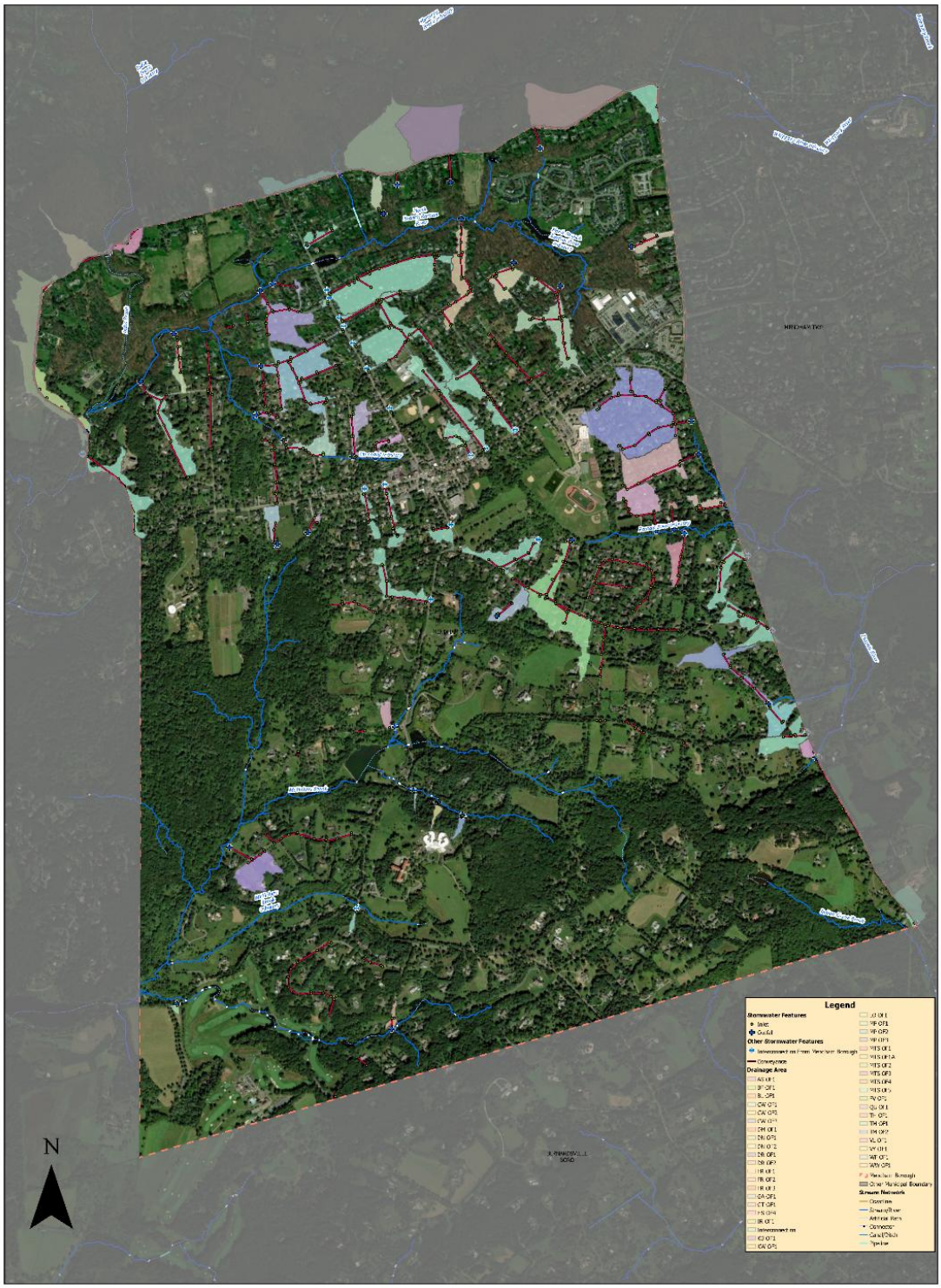
MS4 Outfall Drainage Areas

The data used to delineate MS4 outfall drainage areas was collected during fieldwork conducted in June 2025. GPS devices were used to locate and document the positions of all visible and accessible outfalls. Using this outfall data, drainage areas were delineated in QGIS by analyzing surface topography with digital elevation model (DEM) data to determine flow direction and contributing areas for each outfall.

Drainage area of interconnection(s) from Mendham Borough to another entity

The data used to delineate the drainage area of interconnection(s) from the permittee to another entity was collected during fieldwork conducted in June 2025. GPS devices were used to locate and document the positions of all visible and accessible interconnection points. Using this data, drainage areas were delineated in QGIS by analyzing surface topography with digital elevation model (DEM) data to determine flow direction and contributing areas for each interconnection.

Figure 4:Outfall Drainage Area(s)



Digital Link: https://arcg.is/r9Dmn0

TMDLs and Water Quality Impairments

The identification of TMDLs and water quality impairments was based on outfall data collected through fieldwork collected in 2024, combined with GIS data from the NJDEP Open Data retrieved in 2025. These outfall locations were then overlayed with the 'Total Maximum Daily Loads (TMDL) for Streamsheds in New Jersey' and 'Total Maximum Daily Loads (TMDL) Historic (Pre-2008) for Streamsheds in New Jersey' shapefiles to determine the TMDLs and any applicable impairments. The shapefiles were retrieved from the NJDEP Open Data portal in July 7, 2025 from the Division of Information Technology, NJDEP Bureau of GIS website: https://gisdata-njdep.opendata.arcgis.com/. The table below lists HUC 14 within or bordering Mendham Borough:

Table 9: TMDLs and Impairments for Subwatershed Within or Bordering Mendham Borough

