Watershed Inventory Report

Borough of Elmer

Salem County, New Jersey

120 South Main Street
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Elmer, NJ 08318

Stormwater Program Coordinator:
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Permit Number: *NJG0148377*
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Key Terms and 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*

Catch Basin
A cistern, vault, chamber, or well that is typically built along a street and below a Storm Drain Inlet's grate as part of the storm sewer system that is designed to capture and retain sediment, debris, and pollutants so those particles do not pass on to the stormwater sewer system.

Drainage Area (Catchment)
The land area that drains to a particular storm drain inlet, outfall, or interconnection. Mapping drainage areas helps the Borough understand where runoff and any pollutants are coming from.

Hydrologic Unit Code (HUC) system
The United States Geological Survey (USGS) created a standard system to describe watersheds based on their size and position. Each watershed, or "hydrologic unit," is identified by a Hydrologic Unit Code (HUC) that can range from 2 to 14 digits.

- HUC2 watersheds are the largest and divide the country into 21 major regions.
- HUC4, HUC8, and HUC11 watersheds are smaller parts of those regions.
- HUC14 watersheds ("subwatersheds") are very local, averaging about nine square miles.

Impervious Surface
Hard surfaces such as rooftops, sidewalks, driveways, roads, and parking lots that do not allow water to soak into the ground. More impervious surface means more and faster runoff, which can increase flooding and erosion.

Interconnection
A location where the Borough's stormwater system connects with another stormwater system, such as Salem County, Pittsgrove Township, or a private system. Interconnections help define who is responsible for maintenance and how water and pollutants move between jurisdictions.

MS4 (Municipal Separate Storm Sewer System)
The Borough's stormwater drainage system, including streets, curbs, storm drain inlets, pipes, ditches, and outfalls that carry rain and snowmelt to local streams and lakes. It is separate from the sanitary sewer system, which carries wastewater from homes and businesses to a treatment plant.

Outfall
The point where stormwater from the Borough's MS4 system is discharged into a surface waterbody, such as Muddy Run, Muddy Run Tributary, or Elmer Lake.

Overburdened Community
An area identified by the State where residents face higher environmental and public health burdens compared to other communities. When overburdened communities are present, they receive extra attention when planning improvements.

Storm Drain Inlet
An opening along a curb or in a street where stormwater enters the MS4. These are often called "storm drains," or "grates."

Stormwater
Rain or snowmelt that runs off roofs, driveways, parking lots, streets, and lawns instead of soaking into the ground. As it flows, it can pick up oil, litter, fertilizers, and other pollutants and carry them to streams and lakes.

Stormwater Facility (Stormwater Management Measure)
A structure or practice built to manage stormwater, such as a detention basin, infiltration basin, wet pond, rain garden, or manufactured treatment device. Some facilities are owned by the Borough, while others are privately owned.

Subwatershed / HUC 14
A smaller part of a watershed used by NJDEP and engineers to study water quality. Each one has a 14 digit Hydrologic Unit Code (HUC 14) and a name, such as "Muddy Run (above/incl Elmer Lake)."

TMDL (Total Maximum Daily Load)
A pollution "budget" for a stream or lake that has water quality problems. A TMDL sets the maximum amount of a pollutant (such as bacteria or PCBs) that the waterbody can receive and still meet State standards, and identifies how much reduction is needed.

Water Quality Impairment
When a stream or lake does not meet New Jersey's water quality standards for one or more pollutants, such as bacteria, temperature, or nutrients. Impaired waters are placed on NJDEP's 303(d) list and must be addressed in plans like this WIP.

Watershed
The area of land where all the water drains to the same place, such as a stream, lake, or river. If rain falls anywhere in Elmer and eventually ends up in Muddy Run or Elmer Lake, that land is part of the same watershed.

The Borough of Elmer is in the Muddy Run watershed and is part of one HUC11 and three HUC14 subwatersheds. NJDEP evaluates water quality and stormwater issues at the HUC11 and HUC14 scales, and this report mainly uses the HUC14 level.

Watershed Improvement Plan (WIP)
A three phase planning process required under the Borough's MS4 permit:

- Phase 1 – Watershed Inventory Report (this document): Collects and maps existing conditions (outfalls, drainage areas, interconnections, water quality, etc.).
- Phase 2 – Watershed Assessment Report: Uses the Phase 1 data to assess problems, identify and rank potential projects, estimate costs for the potential projects and estimate pollution reductions.
- Phase 3 – Final Watershed Improvement Plan Report: Finalizes selected projects, costs, schedules, and documents public feedback.

Acknowledgements

The Borough of Elmer's Phase I Watershed Inventory Report has been prepared by **Consulting Engineer Services (CES)**, in cooperation with the **Borough of Elmer**. This report focuses on Elmer's municipal stormwater system, outfalls, drainage areas and the subwatershed in which they contribute.

Regional Collaboration

No regional WIP collaboration was pursued for Phase 1. This Phase 1 Watershed Inventory Report focuses on the Borough of Elmer's stormwater system and conditions within or bordering the Borough.

However, the Borough recognizes that water and flooding do not stop at municipal borders or property lines. **Upper Pittsgrove Township, Pittsgrove Township, Salem County, New Jersey Department of Transportation (NJDOT) and private commercial facilities** share subwatersheds, roadways, and stormwater systems with Elmer. Their facilities and drainage patterns influence how stormwater and pollutants move through the shared Muddy Run watershed. The Borough will coordinate with these neighboring municipalities, the County, NJDOT and nearby private commercial facilities in future phases of the Watershed Improvement Plan where shared drainage or project opportunities are identified. These entities own and operate roads and stormwater infrastructure that influence flows to streams and lakes with The Borough of Elmer which includes: Muddy Run, Muddy Run Tributary, and Elmer Lake.

For Phase 2 (Watershed Assessment Report), the Borough intends to:

- Coordinate with **Upper Pittsgrove Township**, **Pittsgrove Township**, **Salem County**, and **NJDOT** to review shared stormwater interconnections, flooding locations, and potential joint projects within the shared subwatersheds;
- Use NJDEP guidance and resources, including the MS4 County Case Manager and WIP Frequently Asked Questions (FAQ), to help identify opportunities where a regional or joint approach would be more effective or more efficient than separate efforts; and
- If any **formal regional agreement** is established, document that agreement in the Phase 2 report, including each entity's responsibilities, consistent with NJDEP's guidance.

At this time, the Borough has not committed to a regional WIP. Any future regional approach, if pursued, will be based on mutual interest and agreement among participating entities and will be clearly described in Phase 2 documentation.

Introduction

The Borough of Elmer is preparing a Watershed Improvement Plan (WIP) to better understand how stormwater moves through the community and how it affects local streams and lakes. This Phase 1 Watershed Inventory Report under the MS4 permit #NJG0148377, is the first step in that process. It documents where the Borough's stormwater infrastructure is located, where it discharges, and what is known about water quality and flooding within the Borough lakes and streams.

The Borough of Elmer is located in Salem County, New Jersey. Borough Hall, and the location of this plan, is at P.O. Box 882, 120 South Main Street, Elmer, NJ 08318. Elmer is surrounded by Upper Pittsgrove Township to the north and west and Pittsgrove Township to the south and east. According to the 2020 United States Census, the Borough has a population of 1,347. The Borough's demographics include 87.0% White, 4.8% Hispanic, 4.8% Multiracial, 2.2% Black, 0.8% Native American/Other, and 0.5% Asian.

Land use in Elmer is a mix of urban, forest, wetlands, water, and agriculture. The Borough is predominantly residential and commercial development, with buildings, streets, and parking areas surrounded by forested land and agricultural fields. This mix of land uses influences how quickly stormwater runs off and how much pollution is carried to nearby waters.

A watershed is the area of land that contributes runoff to a lake, river, stream, wetland, estuary, or bay. Watersheds have natural boundaries defined by the height and shape of the land, such as ridges and other features that direct the flow of water from higher to lower elevations. The Borough of Elmer is part of the Muddy Run watershed. NJDEP and the U.S. Geological Survey describe smaller "subwatersheds" using 14-digit Hydrologic Unit Codes (HUC 14). Within and bordering Elmer, there are three HUC 14 subwatersheds:

- 02040206150020 – Muddy Run (incl Palatine Lk to Elmer Lk)
- 02040206150010 – Muddy Run (above/incl Elmer Lake)
- 02040206150030 – Palatine Branch (Muddy Run)

NJDEP and the U.S. Geological Survey describe smaller 'subwatersheds' using Hydrologic Unit Codes (HUCs). See the Key Terms and Acronyms section for more information on the HUC system.

When it rains, stormwater in Elmer flows over rooftops, driveways, and streets into storm drain inlets. From there, it travels through the Borough's Municipal Separate Storm Sewer System (MS4) and eventually discharges at outfalls into Muddy Run, Muddy Run Tributary, or Elmer Lake. The path that water takes depends on the shape of the land (the watershed) and the layout of the Borough's pipes, ditches, and other stormwater infrastructure.

The Borough of Elmer has one area known for occasional flooding. This location is the intersection of South Main Street and Salem Street (County Route 611) in the south-eastern portion of the Borough, near the upstream end of Elmer Lake. In this area, flooding occurs during heavy storm events when water levels in Elmer Lake rise, causing water to overtop the lake bank and back up through the County stormwater system. As lake levels increase, water can back up through the County outfall (Local ID #85) into the conveyance system and then surcharge up through the two County inlet grates at the intersection. Along South Main Street south of Salem Street, the Borough owns and operates two inlets (INL10069 and INL10071) and one outfall (OF12012). These Borough owned stormwater structures can capture flood waters should they crest Salem Street and get conveyed to Muddy Run South of Elmer Lake.

This flooding is entirely driven by high water levels in Elmer Lake and backwater effects in the shared drainage system, rather than by a lack of Borough maintenance or an absence of local stormwater infrastructure. These locations will be important as the Borough and its partners consider both water quality and flooding issues in later phases of the WIP.

The Borough of Elmer intends to use the Watershed Improvement Plan to track identified pollutant parameters throughout the Borough so that future phases can plan and implement actions to reduce or eliminate the Borough's contribution of pollutant loads to waters within and bordering its jurisdiction.
In this Phase 1 Watershed Inventory Report, the Borough will:

- Map and describe all Borough-owned stormwater outfalls and their receiving waters;
- Identify interconnections between the Borough's MS4 and neighboring systems;
- Delineate drainage areas to outfalls and interconnections;
- Summarize applicable TMDLs and water quality impairments;
- Identify any overburdened communities;
- Quantify impervious cover by subwatershed; and
- Identify non-municipally owned stormwater facilities within the Borough.

