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## 2002 Coastal Municipal Stormwater Infrastructure Mapping Project

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# **2002 COASTAL MUNICIPAL STORMWATER INFRASTRUCTURE MAPPING PROJECT**

## **A Final Report to The New Hampshire Estuaries Project**

Submitted by

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## **EXECUTIVE SUMMARY**

The New Hampshire Department of Environmental Services (DES) received funds in 2002 from the New Hampshire Estuaries Project (NHEP) to provide assistance to coastal communities to develop storm sewer infrastructure maps. This final report describes the grant projects that were completed in Portsmouth and Seabrook.

NHEP chose to fund stormwater infrastructure mapping projects for a number of reasons. Primarily, this grant was established in order to fulfill one of the water quality action plans identified in the NHEP Management Plan. In addition, the Coastal/Piscataqua watershed has been identified by DES as a priority watershed in need of restoration. A good map is an important part of identifying pollution sources in the storm drainage system. Finally, the two communities that were awarded grants are regulated as small municipal separate storm sewer systems (MS4s) under the Phase II federal stormwater regulation. The financial assistance these municipalities received has helped them comply with one of the requirements of the new regulations.

## **INTRODUCTION**

This final report describes the grant program funded by NHEP and administered by DES. A Memorandum of Agreement (MOA) between NHEP and DES created a grant program to provide assistance to coastal communities to develop storm sewer infrastructure maps. DES issued a request for proposals (RFP), chose grant recipients, and managed the grant agreements. This report provides details on the grant projects completed by Portsmouth and Seabrook. The deadline for completion of all grant projects was December 31, 2003.

## **PROJECT GOALS AND OBJECTIVES**

The goal of the project was to provide financial and technical assistance to coastal municipalities to map their storm drainage systems. The project's objective is derived from one of the Action Plans identified in the NHEP Management Plan relating to water quality (see [www.state.nh.us/nhep/Mgtplan/mgtplan.htm](http://www.state.nh.us/nhep/Mgtplan/mgtplan.htm)). Action WQ-4B aims to assist Seacoast communities in completing and maintaining maps of sewer and stormwater drainage infrastructure maps. The grant summarized in this report was established to help carry out this action plan.

## **METHODS**

On March 14, 2001 and February 20, 2002, the Governor and Executive Council approved a MOA between the New Hampshire Office of Energy and Planning and DES to implement several NHEP actions to improve the environmental quality of the state's estuaries, including funding for municipal stormwater infrastructure mapping.

### **Grant Project**

In January 2002, DES issued a request for proposals (RFP) to all communities within Zone A of the coastal watershed (as designated in the NHEP Management Plan), announcing the

availability of funds for storm drainage system mapping. The requirements for the use of the NHEP funds were as follows:

1. Maps should show catch basins, underground and above ground storm drainage, direction of flow, and outfall locations.
2. Maps must have the ability to be stored electronically, using a system that is compatible with the computer mapping system the municipality uses. Ideally, the system would also be compatible with the NH GRANIT system, so that regional planning commissions and other interested parties can use the data.
3. The proposed project meets the eligibility criteria (see below).
4. Funding must be matched with a 50 percent local (non-federal) share in cash or in-kind services.
5. All projects must be completed by December 31, 2003.

Portsmouth was the only municipality that had an extensive storm drainage system, without maps in place, and that was ready to begin a mapping project at the time the RFP was issued. Exeter, Hampton, Newmarket, Somersworth, Dover, Durham and Rochester had submitted applications for storm drainage system mapping projects under a different NHEP grant program in 2001. Two projects were terminated from the 2001 grant program, when Durham lacked municipal funding to complete a base map, and Rochester was unable to complete the scope of work by the project deadline. At that time, the Town of Seabrook was asked if they were ready to begin a mapping project. DES reviewed both proposals and assessed their merit based on the following criteria:

- Eligible municipalities include Dover, Durham, Exeter, Greenland, Hampton, Hampton Falls, Madbury, New Castle, Newfields, Newington, Newmarket, North Hampton, Portsmouth, Rochester, Rollinsford, Rye, Seabrook, Somersworth, and Stratham.
- Maps should be consistent with the town's GIS system and are encouraged to be compatible with the NH GRANIT system.
- A match of at least 50 percent of total project cost is required. Matching funds must be from a non-federal source. Cash and/or in-kind services are acceptable forms of match.