HUC 14	Subwatershed Name	TMDL(s)	Impairment(s)
02030103010010	Passaic R Upr (above Osborn Mills)	Streamshed: Total Phosphorus Streamshed 2008: Fecal Coliform	PH, TEMPERATURE
02030105060010	Raritan R NB (above/incl India Bk)	Streamshed: Total Phosphorus Total Suspended Solids Streamshed 2008: Fecal Coliform Lakeshed: Fecal Coliform	TEMPERATURE
02030105060030	Raritan R NB(incl McVickers to India Bk)	Streamshed: Total Phosphorus Total Suspended Solids Streamshed 2008: Fecal Coliform Lakeshed: Fecal Coliform	DISSOLVED OXYGEN, TEMPERATURE
02030105060040	Raritan R NB(Peapack Bk to McVickers Bk)	Streamshed: Total Phosphorus Total Suspended Solids Lakeshed: Fecal Coliform	None
02030103020010	Whippany R (above road at 74d 33m)	Streamshed: Total Phosphorus	TEMPERATURE

Total Suspended Solids (TSS)

TSS refers to fine particles suspended in water, which reduce light penetration, disrupt aquatic plant growth, and smother fish eggs and benthic habitat. Elevated TSS levels can clog fish gills, reduce feeding efficiency, and carry attached pollutants such as phosphorus and heavy metals. Common sources include stormwater runoff from construction sites, eroded streambanks, and impervious surfaces. Excessive sedimentation alters habitat structure and can impair designated uses related to aquatic life and recreation.

MS4 permit conditions that regulate this parameter:
• Pet Waste Ordinance
• Wildlife Feeding Ordinance
• Litter Control Ordinance
• Improper Disposal of Waste Ordinance
• Yard Waste Ordinance
• Street Sweeping Program
• Herbicide Application Management
• Roadside Vegetative Waste Management
• Roadside Erosion Control
• Inspection and Maintenance of Stormwater Facilities
• Stream Scouring Program
• Illicit Discharge Detection and Elimination Program

Phosphorus / Total Phosphorus
Phosphorus is a limiting nutrient in freshwater systems. Excess phosphorus promotes excessive plant and algal growth (eutrophication), leading to dissolved oxygen depletion, pH swings, and potential harmful algal blooms (HABs). These impacts can result in aquatic life impairment, human health risks, and interference with recreation and drinking water treatment. Sources include fertilizer runoff, pet waste, eroded soil, leaf litter, septic leaks, and atmospheric deposition.

MS4 permit conditions that regulate this parameter:
• Pet Waste Ordinance
• Wildlife Feeding Ordinance
• Litter Control Ordinance
• Improper Disposal of Waste Ordinance
• Yard Waste Ordinance
• Street Sweeping Program
• Herbicide Application Management
• Roadside Vegetative Waste Management
• Roadside Erosion Control
• Inspection and Maintenance of Stormwater Facilities
• Stream Scouring Program
• Illicit Discharge Detection and Elimination Program

Pathogens (Enterococcus, E. coli, Fecal Coliform, Total Coliform)
Pathogens from animal waste, failing septic systems, sanitary sewer overflows (SSOs), and illicit discharges can cause illness in humans and animals through ingestion or contact. Impacts include gastrointestinal, respiratory, and skin infections. In shellfish waters, pathogens may lead to harvesting closures and economic losses. Stormwater is a primary delivery mechanism, particularly in developed areas lacking adequate source controls.

MS4 permit conditions that regulate this parameter:
• Pet Waste Ordinance
• Wildlife Feeding Ordinance

• Litter Control Ordinance
• Improper Disposal of Waste Ordinance
• Yard Waste Ordinance
• Street Sweeping Program
• Herbicide Application Management
• Roadside Vegetative Waste Management
• Roadside Erosion Control
• Inspection and Maintenance of Stormwater Facilities
• Stream Scouring Program
• Illicit Discharge Detection and Elimination Program

Dissolved Oxygen (DO)
Adequate DO is essential for aquatic life survival, growth, and reproduction. Low DO (hypoxia) or absence of DO (anoxia) can result in fish kills, biodiversity loss, and migration of sensitive species. DO depletion is often driven by decomposition of organic material fueled by nutrient-rich runoff, pet waste, and erosion. Concentrations below 3 mg/L are concerning, and below 1 mg/L typically result in lifeless conditions.

MS4 permit conditions that regulate this parameter:
• Pet Waste Ordinance
• Wildlife Feeding Ordinance
• Litter Control Ordinance
• Improper Disposal of Waste Ordinance
• Yard Waste Ordinance
• Street Sweeping Program
• Herbicide Application Management
• Roadside Vegetative Waste Management
• Roadside Erosion Control
• Inspection and Maintenance of Stormwater Facilities
• Stream Scouring Program
• Illicit Discharge Detection and Elimination Program

pH
pH measures acidity or alkalinity, with deviations outside a waterbody's natural range stressing or killing aquatic organisms. Acidic conditions can result from acid rain or contact with pollutants such as ammonia, fertilizers, or compost; basic conditions can result from lime, detergents, or concrete washout. Even small pH shifts can increase the toxicity of other pollutants and disrupt aquatic reproduction and food webs.

MS4 permit conditions that regulate this parameter:
• Pet Waste Ordinance
• Wildlife Feeding Ordinance
• Litter Control Ordinance
• Improper Disposal of Waste Ordinance

• Yard Waste Ordinance
• Street Sweeping Program
• Herbicide Application Management
• Roadside Vegetative Waste Management
• Roadside Erosion Control
• Inspection and Maintenance of Stormwater Facilities
• BMPs at Municipal Maintenance Yards
• Stream Scouring Program
• Illicit Discharge Detection and Elimination Program

Temperature

Water temperature influences oxygen availability and species composition. Warm water holds less dissolved oxygen, placing stress on cold-water species such as trout, particularly in summer. Elevated temperatures can result from heated runoff over impervious surfaces, streambank erosion creating shallow channels, and loss of riparian shade. These conditions can degrade habitat quality and increase susceptibility to invasive species and disease.