In Phase 2, the Watershed Assessment Report, the Borough will use this Phase 1 information to assess which areas and outfalls contribute most to water quality problems and flooding, to screen and prioritize potential stormwater projects, and to estimate expected pollutant load reductions and other benefits. Together, Phases 1 and 2 will help Elmer develop a practical list of projects and actions to protect local waterways and reduce flooding for Borough residents.

Public Participation

Public participation is an important part of the Watershed Improvement Plan (WIP) process. Residents and local stakeholders can help identify problem areas, suggest potential projects, and provide feedback on proposed solutions.

For this Phase 1 Watershed Inventory Report, no formal public information sessions specific to the WIP have been held. The focus of Phase 1 has been on collecting accurate data on stormwater infrastructure, drainage areas, water quality, and related conditions to establish a solid technical foundation.

Stakeholders for this WIP include:

- The Borough of Elmer elected officials and staff; and
- Consulting Engineer Services (CES), the Borough's engineering consultant.

Beginning in 2026, the Borough intends to hold two public information sessions, one in the month of February, and another in the month of September. During these meetings, the Borough will:

- Present key findings from this Phase 1 inventory;
- Share proposed project ideas and priorities for addressing water quality impairments and flooding; and
- Receive feedback and suggestions from residents and other local stakeholders.

Meeting dates, times, and materials will be posted on the Borough's stormwater webpage: http://elmerboroughnj.com/StormwaterInformation.html

Comments and ideas received during Phase 2 public participation will be summarized in the Watershed Assessment Report and will help shape the final list of projects and actions in Phase 3.

Stormwater Outfall(s)

Stormwater Outfalls Owned/Operated by the Borough of Elmer

The Borough of Elmer hired Consulting Engineer Services (CES) to survey all owned and operated stormwater infrastructure within the Borough's jurisdiction. The initial data collection occurred in November 2024 where the CES survey crew located visible stormwater infrastructure along municipality owned roads and followed conveyance network to locate outfall and hidden structures. Additional information was gathered in June of 2025, following a review of the initial data and identifying missing structures. The data collection has identified thirteen (13) municipality owned and operated outfall structures. Two (2) outfall structures are located within the Muddy Run (above/incl Elmer Lake) subwatershed, while the remaining eleven (11) municipality owned and operated outfall structures are located within the Muddy Run (incl Palatine LK to Elmer Lake) subwatershed as shown in Figure 1.

Receiving Surface Waters

The Borough of Elmer utilized the New Jersey Watershed Evaluation Tool (NJ-WET) to gather the receiving surface water body identification for each outfall. Within the Borough of Elmers jurisdiction there are three (3) receiving surface waters:

- Elmer Lake: 15% of the Boroughs outfalls are located in the Muddy Run (above/incl Elmer Lake) subwatershed and discharge directly into Elmer Lake.
- Muddy Run: 8% of the Boroughs outfalls are located in the Muddy Run (incl Palatine LK to Elmer Lake) subwatershed and discharge into Muddy Run.
- Muddy Run Tributary: 77% of the Boroughs outfalls are located in the Muddy Run (incl Palatine LK to Elmer Lake) subwatershed and discharge into Muddy Run Tributary.

Water Quality Classifications

The Borough of Elmer utilized the New Jersey Watershed Evaluation Tool (NJ-WET) to gather the water quality classifications of the receiving surface waters at the locations Borough owned outfalls. Within the Borough of Elmers jurisdiction there are two (2) water quality classifications:

- FW2-NT (freshwater subject to man-made wastewater discharge and non-trout): 77% of the Boroughs outfalls discharge to FW2-NT water quality classification.
- FW2-NTC1 (freshwater subject to man-made wastewater discharge, non-trout, and category one antidegradation designation): 23% of the Boroughs outfalls discharge to FW2-NTC1 water quality classification.

Purpose of this section for Borough residents

For residents, this section answers two simple questions:

1. Where does the water go when it enters a storm drain on my street? and
2. What kind of waterbody does it flow into?

By identifying each outfall, showing where it discharges, and noting the State's water quality classification at that location, the Borough can see which outfalls most directly affect important local resources like Elmer Lake and Muddy Run. This information will help the Borough decide where to focus future monitoring, maintenance, and improvement projects.

To help residents visualize this information, a map of permittee-owned and operated outfalls is shown in Figure 1 and posted on Borough's stormwater webpage showing:

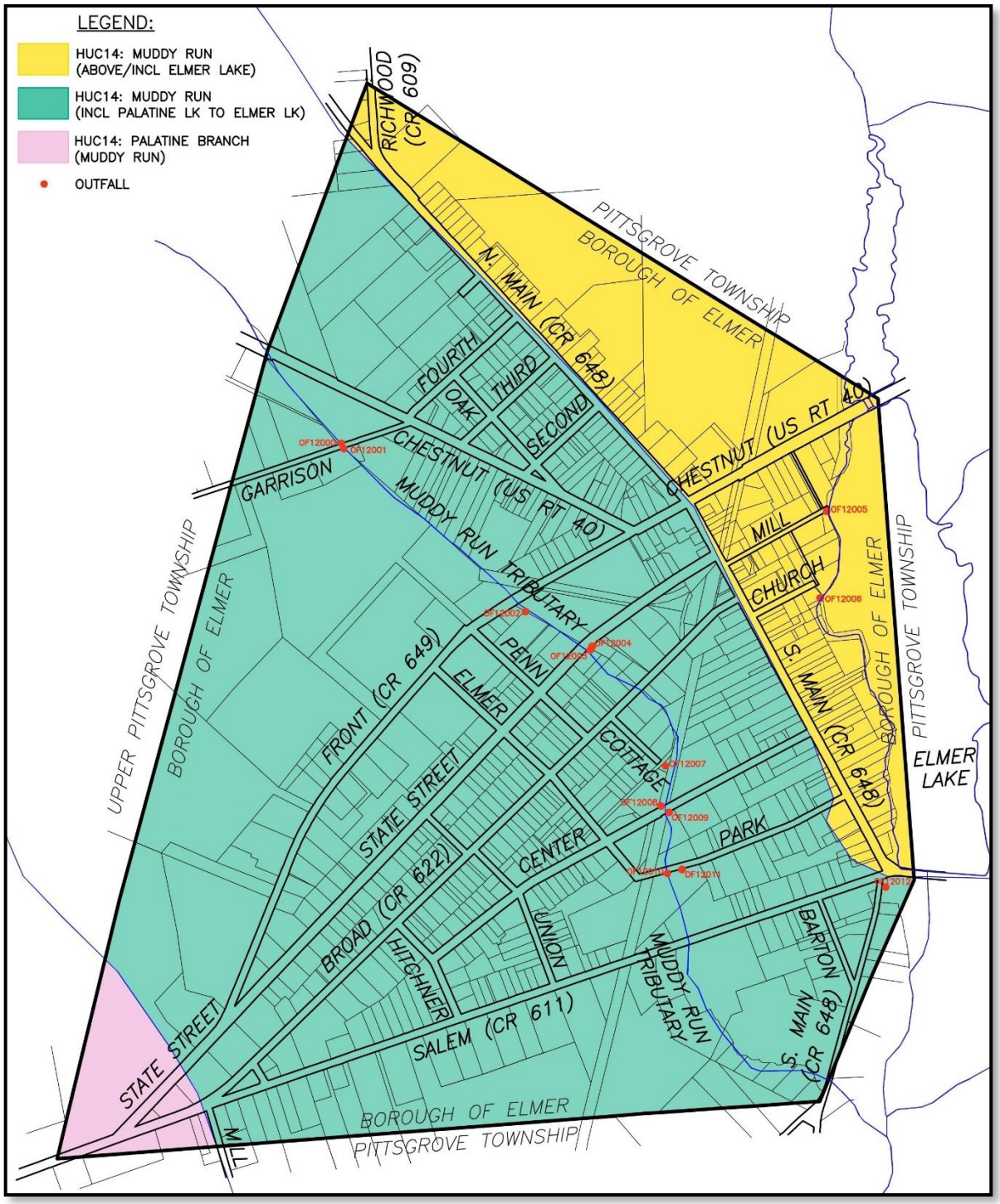
- The location of each Borough-owned outfall, labeled with its ID number;
- Clear symbols or colors for outfalls that discharge to Muddy Run, Muddy Run Tributary, and Elmer Lake;

In Phase 2, these maps will be used to analyze outfalls that drain to impaired or TMDL-listed waters and to communicate where stormwater projects could have the greatest benefit.

Table 1: Receiving Surface Water Bodies & Water Quality Classifications

LOCAL OUTFALL ID	TYPE	RECEIVING SURFACE WATER BODY	WATER QUALITY CLASSIFICATION
OF12000	B INLET	MUDDY RUN TRIBUTARY	FW2-NT
OF12001	B INLET	MUDDY RUN TRIBUTARY	FW2-NT
OF12002	OPEN CHANNEL	MUDDY RUN TRIBUTARY	FW2-NT
OF12003	24" RCP	MUDDY RUN TRIBUTARY	FW2-NT
OF12004	24" RCP	MUDDY RUN TRIBUTARY	FW2-NT
OF12005	18" RCP	ELMER LAKE	FW2-NTC1
OF12006	12" VCP	ELMER LAKE	FW2-NTC1
OF12007	HEADWALL	MUDDY RUN TRIBUTARY	FW2-NT
OF12008	18" RCP	MUDDY RUN TRIBUTARY	FW2-NT
OF12009	18" RCP	MUDDY RUN TRIBUTARY	FW2-NT
OF12010	15" RCP	MUDDY RUN TRIBUTARY	FW2-NT
OF12011	12" RCP	MUDDY RUN TRIBUTARY	FW2-NT
OF12012	12" CIP	MUDDY RUN	FW2-NTC1

Figure 1: Permittee Owned/Operated Stormwater Outfalls



Note: This figure is a simplified overview and does not show all stormwater infrastructure. A more detailed MS4 Infrastructure Map of the Borough's stormwater system, titled "Elmer MS4 Infrastructure Map" is available on the Borough's stormwater webpage: [Elmer, New Jersey - Stormwater Information]

Stormwater Interconnection(s)

An interconnection is a point where the Borough's stormwater system connects to another stormwater system, such as Salem County, Pittsgrove Township, NJDOT, or a private system or vice versa. Understanding interconnections is important because it shows how water and pollutants move between Elmer and its neighbors and helps clarify who is responsible for maintaining particular pipes and outfalls.