Both of the grant applications were deemed to be eligible and acceptable projects. The amounts requested exceeded the \$50,000 made available for the 2002 grant. The money forfeited when Durham terminated its grant was used to fund the remainder of the Seabrook project. Grant Agreements were developed for each project and approved by the town or city managers, the DES commissioner, and the NH Governor and Executive Council.

The deadline for all projects was December 31, 2003. There was not an option, as in previous years, to extend the 2002 grant projects past this deadline.

## **RESULTS AND DISCUSSION**

The outcomes of the activities performed as part of each grant are discussed in this section.

### **Portsmouth Grant**

The Portsmouth mapping project was completed by the December 31, 2003 deadline. The city organized over 2,000 existing paper maps and drainage plan information. Once the maps and plans were organized and accessible, field investigations were conducted to determine their accuracy. In areas where investigators found a discrepancy between the existing plan and how the structures were actually connected, generally around the North Mill Pond area, a number of measures were used to determine the piping system including visual assessment, smoke and dye testing. When the connections were determined, GIS software and a handheld computer were used to sketch the actual location of the pipes according to GPS data gathered at the site. In one instance, where DES found high bacteria counts, smoke testing identified a house with an illicit connection that the city later connected to the sewer line. In total, field investigations resulted in mapping of over 4,000 catch basins, over 1000 pipe inlets and outfalls, and approximately 500 drain manholes, encompassing 90% of the city's storm sewer system.

Because the drainage system still has some connections with the sanitary sewer system, it was necessary to model both systems as an integrated network. Fortunately, at the same time the city was working on this mapping project, a consulting company, Underwood Engineers, was hired to work on a sewer separation plan for a large section of Portsmouth's older neighborhoods. The engineering survey, including data for existing sewer, water, and drain lines, was incorporated into this mapping project. This allowed the city to map both the sanitary and storm sewer systems of an area greater than the project budget allowed, and resulted in a more comprehensive final product.

As the city conducted field work, data were entered into a GIS database to model the storm drainage system as a network. The database was created as part of this project using orthophotos, the existing maps and plans, and the newly gathered field data. The database now contains a complete set of data for Portsmouth's sanitary and storm sewer systems. This has proved useful for analysis of the system as a whole. The database has already been put to use in several situations including tracing the path of stormwater from city facilities to outfalls for permitting purposes. The fire department has expressed interest in adding the database to their command vehicle's computer to enable them to better respond to hazardous material spills.

The city reports that this mapping grant has enabled them to develop a thorough understanding of the drainage system and has allowed them to more effectively track down illicit discharges. The city will continue to work with DES to find and clarify remaining connections. Examples of how the information was gathered and imported into the database, as well as views of various database functions, can be seen in the appendix.

The grant amount for project was \$ 40,230. Portsmouth provided \$ 40,230 in non-federal match.

### **Seabrook Grant**

Seabrook was awarded a mapping grant using funds from 2001 (leftover when Durham terminated their grant) and 2002. Phase 1 of the mapping project was completed by the June 30, 2003 deadline. The town hired Earth Tech to complete the mapping project. Earth Tech

converted paper records into electronic data, and used the town’s April 2001 aerial photographs to obtain surface utility data and compare those data against the digitized data.

The grant amount for this phase of the project was \$5,605. Seabrook provided \$5,605 in non-federal match.

Phase 2 of the mapping project was completed by the December 31, 2003 deadline. Earth Tech compiled all available drawings and plans in the town and identified areas that were lacking information. Due to an insufficient budget for field work, the town was not able to address all of the areas that lacked information. Based on the areas identified, Earth Tech and town officials designated priority areas, including the tributaries to the Blackwater River and Hampton Harbor, to focus their field efforts and gather missing data. When the field work was completed, two final maps were produced. The first map incorporates the drainage features from the available paper records and from field investigations town-wide. The second map focuses on the coastal area where structure inspections were completed. Copies of the maps are on file with the Town of Seabrook, 99 Lafayette Road, Seabrook, NH 03874. The maps and data are on file at Department of Environmental Services, Watershed Assistance Section.

The grant amount for this phase of the project was \$9,770. Seabrook provided \$9,770 in non-federal match.

**CONCLUSIONS AND RECOMMENDATIONS**

This grant has assisted the city of Portsmouth and the town of Seabrook in complying with federal Phase II stormwater requirements, and has alleviated some of the strain on municipal budgets. The grant has continued to foster positive relationships between municipalities and DES. Table 1 summarizes the final project costs under this grant.