MS4 permit conditions that regulate this parameter:
• Pet Waste Ordinance
• Wildlife Feeding Ordinance
• Litter Control Ordinance
• Improper Disposal of Waste Ordinance
• Yard Waste Ordinance
• Street Sweeping Program
• Herbicide Application Management
• Roadside Vegetative Waste Management
• Roadside Erosion Control
• Inspection and Maintenance of Stormwater Facilities
• Stream Scouring Program
• Illicit Discharge Detection and Elimination Program

Figure 5: Subwatersheds Within or Bordering Mendham Borough

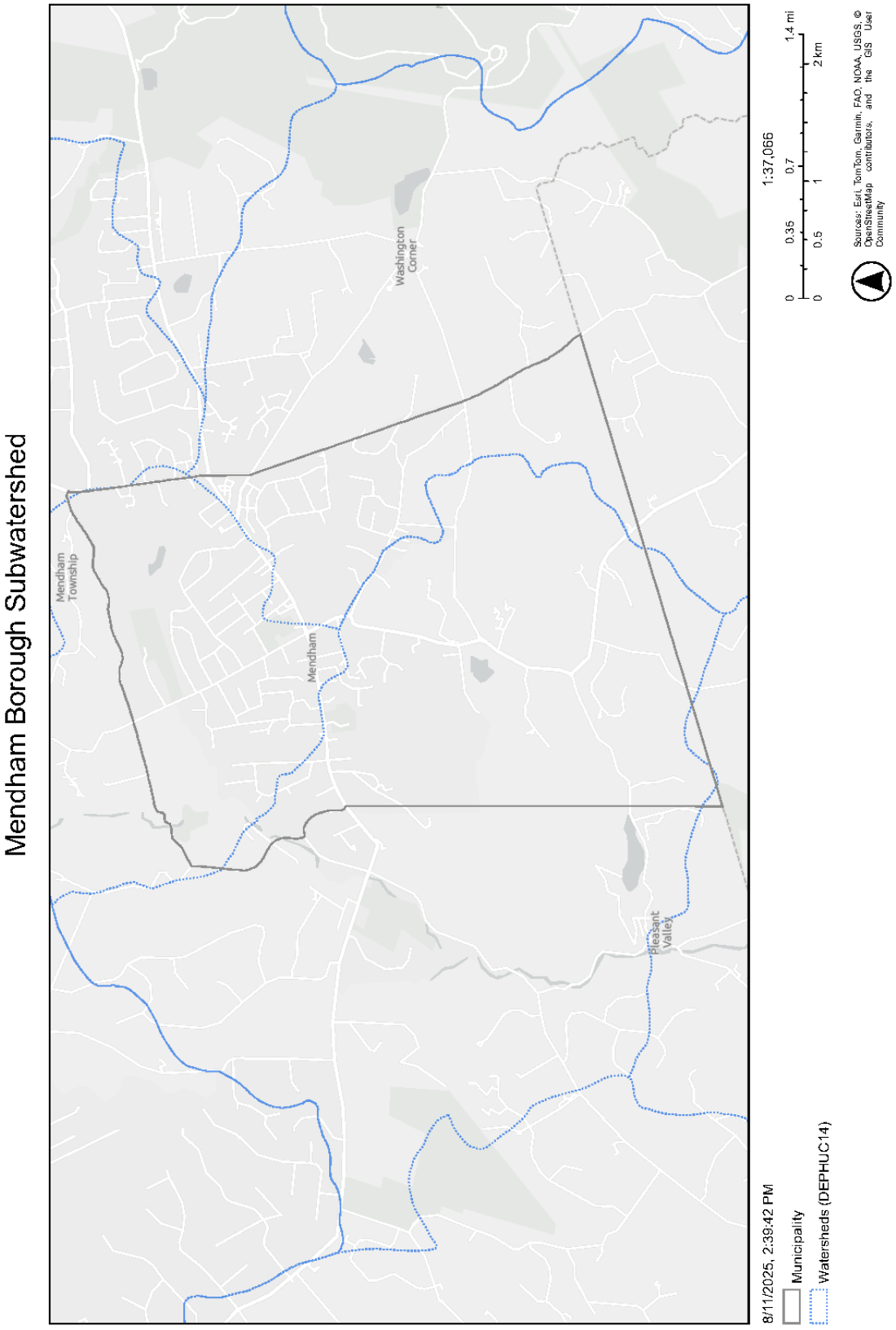


Figure 6: TMDL Streamshed Within or Bordering Mendham Borough

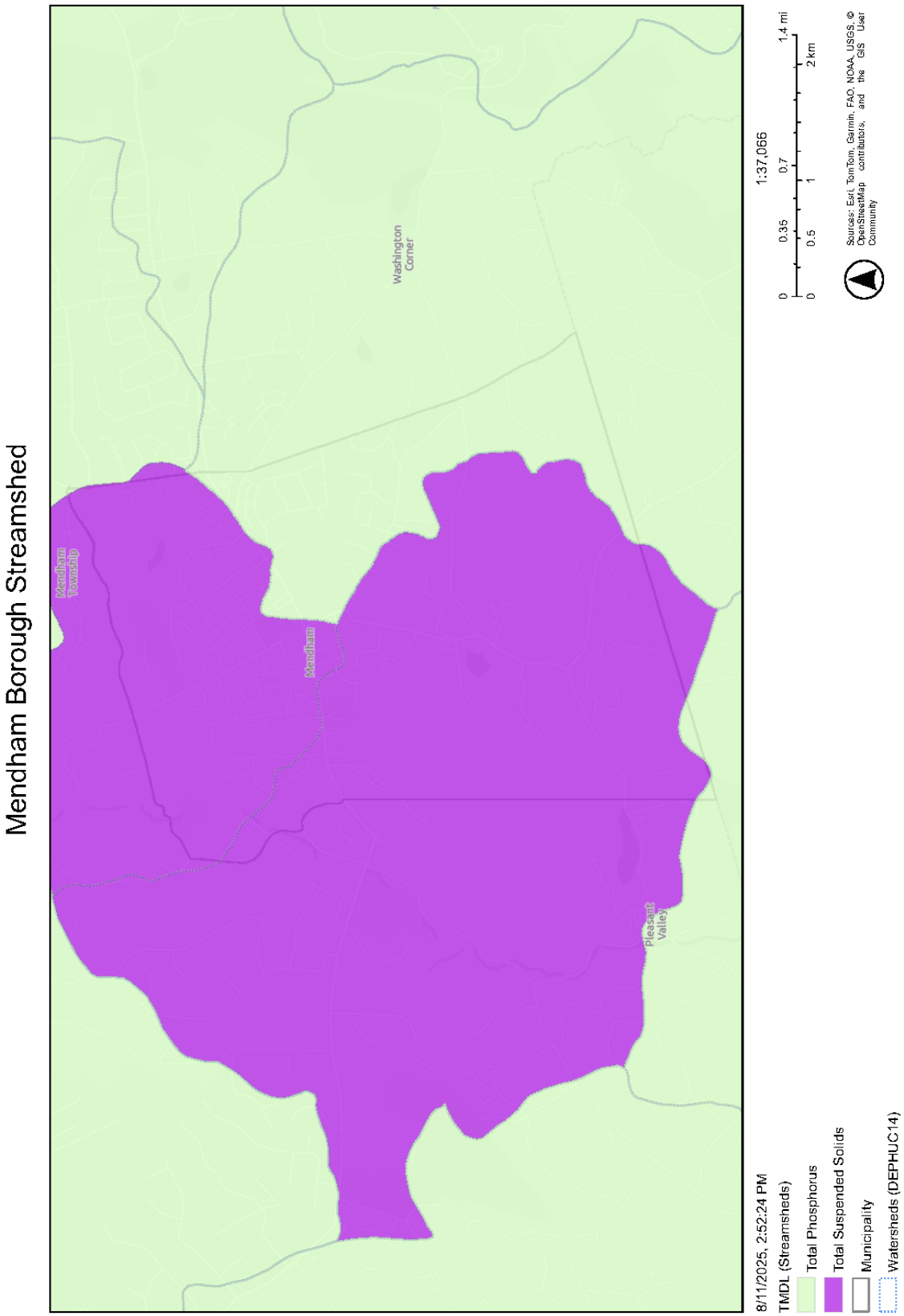


Figure 7: TMDL Streamshed Pre-2008 Within or Bordering Mendham Borough

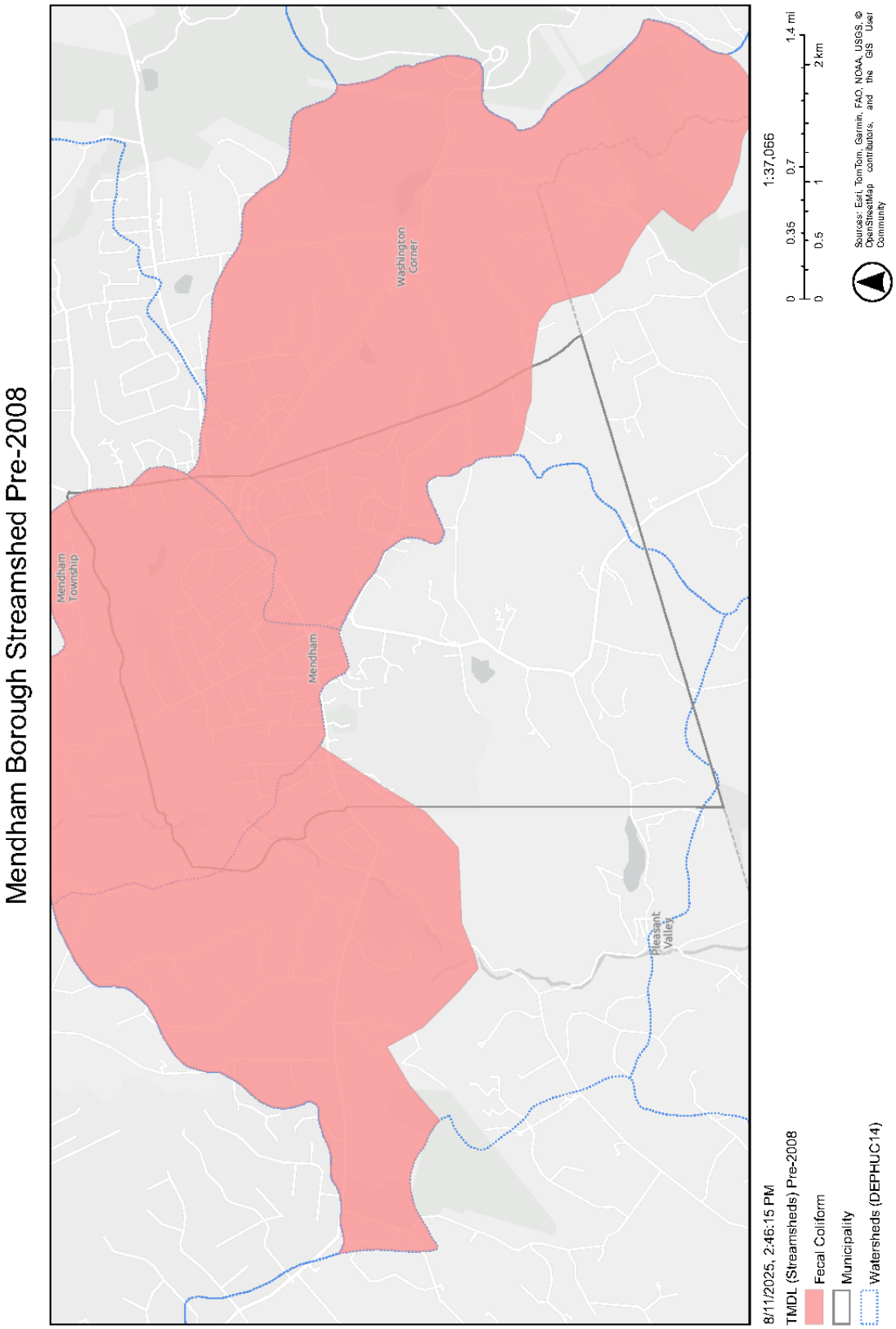
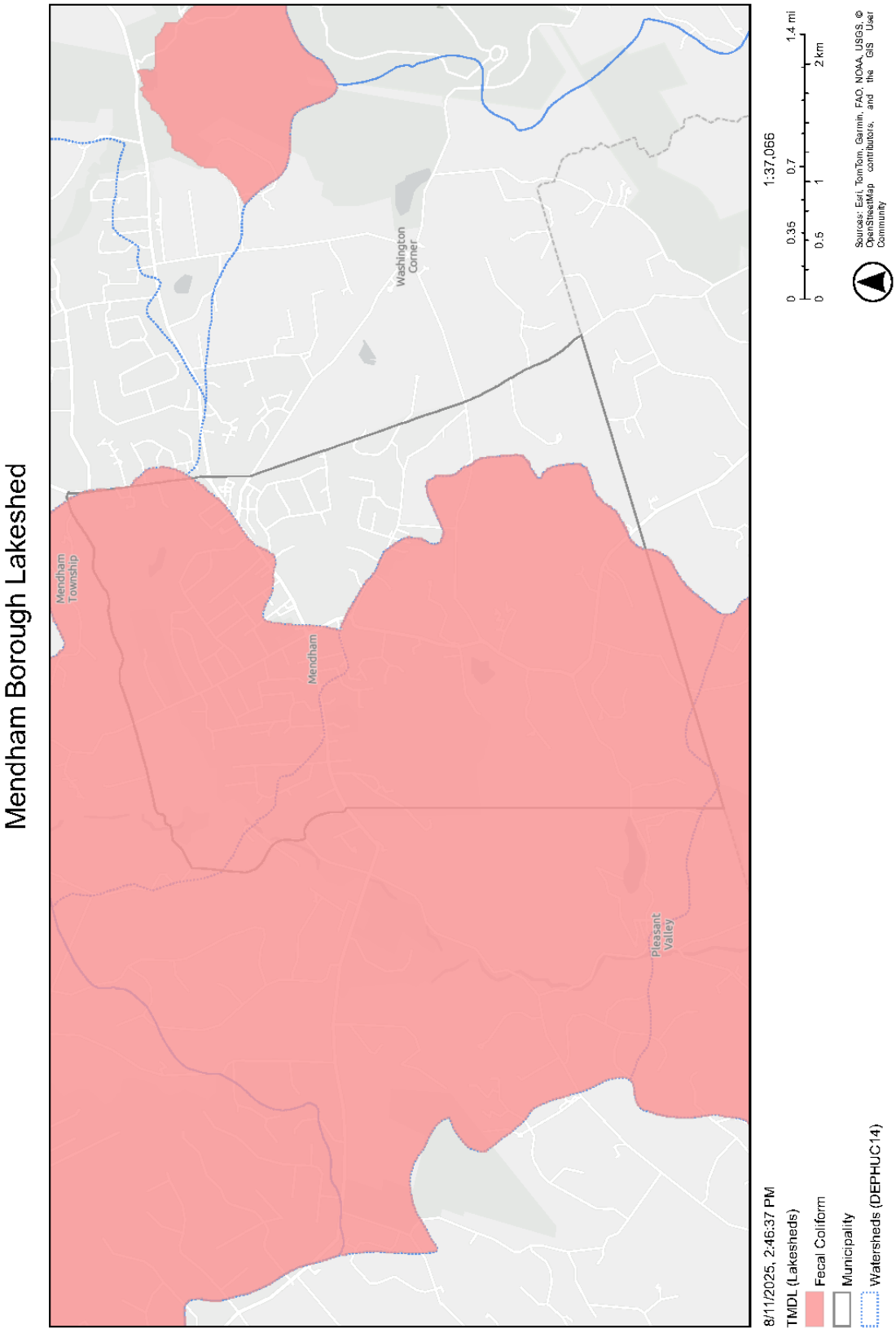


Figure 8: TMDL Lakeshed Within or Bordering Mendham Borough



Overburdened Communities

The Environmental Justice (EJ) Law (N.J.S.A. 13:1D-157 through 13:1D-165) requires that the NJDEP develop a list of Overburdened Communities (OBCs), to notify municipalities of the block groups that met the criteria, and to develop corresponding dataset