Interconnections from the permittee's MS4 into another entity

The Borough of Elmer's MS4 discharges to systems operated by the New Jersey Department of Transportation (NJDOT), Salem County, and Pittsgrove Township. Based on GPS field surveys and review of state parcel data to establish property boundaries, conducted/verified between November 2024 and June 2025, 10 interconnections from the Borough's MS4 to downstream systems were identified: 9 direct piped connections and 1 overland flow. No interconnections to sanitary or combined sewer systems were identified, and no discharges to private systems were found. Interconnection locations are shown on MS4 Infrastructure Map. A detailed breakdown of these interconnections is provided in Table 2 and shown in Figure 2.

Interconnection(s) into the permittee's MS4 from another entity (for Tier A permittees only)

The Borough of Elmer receives stormwater from systems operated by the New Jersey Department of Transportation (NJDOT), Salem County, Pittsgrove Township, and/or private systems. Based on GPS field surveys and review of state parcel data to establish property boundaries, conducted/verified between November 2024 and June 2025, 11 interconnections from other entities into the Borough's MS4 were identified. All 11 interconnections are direct piped connections. No interconnections from sanitary or combined sewer systems into the Borough's MS4 were identified. Interconnection locations are shown on MS4 Infrastructure Map; see Table 2 and Figure 2 for a detailed breakdown of these interconnections.

Why interconnections matter for residents and for Phase 2

For residents, interconnections explain how stormwater from outside the Borough can reach Elmer's pipes and outfalls, and how stormwater from Elmer can travel into County or neighboring municipal systems. In Phase 2, the Borough will use this information to:

- Coordinate with Salem County, Pittsgrove Township, Upper Pittsgrove Township, NJDOT and private owners on shared flooding and water quality concerns; and
- Identify potential joint projects or maintenance activities at key interconnection points.

These coordinated efforts, consistent with NJDEP's WIP guidance, can be more effective at improving water quality and reducing flooding than actions taken by each jurisdiction alone.

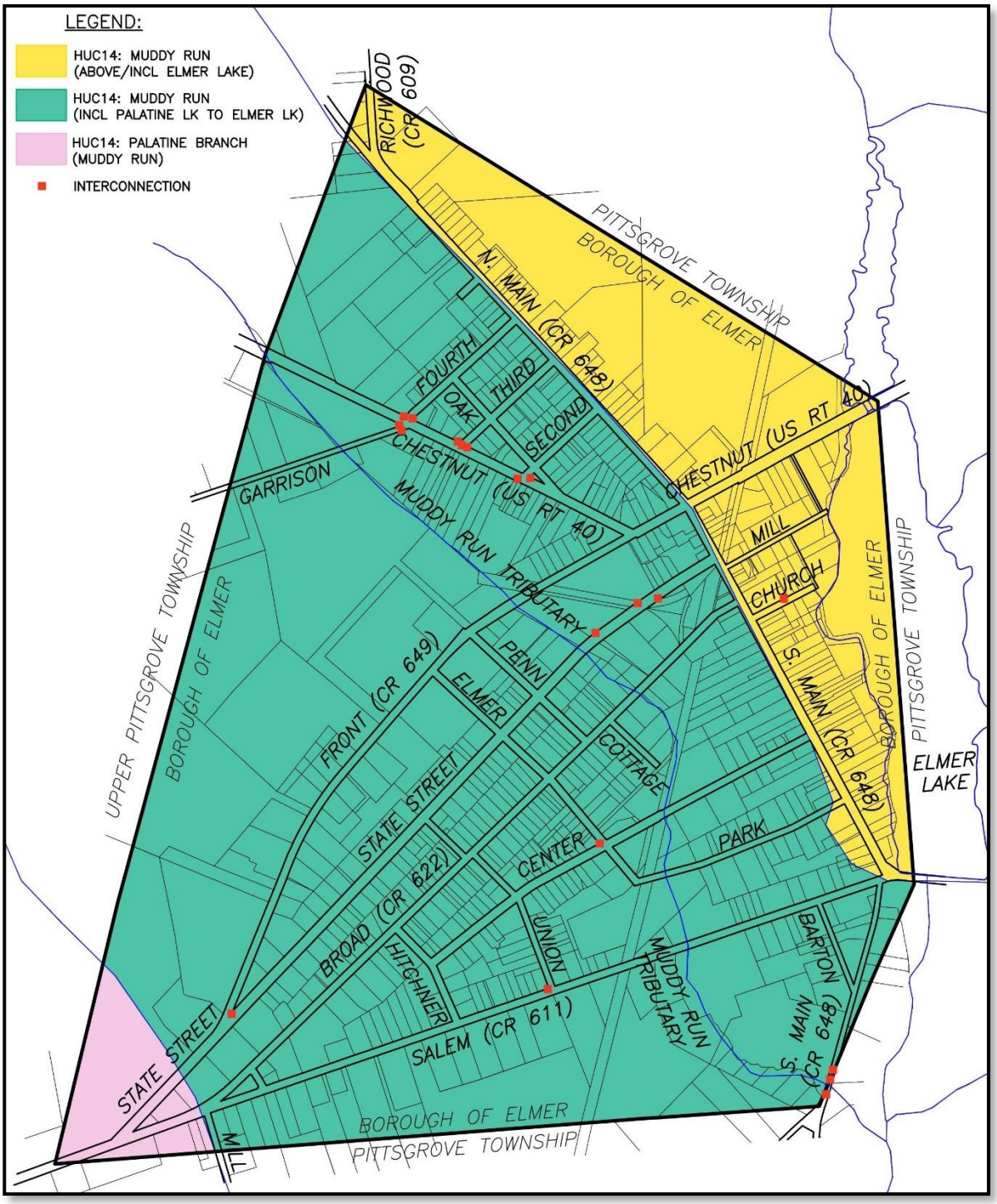
Electronic data submission

Electronic data for interconnections will be submitted via NJDEP online in georeferenced CAD format with required attributes.

Table 2: Interconnections into and from the Borough of Elmer

LOCAL ID	TYPE	UPSTREAM ENTITY	DOWNSTREAM ENTITY
ITC11001	18"CIP	BOROUGH OF ELMER'S MS4	NJDOT MS4
ITC11002	18"RCP	NJDOT MS4	BOROUGH OF ELMER'S MS4
ITC11003	24"RCP	NJDOT MS4	BOROUGH OF ELMER'S MS4
ITC11004	15"RCP	BOROUGH OF ELMER'S MS4	NJDOT MS4
ITC11005	15"RCP	BOROUGH OF ELMER'S MS4	NJDOT MS4
ITC11006	15"RCP	BOROUGH OF ELMER'S MS4	NJDOT MS4
ITC11007	15"RCP	BOROUGH OF ELMER'S MS4	NJDOT MS4
ITC11008	15"RCP	NJDOT MS4	BOROUGH OF ELMER'S MS4
ITC11009	12"RCP	PRIVATE STORMWATER SYSTEM	BOROUGH OF ELMER'S MS4
ITC11010	12"RCP	PRIVATE STORMWATER SYSTEM	BOROUGH OF ELMER'S MS4
ITC11011	12"RCP	PRIVATE STORMWATER SYSTEM	BOROUGH OF ELMER'S MS4
ITC11012	15"RCP	PRIVATE STORMWATER SYSTEM	BOROUGH OF ELMER'S MS4
ITC11013	24"RCP	BOROUGH OF ELMER'S MS4	SALEM COUNTY MS4
ITC11014	15"RCP	BOROUGH OF ELMER'S MS4	SALEM COUNTY MS4
ITC11015	12"RCP	BOROUGH OF ELMER'S MS4	SALEM COUNTY MS4
ITC11016	12"RCP	PRIVATE STORMWATER SYSTEM	BOROUGH OF ELMER'S MS4
ITC11017	15"RCP	PITTSGROVE TOWNSHIP MS4	BOROUGH OF ELMER'S MS4
ITS11018	24"RCP	BOROUGH OF ELMER'S MS4	PITTSGROVE TOWNSHIP MS4
ITC11019	OPEN CHANNEL	BOROUGH OF ELMER'S MS4	SALEM COUNTY MS4
ITC11020	18" RCP	PRIVATE STORMWATER SYSTEM	BOROUGH OF ELMER'S MS4
ITC11021	8" PVC	PRIVATE STORMWATER SYSTEM	BOROUGH OF ELMER'S MS4

Figure 2: Interconnections into and from the Permittee's MS4



Note: This figure is a simplified overview and does not show all stormwater infrastructure. A more detailed MS4 Infrastructure Map of the Borough's stormwater system, titled "Elmer MS4 Infrastructure Map" is available on the Borough's stormwater webpage: [Elmer, New Jersey - Stormwater Information]

Drainage Area(s) for Stormwater Outfalls and Stormwater Interconnections

Drainage Areas
The Borough has delineated Drainage Areas that define a boundary around the area of land that drains to each outfall and interconnection. The drainage areas for the Storm Drain Inlets, Outfalls, and Interconnection(s) were delineated through visual analysis of the latest LiDAR-derived topographic data, supplemented with field-surveyed inlet and pipe network locations, along with invert and grate elevations. AutoCAD Civil 3D was used to integrate the LiDAR topography with the surveyed data, while aerial imagery was reviewed to identify physical features such as curb lines, pavement edges, buildings, and other site elements. These drainage areas show which streets, properties, and land uses contribute runoff to each outfall or interconnection.

Storm Drain Inlets, Outfalls, & Interconnection(s)
Storm drain inlets and outfalls were inventoried to support the MS4 Infrastructure Map and drainage area delineations. Between November 2024 and June 2025, field crews from Consulting Engineer Services (CES) surveyed inlet locations in the public right-of-way using GPS. The inventory includes only municipally owned/operated inlets; county and private inlets were not collected, which is in accordance with the guidelines issued by NJDEP. Interconnections where the municipal system ties into county/state roads—or receives flow from them—were identified and noted. In total for the Borough of Elmer MS4 stormwater system includes: 77 storm drain inlets, 13 outfalls, and 21 interconnections were identified as of December 2025. Refer to tables below which outlines the inlet type and NJDEP required attributes.