**Table 1. 2002 Coastal Municipal Stormwater Infrastructure Mapping Grant Project Costs**

<b>Grant recipient</b>	<b>Grant amount</b>	<b>Match amount</b>	<b>Total project cost</b>
Portsmouth	\$40,230.00	\$40,230.00	\$80,460.00
Seabrook	\$9,770.00*	\$9,770.00*	\$19,540.00*
<b>Total</b>	<b>\$50,000.00</b>	<b>\$50,000.00</b>	<b>\$100,000.00</b>

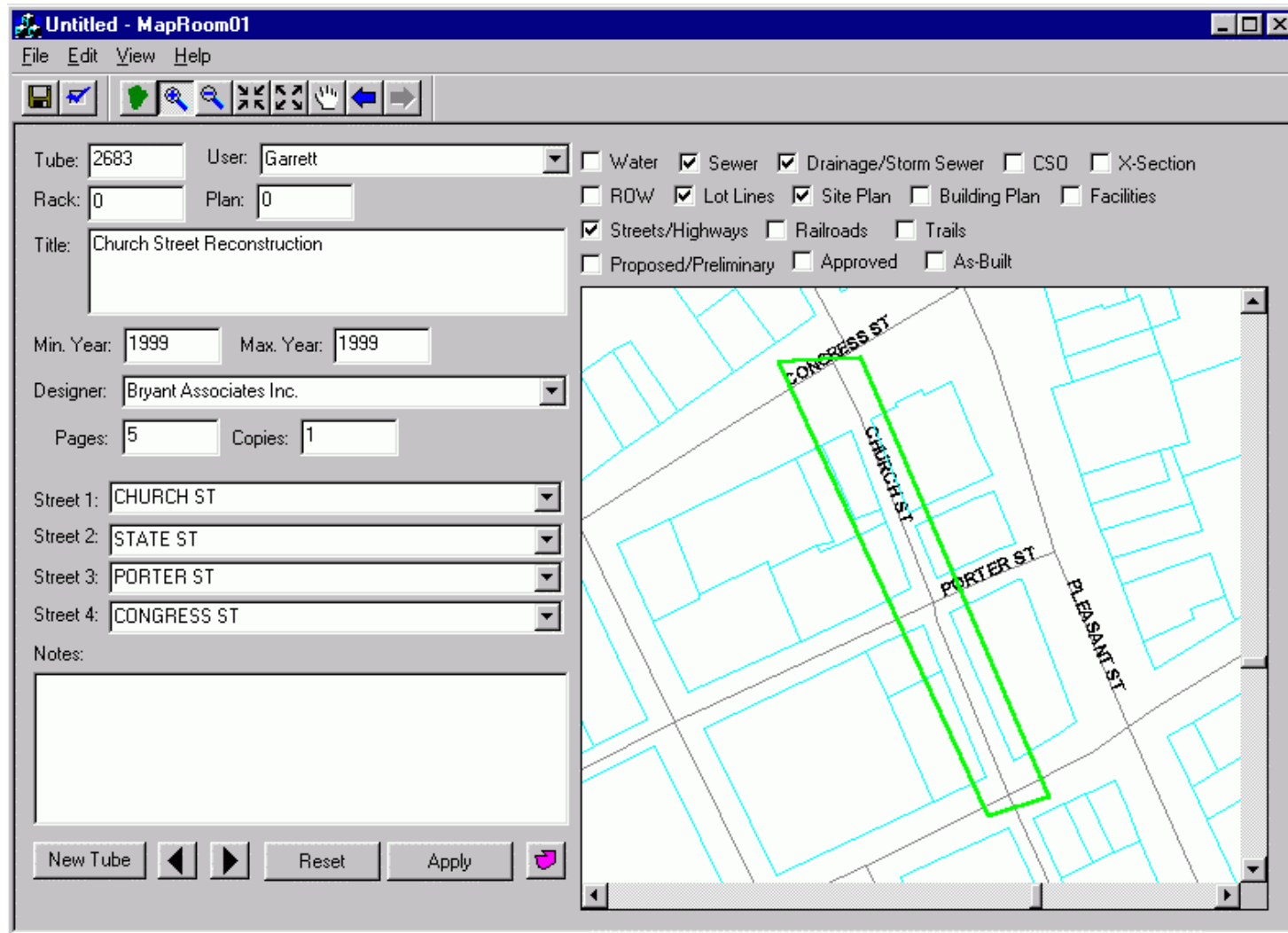
Notes: \*The grant and match amount reported for the town of Seabrook represents the amount granted for Phase 2. Phase 1 of the project was funded under 2001 in the amount of \$5,605 with \$5,605 in match, bringing the total project cost to \$30,750.