mapping. As defined in the EJ law, "overburdened community" means any census block group, as determined in accordance with the most recent United States Census, in which at least: (1) 35 percent of the households qualify as low-income households; (2) 40 percent of the residents identify as minority or as members of a State recognized tribal community; or (3) 40 percent of the households have limited English proficiency.

Under the EJ law, development applications within (in whole or in part) Overburdened Communities areas (or applications for a permit for a new or expanded facility, or any application for the renewal of an existing facility's major source permit) are required to prepare and submit an environmental justice impact statement to the NJDEP, to the municipal clerk and the municipal governing body, and meet the public notice requirements set forth in the law.

Based on the NJDEP published EJMAP, NJ-WET, and confirmed in December 2025, it is determined that there are no Overburdened Communities areas within the Borough of Mendham.

Impervious Area

Impervious surfaces - including roadways, driveways, parking areas, rooftops, sidewalks, and other paved or compacted surfaces—alter the natural hydrology of the watershed and contribute to stormwater-related water quality impacts. As development increases and impervious coverage expands, the result is an increase in stormwater runoff volumes, elevated peak discharge rates, and greater pollutant transport to receiving waters.

The identification of impervious areas was based on GIS analysis using publicly available data. The dataset used was from the New Jersey Watershed Evaluation Tool (NJ-WET) and was retrieved on July 7, 2025, from the Division of Watershed and Land Management, Bureau of NJPDES Stormwater Permitting & Water Quality Management website: https://dep.nj.gov/njpdes-stormwater/municipal-stormwater-regulation-program/watershed-improvement-plan-guidance/. Additional information was obtained and is available from January 2020 Impervious Cover Assessment Report prepared by the Rutgers Cooperative Extension Water Resources Program funded by the New Jersey Highlands Water Protection and Planning Council. The table below identifies the percentage of impervious cover in each subwatershed within Mendham Borough jurisdiction.