Importance of Drainage Area mapping for Borough planning:

- If a water quality problem is found at an outfall, the Borough can look “upstream” within the mapped drainage area to see where the problem might be coming from;
- If residents report flooding at a particular location, the drainage area map can help determine which parts of the stormwater system should be inspected or improved; and
- When planning future projects, the Borough can estimate how much impervious surface and how many properties would benefit from improvements at each outfall or interconnection.

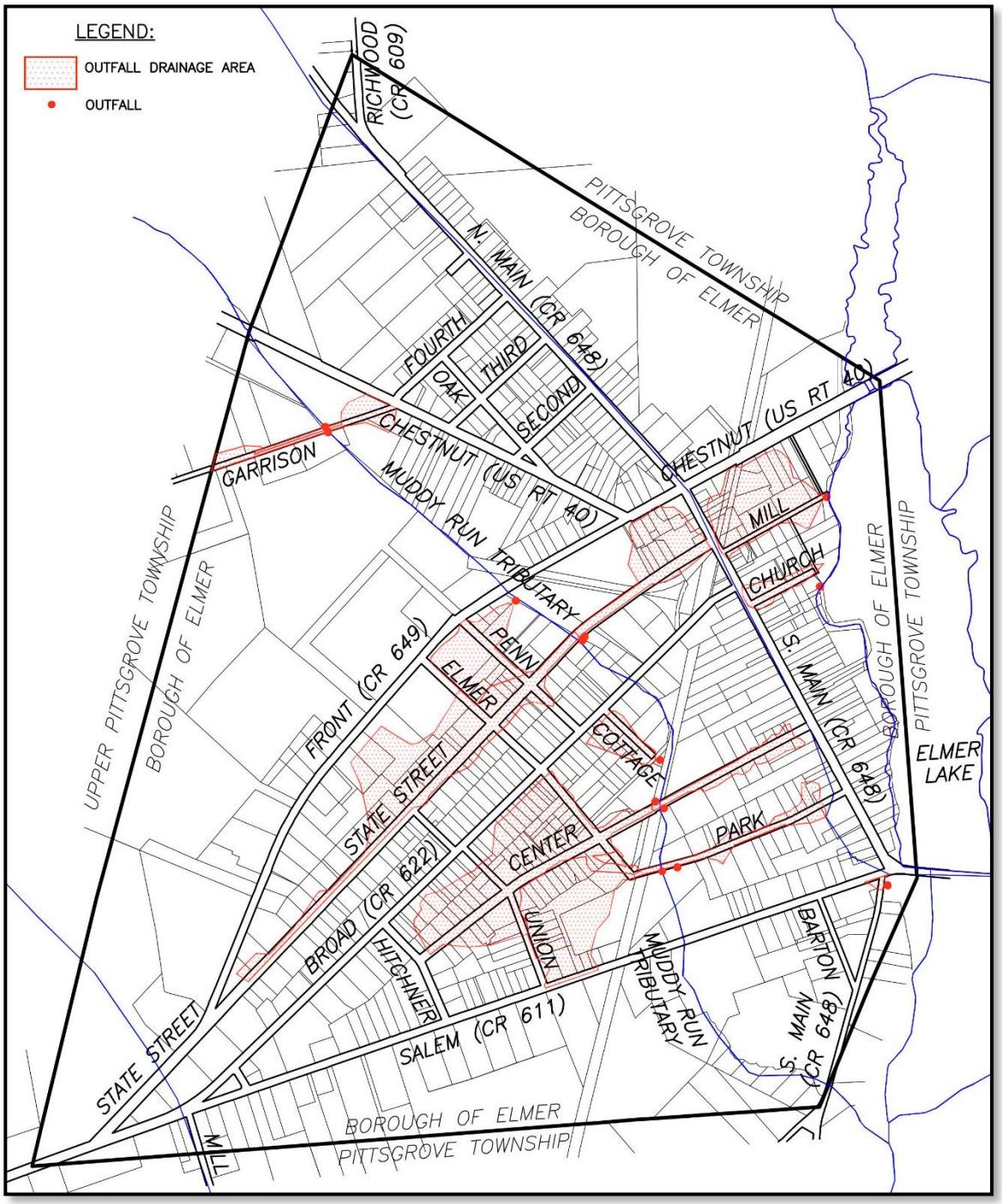
In Phase 2, the Watershed Assessment Report, these drainage area maps will be combined with information on TMDLs, impairments, and impervious cover to identify where stormwater projects (such as green infrastructure or basin retrofits) would provide the greatest reduction in pollutants and the most relief from flooding.

Electronic submission
Outfall drainage areas and drainage areas for interconnections from the Borough to other entities will be submitted electronically in georeferenced CAD file with required attributes via NJDEP Online

Table 3: Stormwater Outfall and Interconnection Drainage Areas

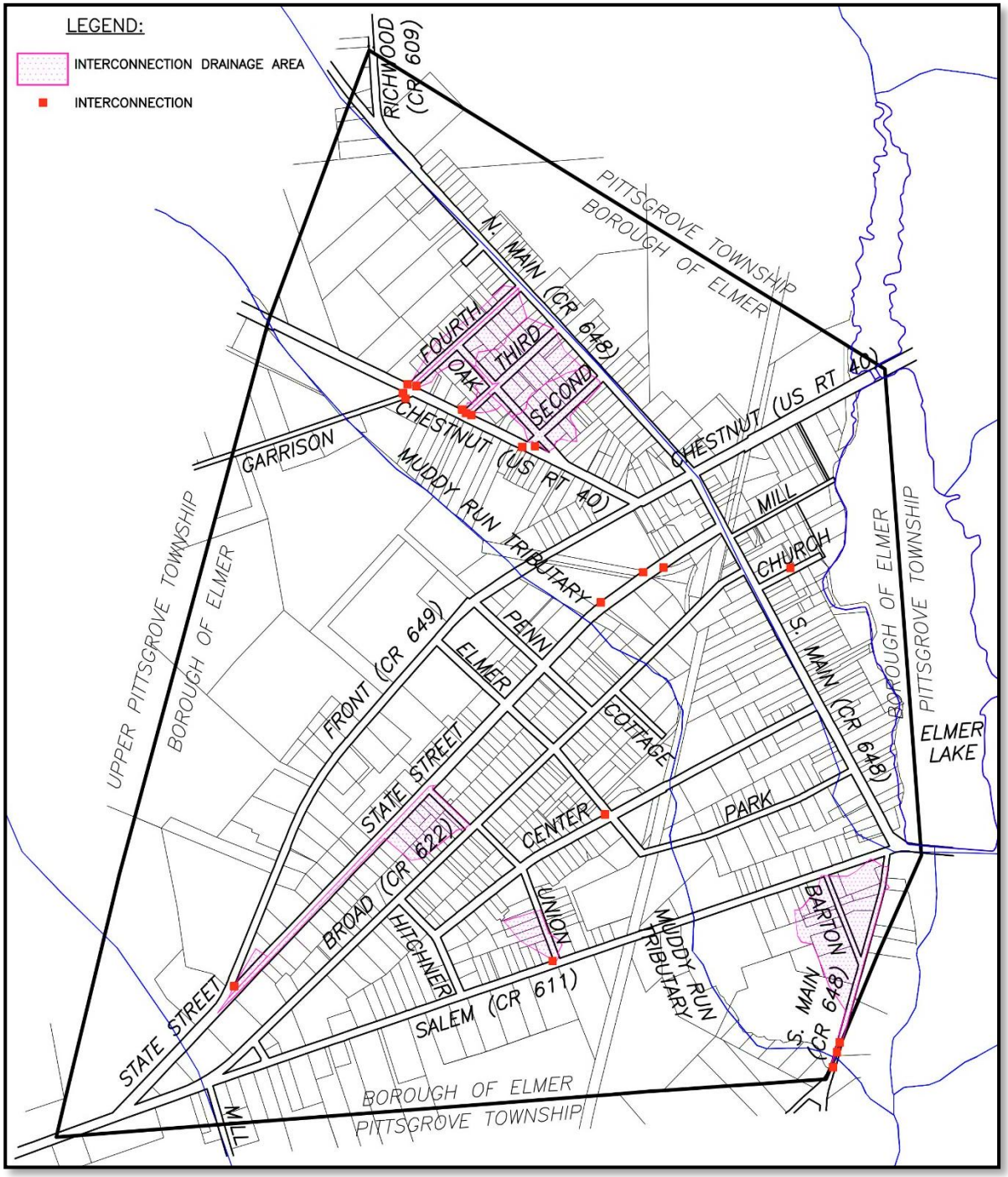
DRAINAGE AREA ID	DRAINAGE AREA (ACRES)	INTERCONNECTION OR OUTFALL	PRIMARY CONTRIBUTING DRAINAGE AREA TYPE
DA1	0.201	BOROUGH MS4 OUTFALL (OF12000)	URBAN
DA2	1.926	BOROUGH MS4 OUTFALL (OF12001)	URBAN
DA3	1.442	INTERCONNECTION TO NJDOT MS4	URBAN
DA4	2.457	INTERCONNECTION TO NJDOT MS4	URBAN
DA5	0.347	INTERCONNECTION TO NJDOT MS4	URBAN
DA6	4.823	INTERCONNECTION TO NJDOT MS4	URBAN
DA7	0.308	INTERCONNECTION TO NJDOT MS4	URBAN
DA8	3.423	INTERCONNECTION TO NJDOT MS4	URBAN
DA9	4.087	BOROUGH MS4 OUTFALL (OF12002)	URBAN
DA10	11.828	BOROUGH MS4 OUTFALL (OF12003)	URBAN
DA11	4.363	BOROUGH MS4 OUTFALL (OF12004)	URBAN
DA12	3.671	INTERCONNECTION TO SALEM COUNTY MS4	URBAN
DA13	1.618	BOROUGH MS4 OUTFALL (OF12007)	URBAN
DA14	13.411	BOROUGH MS4 OUTFALL (OF12008)	URBAN
DA15	1.738	BOROUGH MS4 OUTFALL (OF12009)	URBAN
DA16	7.499	BOROUGH MS4 OUTFALL (OF12010)	URBAN
DA17	2.035	BOROUGH MS4 OUTFALL (OF12011)	URBAN
DA18	6.121	BOROUGH MS4 OUTFALL (OF12005)	URBAN
DA19	1.146	BOROUGH MS4 OUTFALL (OF12006)	URBAN
DA20	0.384	INTERCONNECTION TO SALEM COUNTY MS4	URBAN
DA21	1.282	INTERCONNECTION TO SALEM COUNTY MS4	URBAN
DA22	0.129	BOROUGH MS4 OUTFALL (OF12012)	URBAN