Based on the experience of the 2002 grant, the following changes are recommended for future grant opportunities with NHEP.

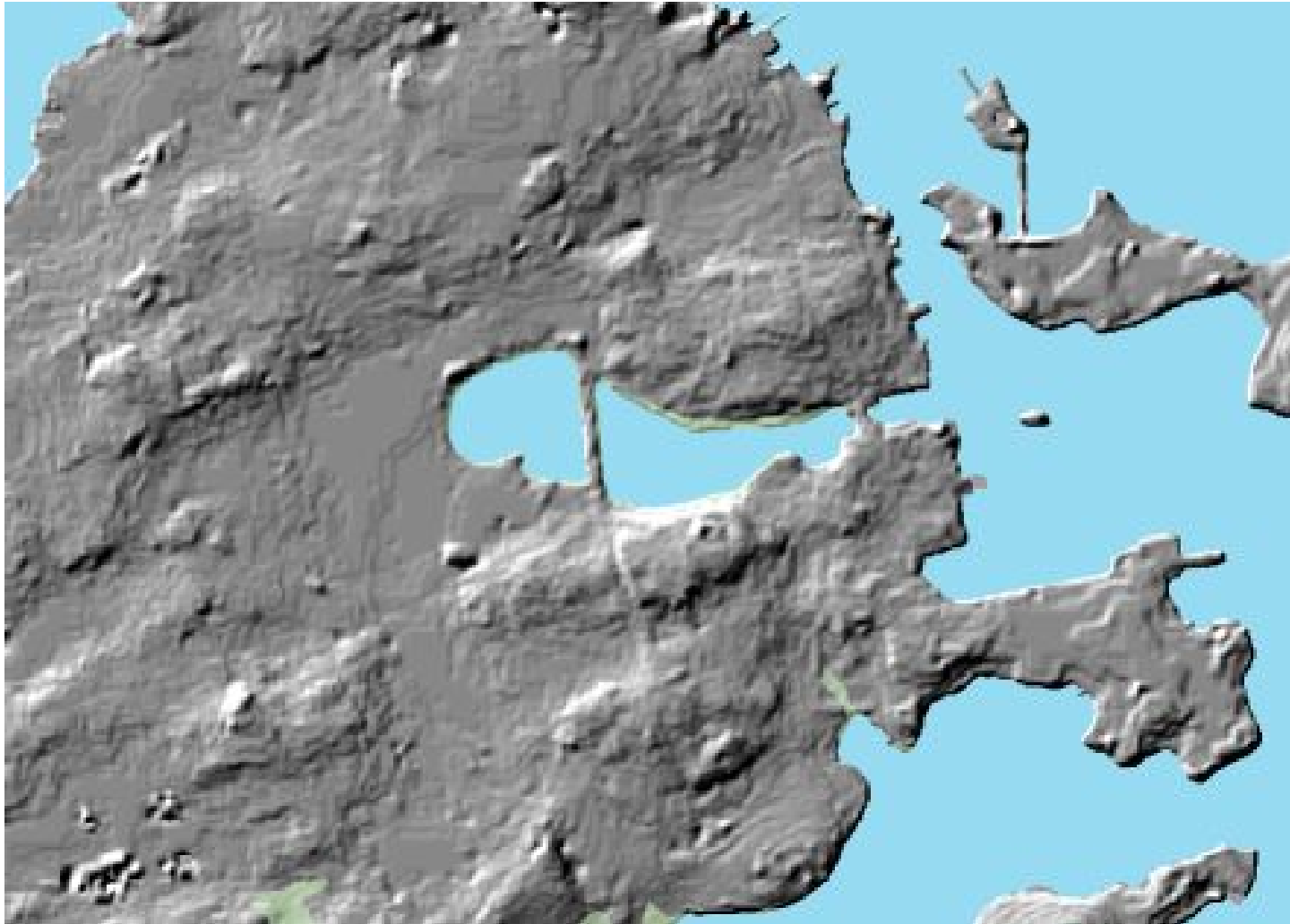
- A project completion date prior to the NHEP final reporting deadline is desirable. Given the time it takes the municipalities to submit final work products after the completion of the project, it frequently does not give DES staff enough time to review the documents and incorporate them into the final report to NHEP prior to the reporting deadline.
- Additional funding for this grant is recommended until most communities in the coastal watershed have adequate maps. This grant program was viewed very positively by communities, and there is continued interest, particularly among regulated MS4s, for the grant to be offered again.