Table 10:Subwatershed Percent Impervious Cover within Mendham Borough Jurisdiction

Subwatershed	Percent Impervious
Passaic R Upr (above Osborn Mills)	19%
Raritan R NB (above/incl India Bk)	23%
Raritan R NB(incl McVickers to India Bk)	9%
Raritan R NB(Peapack Bk to McVickers Bk)	26%
Whippany R (above road at 74d 33m)	40%

Impervious surfaces limit infiltration and increase the volume and rate of stormwater runoff, thereby significantly impacting watershed hydrology and stream condition. Increases to stormwater rates and

volume can result in stream bed erosion, diminish bank integrity, adversely affect habitat and aquatic communities, and accelerate the transport of pollutants, sediment, nutrients, metals, hydrocarbons, and fecal bacteria, to surface waters. Runoff from paved surfaces can also elevate stream temperatures and reduce dissolved oxygen, which, in turn, diminishes stream conditions and aquatic ecosystems.

Figure 9:Overburdened Communities and Impervious Surfaces within Mendham Borough

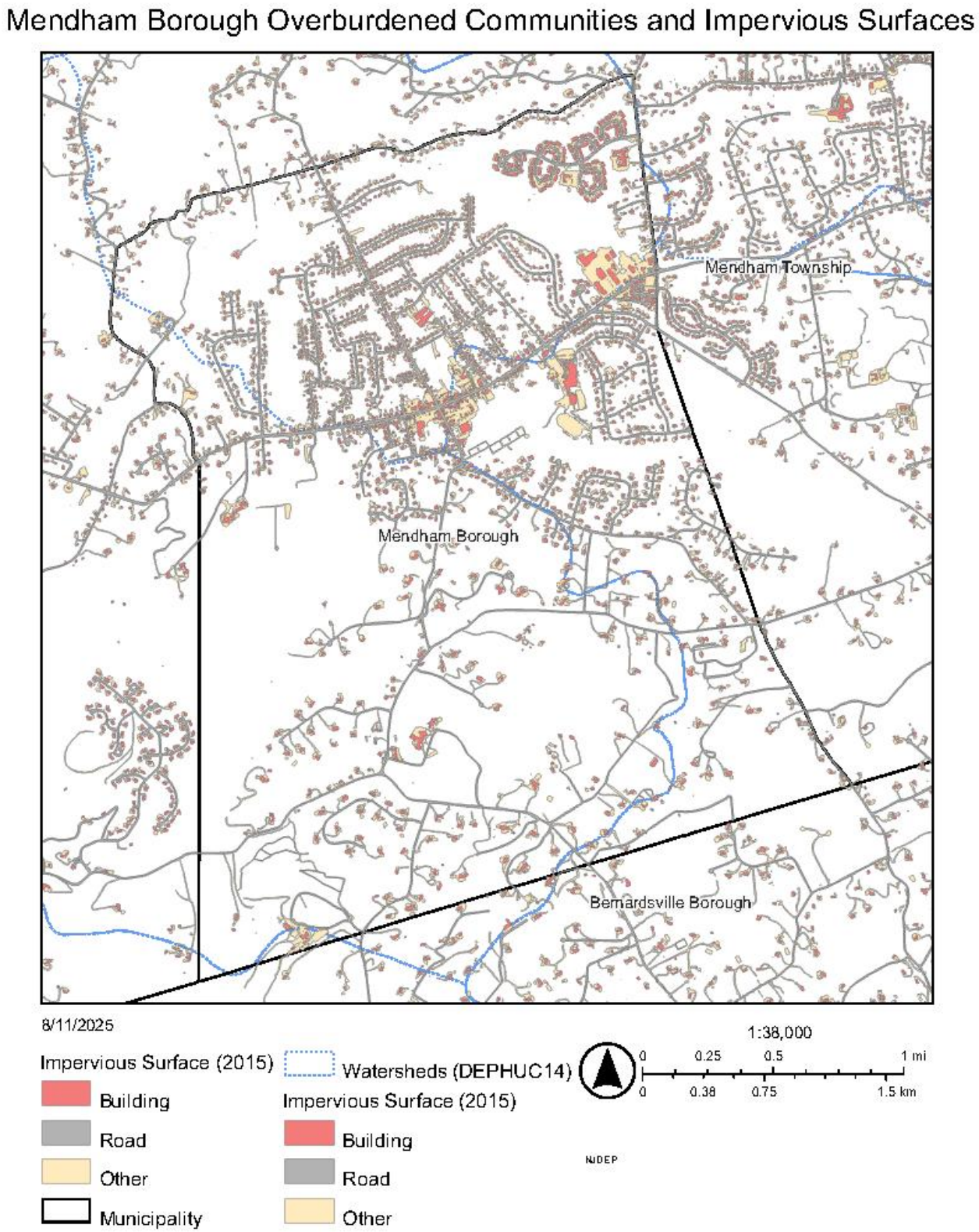
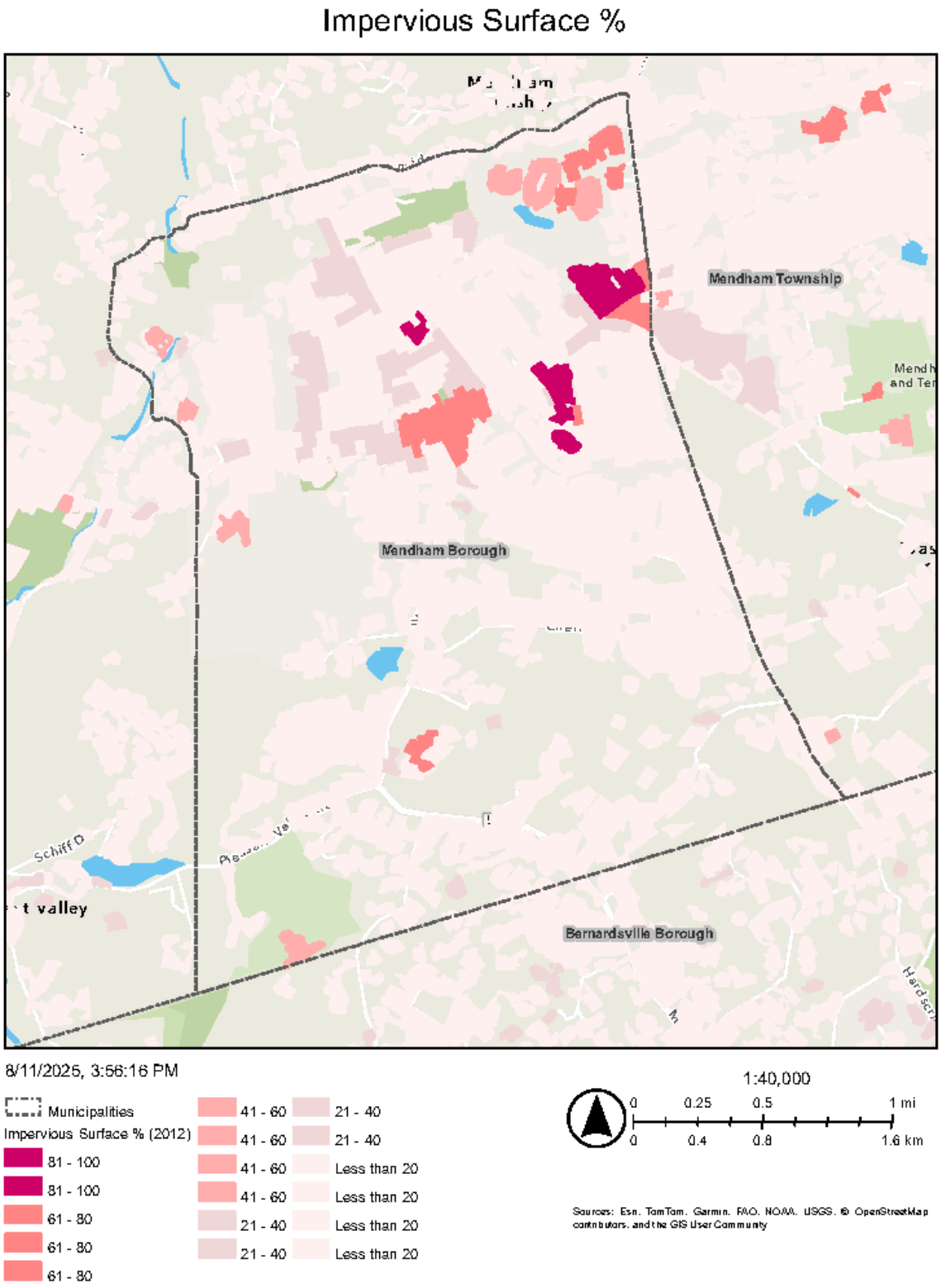