Figure 3: Outfall Drainage Area(s)



Note: This figure is a simplified overview and does not show all stormwater infrastructure. A more detailed MS4 Infrastructure M*ap of the Borough's stormwater system*, titled "Elmer MS4 Infrastructure Map" *is available on the Borough's stormwater webpage: [Elmer, New Jersey - Stormwater Information]*

Figure 4: Interconnection Drainage Area(s)



Note: This figure is a simplified overview and does not show all stormwater infrastructure. A more detailed MS4 Infrastructure Map of the Borough's stormwater system, titled "Elmer MS4 Infrastructure Map" is available on the Borough's stormwater webpage: [Elmer, New Jersey - Stormwater Information]

TMDLs and Water Quality Impairments

The Borough of Elmer utilized the New Jersey Watershed Evaluation Tool (NJ-WET) to gather all HUC14 TMDL and Water Quality Impairment data for the surface water bodies within the Borough of Elmer. Data was collected on or about May 9, 2025. The Borough has three (3) HUC14s that lie within or bordering its jurisdiction:

1. Muddy Run (above/incl Elmer Lake)
2. Muddy Run (incl Palatine Lk to Elmer Lk)
3. Palatine Branch (Muddy Run)

Total Maximum Daily Load (TMDL) is a calculated federal regulation maximum pollutant load a water body can take while staying healthy and still meet water quality standards to allow waters to be fishable and/or swimmable. Under the Clean Water Act the TMDL focuses on pollutants like bacteria or nutrients that harm designated uses. The TMDL calculation is developed for a specific impaired water (stream or lake) based on the boundaries of its surrounding watershed. In essence, the "streamshed" or "lakeshed" is the geographic area of study and management used to develop the specific TMDL plan for the water body it drains. The TMDLs listed below for each HUC 14 show the TMDL loading for the streamshed areas and the lakeshed areas. New Jersey also specified that shellfish waters shall meet the guidelines of the National Shellfish Sanitation Program (NSSP). The NSSP guidelines include stringent criteria, expressed in terms of indicator organisms, to protect against the harvest of shellfish in waters where the sanitary quality could have health risks for consumers. The TMDLs listed below for each HUC 14 also include the Shellfish maximum loadings.

Each HUC14 is evaluated for TMDL limits based on Streamshed, Lakeshed and Shellfish based on the New Jersey Water Quality standards. Also NJDEP also evaluates watersheds based on 2020 water quality impairments. All HUC14s impacting the Borough and their TMDL(s) and Impairments are as follows:

- 02040206150020 – Muddy Run (incl Palatine Lk to Elmer Lk)
- 02040206150010 – Muddy Run (above/incl Elmer Lake)
- 02040206150030 – Palatine Branch (Muddy Run)

1. HUC14 02040206150010: Muddy Run (above/incl Elmer Lake)
    - Total Maximum Daily Loads (TMDLs)
        - Streamsheds – PCBs
        - Lakesheds – Fecal Coliform
        - Shellfish – Total Coliform
    - 2020 Water Quality Impairments Related to Stormwater
        - Temperature
2. HUC14 02040206150020: Muddy Run (incl Palatine Lk to Elmer Lk)
    - Total Maximum Daily Loads (TMDLs)
        - Streamsheds – PCBs
        - Lakesheds – Fecal Coliform
        - Shellfish – Total Coliform

- 2020 Water Quality Impairments Related to Stormwater
  - None

3. HUC14 02040206150030: Palatine Branch (Muddy Run)

   - Total Maximum Daily Loads (TMDLs)
     - Streamsheds – PCBs
     - Lakesheds – Fecal Coliform
     - Shellfish – Total Coliform
   - 2020 Water Quality Impairments Related to Stormwater
     - E. Coli

Each TMDL and Impairment listed above is a pollutant that is a concern as the elevated levels exist in the waterways within the Borough of Elmer. The following is a brief description of each TMDL and Impairment and areas where the municipality can regulate and review the parameter. This information is taken directly from the NJDEP "Pollutants of Concern" document provided to each municipality

1. **Polychlorinated Biphenyls (PCBs)**
   The term 'PCBs' (Polychlorinated Biphenyls) represents a broad class of toxic industrial chemicals first discovered and synthesized in the late 19th century. Their novel chemical properties led to widespread industrial production and usage peaking between the 1930's and late-1960's. Some products may continue to contain PCBs, including electrical equipment, motor and hydraulic oils, oil-based paint, and some plastics. The recognition of PCB associated health hazards were first noted in the 1960's and their production finally banned in 1979. PCBs can accumulate in the leaves and above-ground parts of plants and food crops. They are also taken up into the bodies of small organisms and fish. As a result, people who ingest fish may be exposed to PCBs that have bioaccumulated in the fish they are ingesting. Their oily nature allows them to accumulate in fatty animal tissues and bioaccumulate up the global food chain where they contribute to organ damage and carcinogenesis in higher-tiered species.

   PCBs are easily carried away as TSS by stormwater runoff from products containing the compounds which are exposed to stormwater and known and unknown contaminated areas. PCBs have a moderate level of volatility, which means that their vapors are also readily carried aloft by the wind. They are then deposited on exposed surfaces via air deposition.

   MS4 permit conditions that regulate this parameter:
   - Improper Disposal of Waste Ordinance
   - Yard Waste Ordinance
   - Roadside Vegetative Waste Management
   - Inspection and Maintenance of Stormwater Facilities
   - BMPs at Municipal Maintenance Yards
   - Illicit Discharge Detection and Elimination Program

2. **Pathogens (Enterococcus, E. Coli, Fecal Coliform, Total Coliform)**
   Pathogens, including enterococcus, E. Coli, fecal coliform, and total coliform, enter the

receiving waters when stormwater comes into contact with sources of these pathogens, such as pet waste, animal waste from geese and other wildlife, some farming activities, illicit discharges, failing sewage conveyance systems and septic systems, combined sewage overflows, and sanitary sewer overflows (SSOs). While sewage treatment plants contribute a steady input of treated sewage to their receiving waters, stormwater runoff is the primary contributor to pathogen loads in the surface waters of the state.

Many of these pathogens affect the designated uses of the receiving waters and are harmful to human or animal health when ingested causing intestinal disease. Pathogens can attack the immune system and cause infections that may result in abdominal issues, respiratory problems, fever, headache, skin rashes, etc. (Water Quality Topics: Pathogens | US EPA).

When receiving surface waters include shellfish harvesting as a designated use, pathogens also pose additional concerns. Proximity to potential sources such as marinas, development served by septic systems and concentrated stormwater outfall locations warrant precautionary closures of shellfish waters on a seasonal or full-time basis. The National Shellfish Sanitation Program has established criteria for pathogens that are used to determine support of the shell fishing use.

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

3. Temperature

The concentration of dissolved oxygen in the receiving waters is also affected by the temperature of the water. Cold water holds more dissolved oxygen than warm water, so in New Jersey during winter and early spring, the dissolved oxygen concentration in the surface waters is relatively high. However, in summer and fall, the dissolved oxygen concentration is often lower and therefore can pose a risk to designated uses associated with aquatic life. Deeper water also tends to be colder and hold more dissolved oxygen than shallower waters. Yet, turbid waters will absorb more heat. The elevated temperatures are especially harmful to cold water fish, such as trout.

Temperature impairments in the receiving waters can be due to heating of stormwater runoff as it runs across hot paved areas, such as roadways and parking lots, overflow of heated stormwater ponded in basins, stream bank erosion that widens the stream and creates more shallow stream beds, and increased solar incidence in areas where shading vegetation is lacking in the riparian buffer. In addition to the other Tier A permit conditions noted below,

the increased temperature impacts associated with stormwater runoff can also be mitigated by implementing green infrastructure measures to manage stormwater runoff at the source rather than direct it into the MS4 and receiving waterbodies, providing proper stormwater management practices, and conducting streambank restoration projects where needed.

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

In simple terms, the TMDLs and water quality impairments identified in this section mean that the waters receiving stormwater from Elmer already have documented pollution problems. PCBs and bacteria (such as E. coli and fecal coliform) affect whether fish are safe to eat and whether water is safe for recreation. Temperature impairments affect the health of fish and other aquatic life.

The Borough cannot solve all of these problems alone, but is responsible for understanding how their stormwater outfalls and drainage areas may contribute to them. Phase 1 identifies which subwatersheds and which parameters (PCBs, bacteria, temperature) are of concern.

In Phase 2, the Borough will use this information together with the outfall and drainage area maps to:

- Analyze the delineated drainage areas for outfalls that discharge to TMDL or impaired waters to narrow down portions of each drainage area that may be contributing the most to the identified pollutants of concern;
- Evaluate impervious areas and runoff potential within the delineated drainage areas in each HUC14 subwatershed, to better understand how land use and hard surfaces may be influencing pollutant loading; and
- Prioritize projects that will most effectively reduce bacteria and other pollutants reaching Muddy Run, Muddy Run Tributary, and Elmer Lake, based on this analysis and other factors such as feasibility and co-benefits.

Table 4: TMDLs and Impairments for Subwatersheds within or bordering the Borough of Elmer

HUC 14	SUBWATERSHED NAME	TMDL(S)	IMPAIRMENT(S)
2040206150010	MUDDY RUN (ABOVE/INCL ELMER LAKE)	STREAMSHEDS PCBS	TEMPERATURE
		LAKESHEDS FECAL COLIFORM	
		SHELLFISH TOTAL COLIFORM	
2040206150020	MUDDY RUN (INCL PALATINE LK TO ELMER LAKE)	STREAMSHEDS PCBS	NONE
		LAKESHEDS FECAL COLIFORM	
		SHELLFISH TOTAL COLIFORM	
2040206150030	PALATINE BRANCH (MUDDY RUN)	STREAMSHEDS PCBS	E. COLI
		LAKESHEDS FECAL COLIFORM	
		SHELLFISH TOTAL COLIFORM	

Figure 5: TMDL (Streamsheds) – Polychlorinated Biphenyls (PCBs)

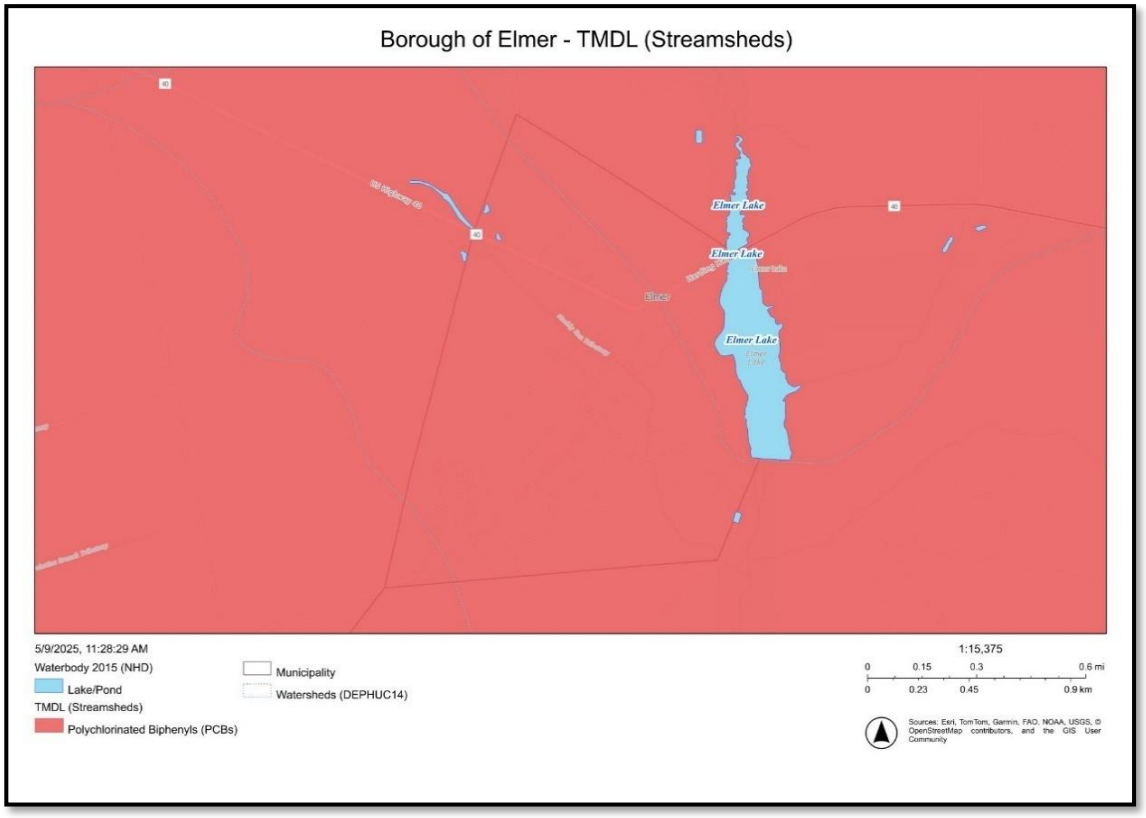


Figure 6: TMDL (Lakesheds) – Fecal Coliform

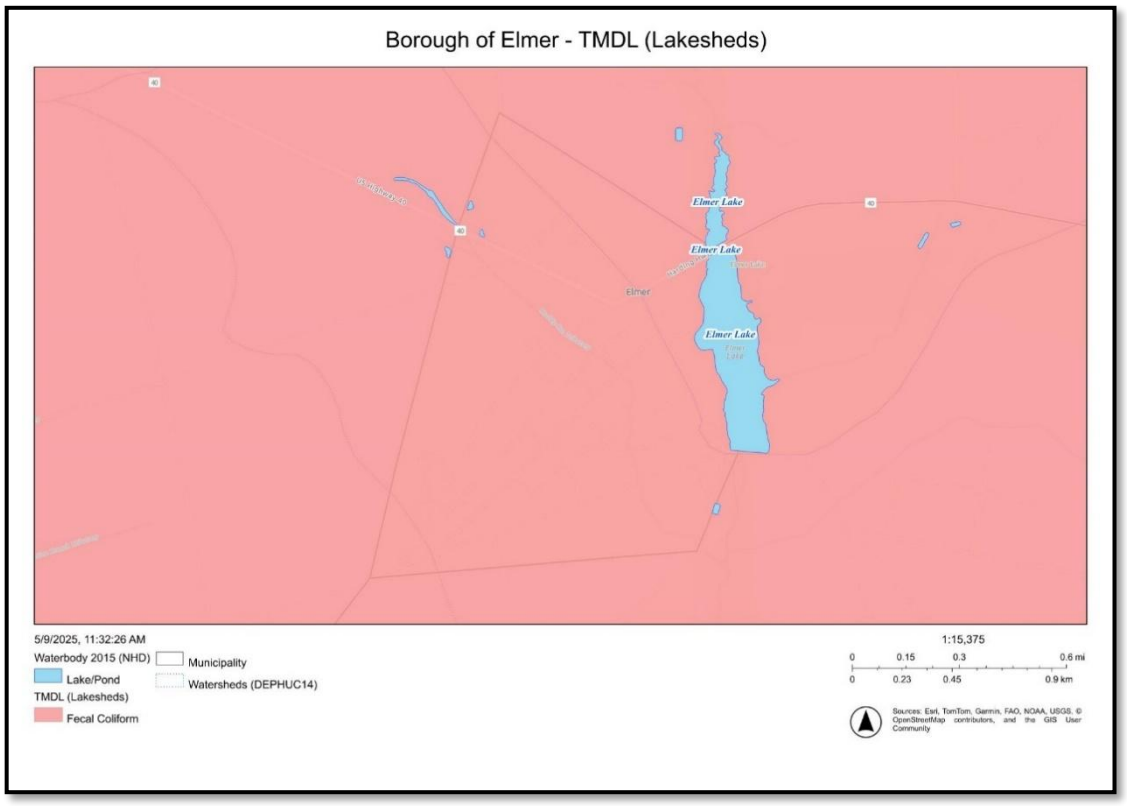
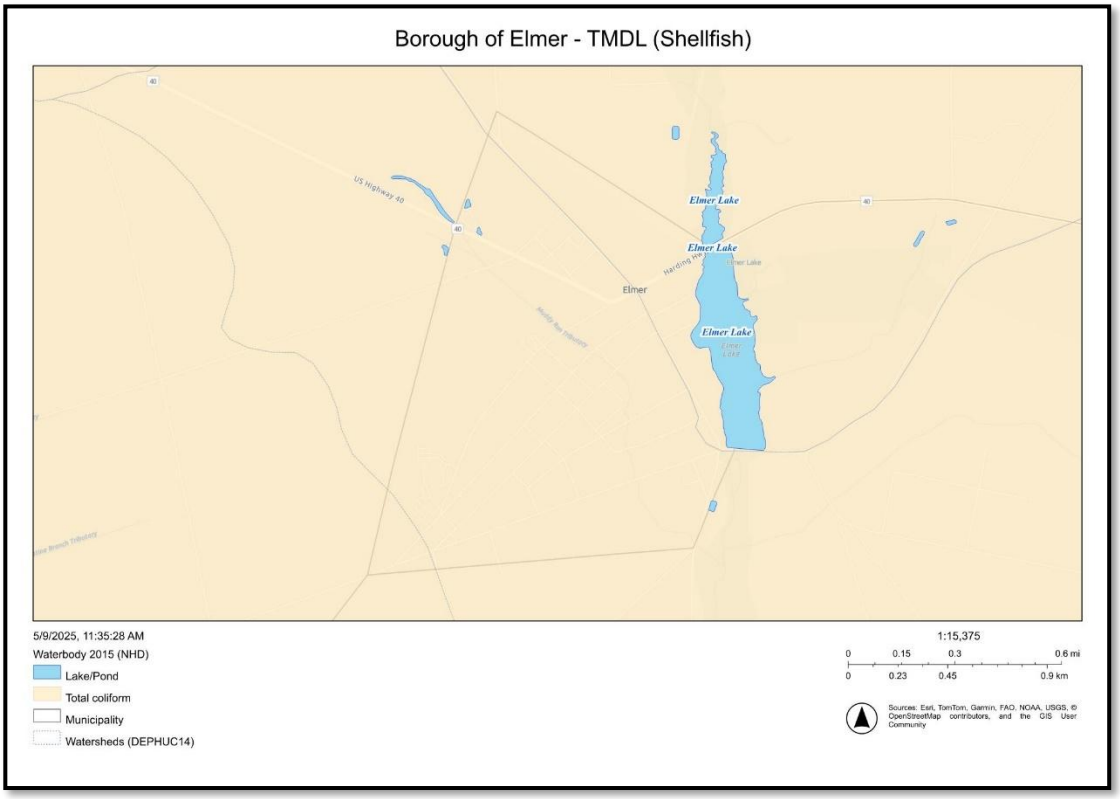