Figure 10: Mendham Borough Impervious Surface %



Non-Municipally Owned or Operated Stormwater Facilities

Privately-owned stormwater systems are an important part of a comprehensive municipal stormwater management system. The identification of these facilities helps to accurately assess watershed conditions, quantify pollutant sources, and identify TMDL improvement strategies in a watershed improvement plan. The private systems discharge to the same municipal conveyances as the public systems, so including them strengthens the consistency of long-term planning efforts, while also helping to identify issues (erosion, sedimentation, illicit discharges, etc.) that may arise. Examples of structural privately-owned stormwater systems can include:

- Bioretention Systems (large-scale)
- Blue Roofs
- Cisterns
- Dry Wells
- Extended Detention Basins
- Grass Swales
- Green Roofs
- Infiltration Basins (large-scale)
- Manufactured Treatment Devices (MTDs)
- Pervious Paving Systems
- Sand Filters (large-scale)
- Small-scale Bioretention Systems
- Small-scale Infiltration Basins
- Small-scale Sand Filters
- Standard Constructed Wetlands
- Stormwater Outfalls
- Subsurface Gravel Wetlands
- Vegetative Filter Strips
- Wet Ponds

Non-municipally owned or operated stormwater facilities were identified through fieldwork in June 2025, supplemented by publicly available data and input from Bernardsville Borough. Field crews verified site conditions and recorded required parameters per Tier A Permit Section G1viii.The New Jersey Hydrologic Modeling (H&H) Database was also used to support identification. The dataset used was from the New Jersey Hydrologic Modeling Database (H&H Database) and was retrieved on July 7, 2025, from the Rutgers University HydroLab website: https://hydro.rutgers.edu/about/.