Figure 7: TMDL (Shellfish) – Total Coliform

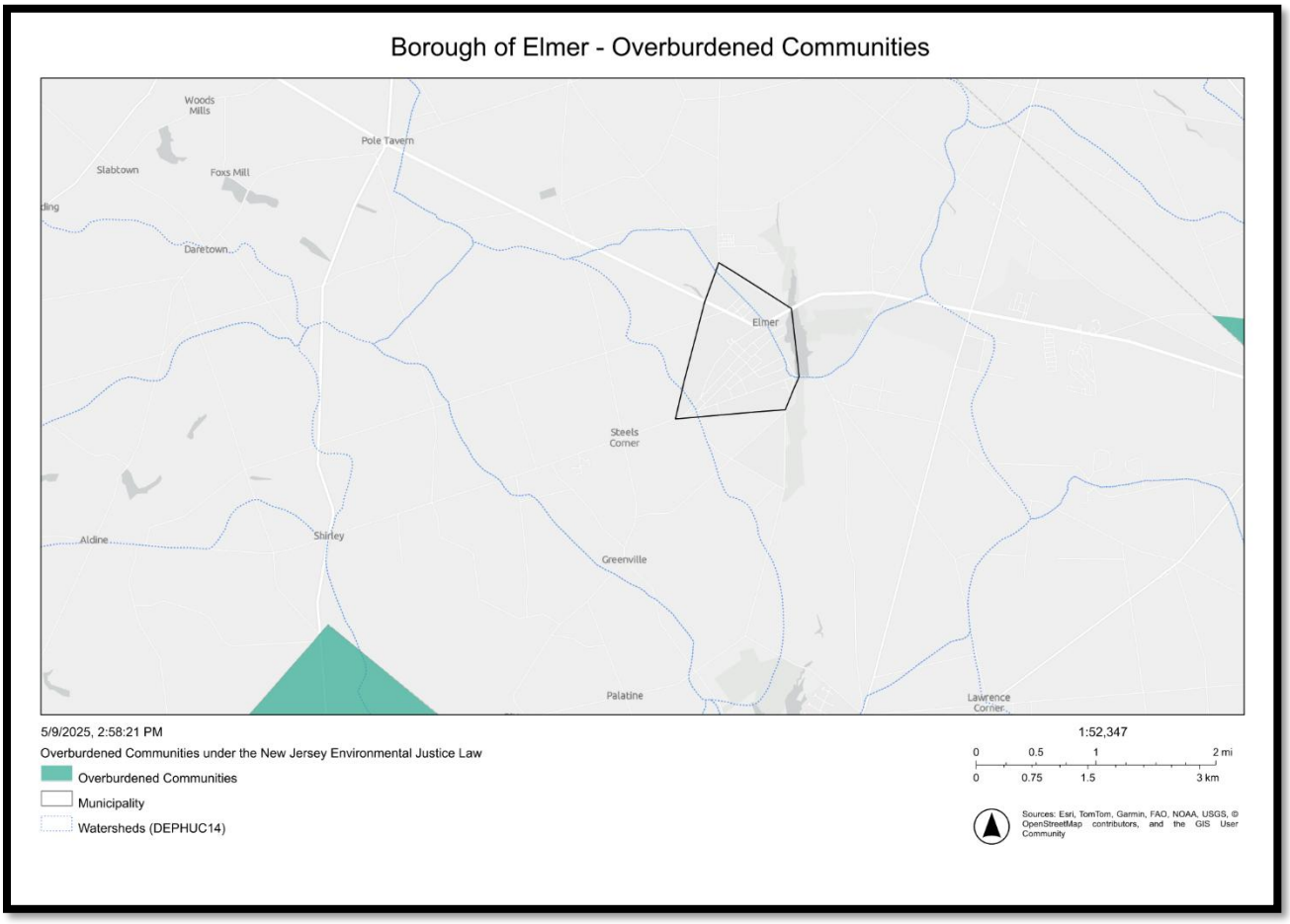


Overburdened Communities

Overburdened communities are locations identified by the State as facing higher environmental and public health burdens than other communities, often due to a combination of pollution sources, flooding risk, and social and economic factors. When overburdened communities are present, the MS4 permit and NJDEP's WIP guidance expect municipalities to give them special consideration when planning and prioritizing stormwater projects.

The Borough of Elmer utilized the New Jersey Watershed Evaluation Tool (NJ-WET) to gather all overburdened communities information, collected on May 9, 2025. Based on the NJ-WET, the Borough does not have any overburdened communities within its jurisdiction, as shown in *Figure 8*.

Figure 8: Overburdened Communities within the Borough of Elmer



Impervious Area

Impervious areas are surfaces like concrete, asphalt, rooftops, and over compacted gravel that prevents stormwater from soaking into the ground, which increases runoff and pollutants.

The amount of impervious cover within a permittee's jurisdiction can cause a variety of effects on the local ecosystems and stream health, such as elevated temperatures, lower dissolved oxygen concentration, and increased turbidity. Temperature impairments in the receiving waters can be due to heating of stormwater runoff as it runs across hot paved areas. The elevated temperatures can directly impact cold water fish, such as trout. Additionally, the elevated temperatures cause the dissolved oxygen concentration to lower, which is essential for aquatic life. The increase of impervious cover without proper stormwater management can cause increased flows that lead to stream bank erosion and/or introducing runoff debris that increase the turbidity in the water, which reduces the ecological productivity.

The Borough of Elmer utilized the New Jersey Watershed Evaluation Tool (NJ-WET) to gather impervious area map on August 28, 2025. Additionally, NJ GIS data was collected and imported to AutoCAD to determine the percent impervious cover in each subwatershed within the Borough's jurisdiction. The percent impervious cover for each subwatershed is as follows:

- HUC14: Muddy Run (above/incl Elmer Lake) – 69.44%
- HUC14: Muddy Run (incl Palatine Lk to Elmer Lk) – 75.24%
- HUC14: Palatine Branch (Muddy Run) – 27.92%

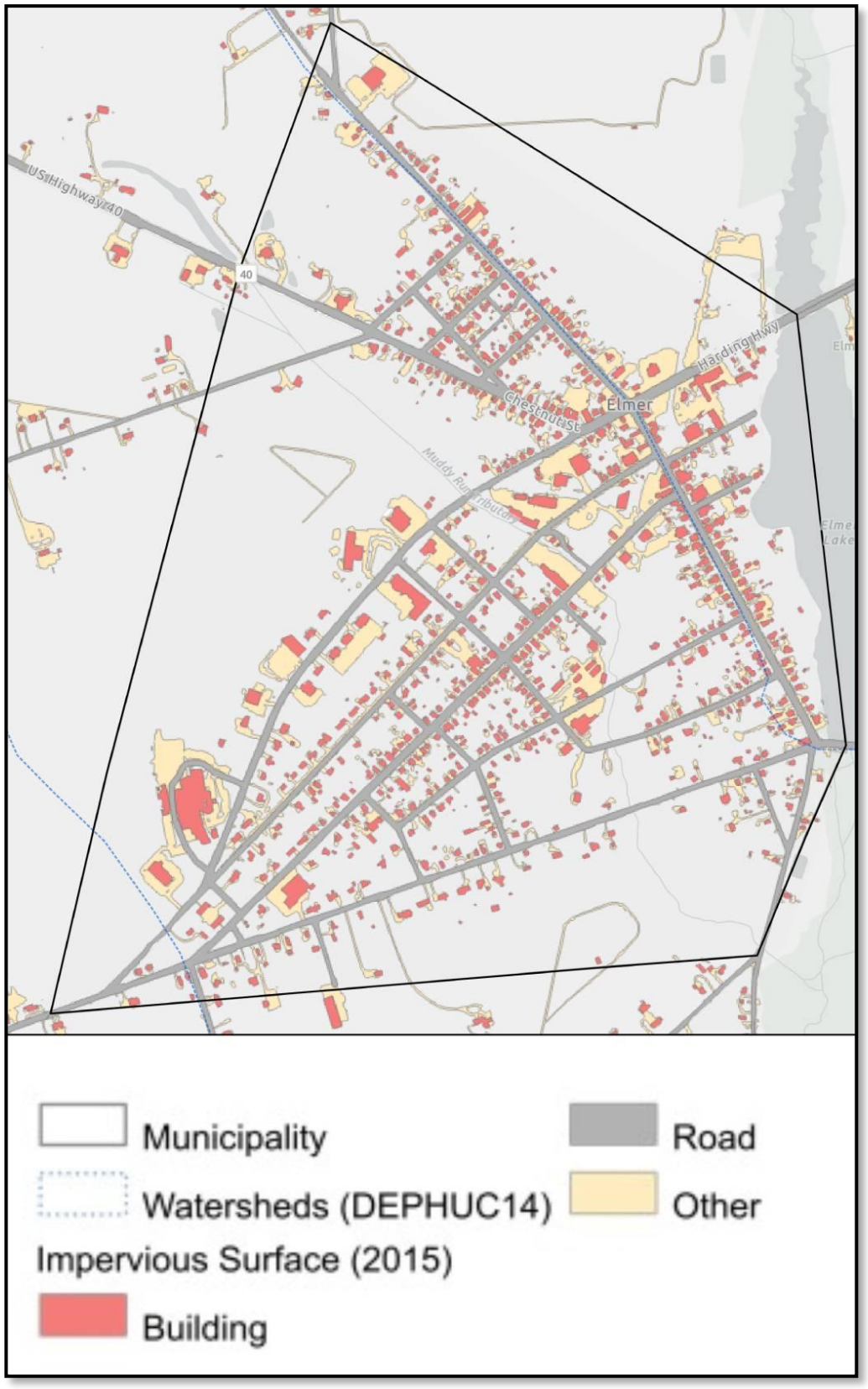
Role of surrounding municipalities and use in Phase 2

The three subwatersheds listed above extend beyond the Borough's borders into Upper Pittsgrove Township, Pittsgrove Township, and other surrounding areas. Impervious surfaces in these neighboring municipalities also contribute runoff to Muddy Run, Muddy Run Tributary, and Elmer Lake.

While this report focuses on impervious cover within Elmer's jurisdiction, NJDEP guidance encourages municipalities that share subwatersheds to consider regional approaches where appropriate. In Phase 2, the Borough will:

- Use these impervious cover estimates together with drainage area maps to identify which outfalls and subwatersheds are most affected by hard surfaces;
- Discuss with Upper Pittsgrove Township, Pittsgrove Township, NJDOT and Salem County how shared impervious areas and drainage patterns may influence flooding and water quality in Elmer; and
- Prioritize potential projects, such as green infrastructure or basin retrofits, in areas where reducing runoff from impervious surfaces would provide the greatest benefit to local streams and lakes

Figure 9: Impervious Area within the Borough of Elmer



Source: NJWET

Non-Municipally Owned or Operated Stormwater Facilities

Non-Municipally owned stormwater facilities are structures that help manage rain and snowmelt so that it does not cause flooding or carry too many pollutants into nearby streams and lakes that are not owned or operated by the Borough. Common examples include:

- **Detention basins** – Stormwater detention shallow ponds that **temporarily hold** stormwater and release it slowly to reduce downstream flooding.
- **Infiltration basins** – Stormwater Facilities that are designed so that stormwater can **soak into the ground**, helping to recharge groundwater and filter pollutants.
- **Retention basins / wet ponds** – Stormwater detention ponds that keep a **permanent pool of water** and provide extra storage during storms. As water moves through them, some pollutants can settle out or break down.