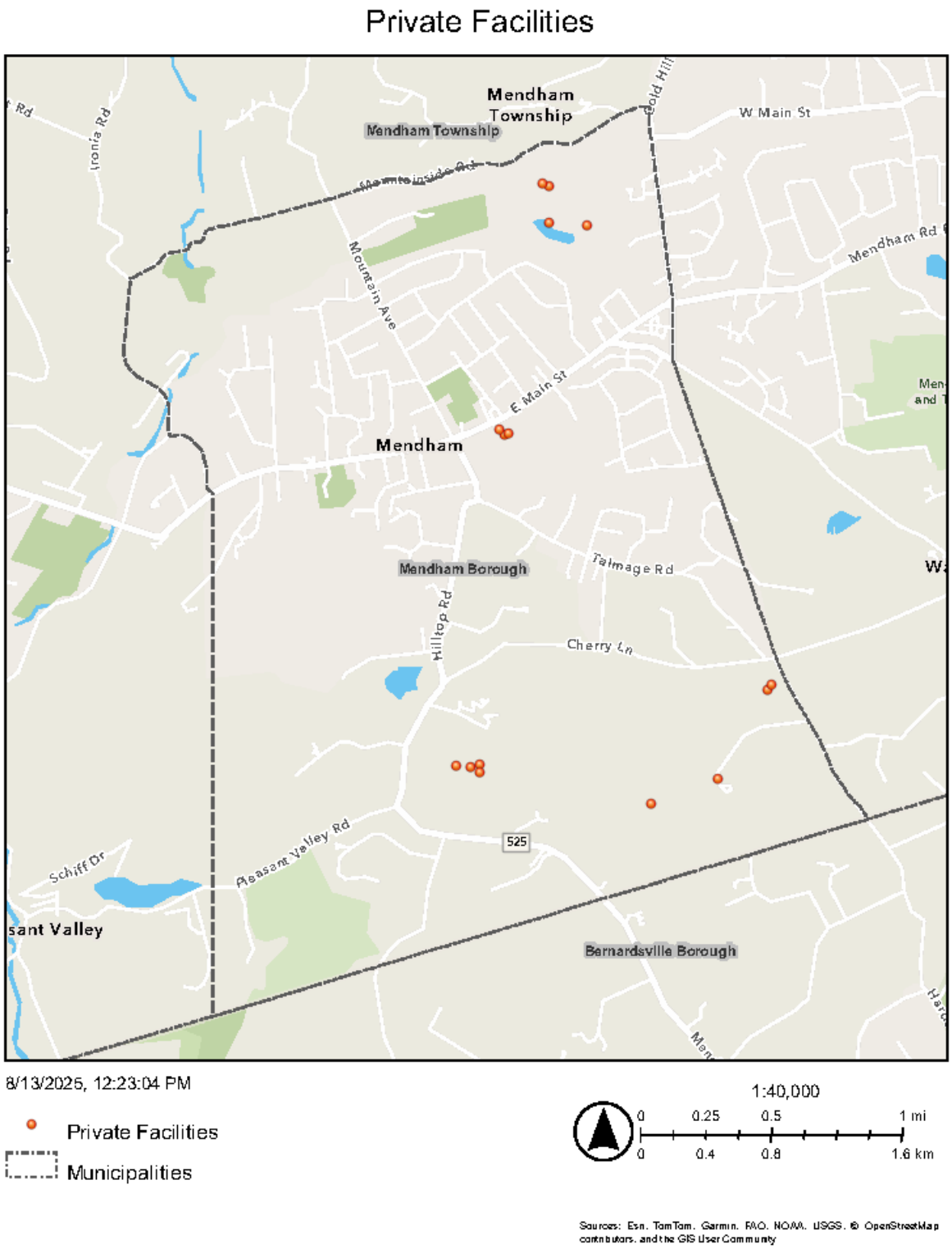
Table 11: Subwatersheds That Have Non-Municipally Owned or Operated Stormwater Infrastructure

HUC-14	**Sub-Watershed Name**
02030103010010	Passaic R Upr (above Osborn Mills)
02030105060010	Raritan R NB (above/incl India Bk)
02030105060030	Raritan R NB(incl McVickers to India Bk)

Table 12:Type, Quantity, Block and Lot, and Owner of the Infrastructure Within Each Subwatershed

Owner	Block	Lot	Type	HUC_14	Subwatershed
Zenjon	1501	11	Infiltration	02030103010010	Passaic R Upr (above Osborn Mills)
	1501	13	Stormwater Basin	02030103010010	Passaic R Upr (above Osborn Mills)
29 E MAIN ST	1501	13	Stormwater Basin	02030103010010	Passaic R Upr (above Osborn Mills)
Private Residence	2401	31	Stormwater Basin	02030103010010	Passaic R Upr (above Osborn Mills)
Private Residence	2401	19	Outfall	02030103010010	Passaic R Upr (above Osborn Mills)
Private Residence	2401	19	Outfall	02030103010010	Passaic R Upr (above Osborn Mills)
	1102	70	Outfall	02030105060010	Raritan R NB (above/incl India Bk)
	1102	70	Outfall	02030105060010	Raritan R NB (above/incl India Bk)
	1102	70	Outfall	02030105060010	Raritan R NB (above/incl India Bk)
The Commons at Mendham	1102	70	Outfall	02030105060010	Raritan R NB (above/incl India Bk)
Horseshoe Bend Road Residence #16	2401	32	Infiltration \ Detention	02030105060030	Raritan R NB(incl McVickers to India Bk)
	2301	13	DETENTION BASIN	02030105060030	Raritan R NB(incl McVickers to India Bk)
	2301	13	DETENTION BASIN	02030105060030	Raritan R NB(incl McVickers to India Bk)
	2301	13	Outfall	02030105060030	Raritan R NB(incl McVickers to India Bk)
Sisters of Christian Charity	2301	13	Outfall	02030105060030	Raritan R NB(incl McVickers to India Bk)

Figure 11:Non-municipally Owned/Operated Stormwater Infrastructure in Mendham Borough



Conclusion

The Borough of Mendham Watershed Inventory Report, Phase 1 of the Watershed Improvement Plan, identifies stormwater infrastructure and summarizes water quality data, including stream classifications, TMDLs, and water quality impairments.

As the Borough continues its work in collaboration with stakeholders, residents, professionals and municipal partners during Phases II & III of the Plan, it will develop an actionable plan to address areas of concern and reduce stormwater-driven water quality impairments. The Borough of Mendham will continue its focus on best management practices and sustained public engagement as it works to protect and enhance critical local waterways and reduce local flooding risks. The implementation of stormwater controls and watershed-based planning will aid in achieving required pollutant load restrictions and positively affect and protect water quality in the region.

The data that accompanies this inventory report has been compiled as an electronic map and submitted to the NJDEP as required under the 2023 Tier A MS4 Stormwater Permit. The information contained in this inventory report will be analyzed to identify potential water quality improvement projects and areas of potential concern that may be improved by the implementation of water quality improvement projects. This analysis will be conducted during the development of the Watershed Assessment Report, Phase 2 of the Watershed Improvement Plan, due to the NJDEP by January 1, 2027. A record of public input received will be maintained for inclusion in the complete Watershed Improvement Plan.