The stormwater facilities in this section are not owned by the Borough. They are owned and operated by private property owners (for example, medical offices, banks, and other businesses, as listed in the table below). Even though the Borough does not maintain these facilities, they are part of the overall drainage system that affects how water and pollutants move through the Muddy Run watershed.

The Borough of Elmer utilized the Rutgers hydrologic modeling database or "H & H" database to gather non-municipally owned or operated stormwater facilities within the Borough's jurisdiction on November 2025. Additionally, the infiltration basin owned by *A. Foote Repair Service* was not included in the H & H database, instead it is clearly visible and located with the use of *Google Maps*. All identified non-municipally owned or operated stormwater facilities are located within the middle of the three (3) subwatersheds impacted by the Borough, known as **Muddy Run (incl Palatine LK to Elmer Lake)**. The Muddy Run (incl Palatine LK to Elmer Lake) subwatershed contains **two (2)** detention basins, **five (5)** infiltration basins, and **three (3)** retention basins/wet ponds. All infrastructure is owned by separate businesses and a church, all located on Front Street (CR649), State Street, Broad Street (CR622) and S. Main Street (CR648), as shown in figure 10.

Electronic data for non-municipally owned or operated stormwater infrastructure will be submitted electronically in georeferenced CAD file with required attributes via NJDEP Online

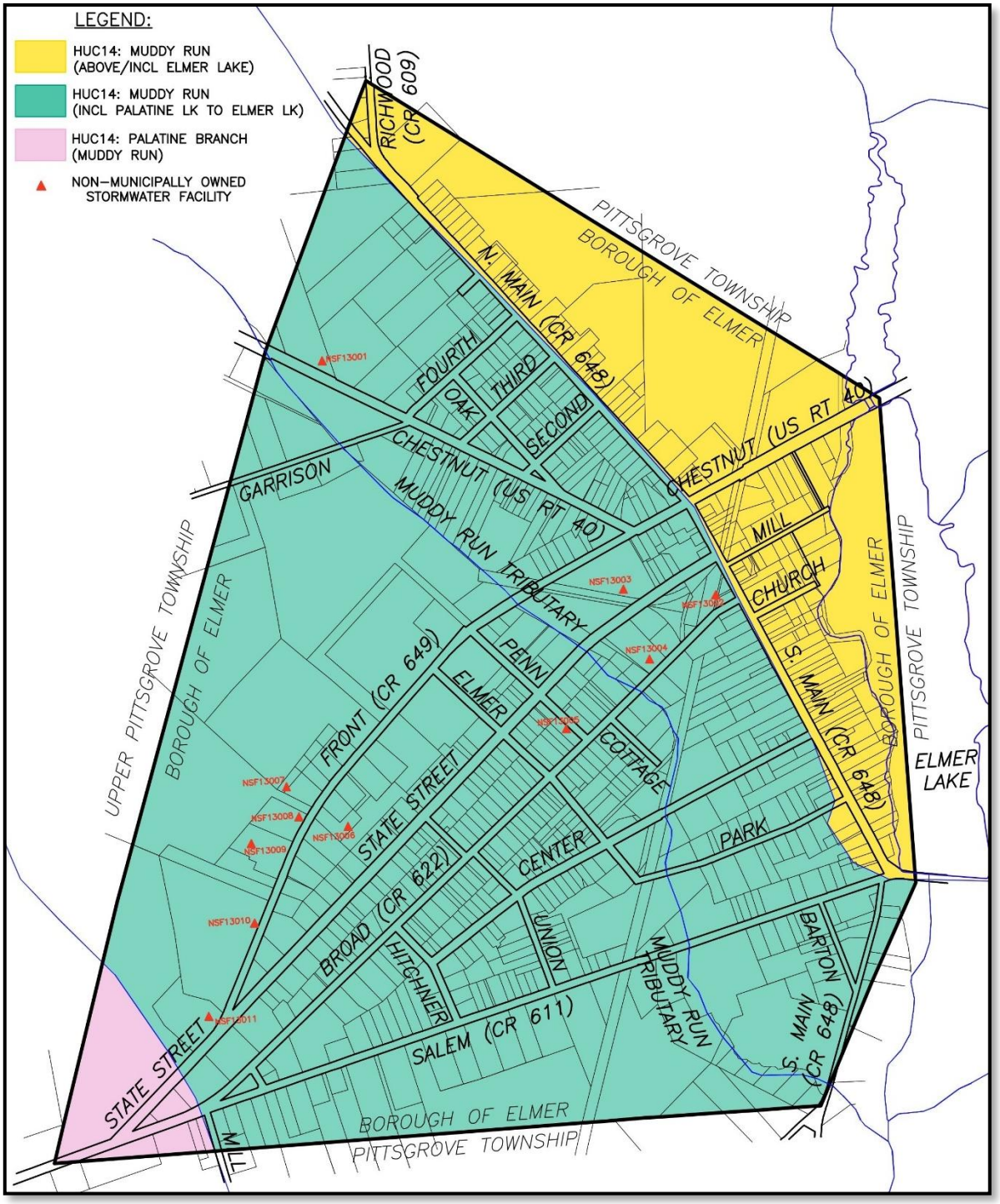
How this information will be used in Phase 2

In Phase 2 (Watershed Assessment Report), the Borough will use this inventory of private stormwater facilities to:

- Understand how much stormwater is already being managed on private properties within the Muddy Run (incl Palatine Lk to Elmer Lk) subwatershed;
- Identify whether additional improvements or retrofits to these facilities could help reduce pollutant loads or flooding, especially where they are located within drainage areas to Borough outfalls; and
- Where appropriate, coordinate with willing private owners to encourage good maintenance and explore opportunities for voluntary upgrades that align with the Borough's watershed and flooding goals.

These non-municipal facilities will be evaluated alongside Borough-owned infrastructure when the Borough identifies and prioritizes potential water quality and flooding projects in Phase 2.

Figure 10: Non-municipally Owned/Operated Stormwater Infrastructure in the Borough of Elmer



Note: This figure is a simplified overview and does not show all stormwater infrastructure. A more detailed MS4 Infrastructure Map of the Borough's stormwater system, titled "Elmer MS4 Infrastructure Map" is available on the Borough's stormwater webpage: [Elmer, New Jersey - Stormwater Information]

Table 5: Non-municipally Owned/Operated Stormwater Infrastructure in the Borough of Elmer

LOCAL ID	TYPE	OWNER	BLOCK	LOT
NSF13001	RETENTION BASIN/WET POND	PENNSVILLE NATIONAL BANK	3	34
NSF13002	DETENTION BASIN	FIRST NATIONAL BANK OF ELMER	18	18
NSF13003	INFILTRATION BASIN	DG MARKET	15	6
NSF13004	INFILTRATION BASIN	A. FOOTE REPAIR SERVICE	18	7
NSF13005	RETENTION BASIN/WET POND	ST. ANN'S RESIDENCE	19	7
NSF13006	INFILTRATION BASIN	WARMUTH INSTITUTE OF DERMATOLOGY	13	10
NSF13007	DETENTION BASIN	PREMIER WOMEN'S HEALTH OF SOUTH JERSEY	12	2.05
NSF13008	INFILTRATION BASIN	BRIGHTPATH ELMER CHILD CARE CENTER	12	10
NSF13009	INFILTRATION BASIN	INSPIRA VESTIBULAR PROGRAM ELMER	12	11
NSF13010	RETENTION BASIN/WET POND	INSPIRA MEDICAL CENTER ELMER	12	13
NSF13011	RETENTION BASIN/WET POND	STANKER & GALETTO, INC	12	14

Conclusion

The Borough of Elmer's Phase 1 Watershed Inventory Report provides a clear picture of how stormwater moves through the community and how it reaches local waterways. Using GPS field surveys, State parcel data, and NJDEP tools in 2025, **Consulting Engineer Services (CES), in cooperation with the Borough of Elmer**, documented the Borough's stormwater outfalls, interconnections with neighboring systems, drainage areas, TMDLs and impairments, impervious cover, overburdened community status, and key non-municipal stormwater facilities.

The Borough identified 13 outfalls that discharge to Muddy Run Tributary, Elmer Lake, and Muddy Run. These outfalls lie within three HUC 14 subwatersheds: Muddy Run (above/incl Elmer Lake), Muddy Run (incl Palatine Lk to Elmer Lk), and Palatine Branch (Muddy Run). Applicable TMDLs include Streamsheds – PCBs, Lakesheds – Fecal Coliform, and Shellfish – Total Coliform, and identified impairments include Temperature and E. Coli. Impervious cover ranges from about 28% to 75% among the three subwatersheds, reflecting a mix of more urban and more rural areas within and around the Borough.

The Borough also identified 10 interconnections from its MS4 into systems owned by **Salem County, NJDOT and Pittsgrove Township** (9 piped, 1 overland), and 11 interconnections from those and private systems into the Borough's MS4 (all piped). No interconnections to or from sanitary or combined sewer systems were found. These findings clarify how stormwater and pollutants can move across municipal boundaries and will support better coordination on future projects.

The underlying electronic data associated with this report, including outfall locations, drainage areas, interconnections, and non-municipal stormwater facilities, will be submitted to NJDEP via NJDEP Online in georeferenced CAD format with all required attributes.

Next steps – setting the stage for Phase 2

Phase 1 focuses on "what we have and where it is." In Phase 2, the Watershed Assessment Report, the Borough will use this inventory to:

- Identify and rank areas and outfalls that most affect impaired or TMDL-listed waters;
- Evaluate where flooding and drainage concerns are most significant within the mapped drainage areas;
- Screen and prioritize potential projects, including green infrastructure, basin retrofits, pipe and inlet improvements, and targeted maintenance;
- Estimate expected pollutant load reductions and other benefits from these projects; and
- Engage residents and neighboring communities in reviewing proposed priorities and providing feedback, as required by the MS4 permit and associated WIP guidance.

By moving from inventory (Phase 1) to assessment and prioritization (Phase 2), the Borough of Elmer will be better prepared to seek funding, coordinate with Upper Pittsgrove Township, Pittsgrove Township, Salem County, and NJDOT where appropriate, and implement projects that improve water quality and reduce flooding for its residents.

Limitations

This report reflects conditions observed during the 2025 GPS field surveys and the NJDEP and other datasets available at the time of review; interconnections, drainage areas, and system conditions may change over time due to construction, maintenance, redevelopment, or data updates.

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