**APPENDIX: PORTSMOUTH'S GEOGRAPHIC DATABASE EXAMPLES**





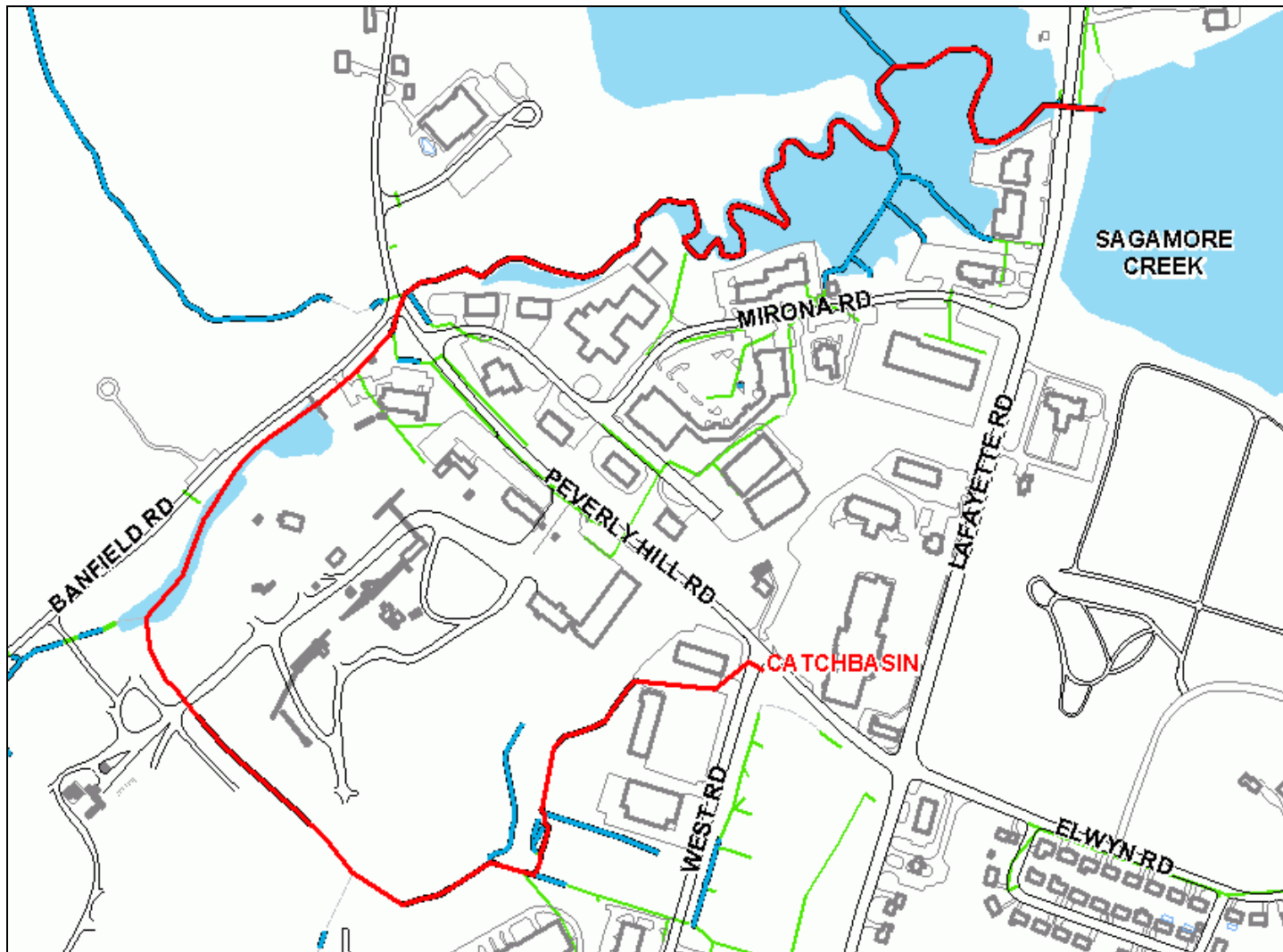
*Figure 1. Portsmouth user interface for the map room data entry software. The green rectangle represents the area covered by a particular set of plans.*



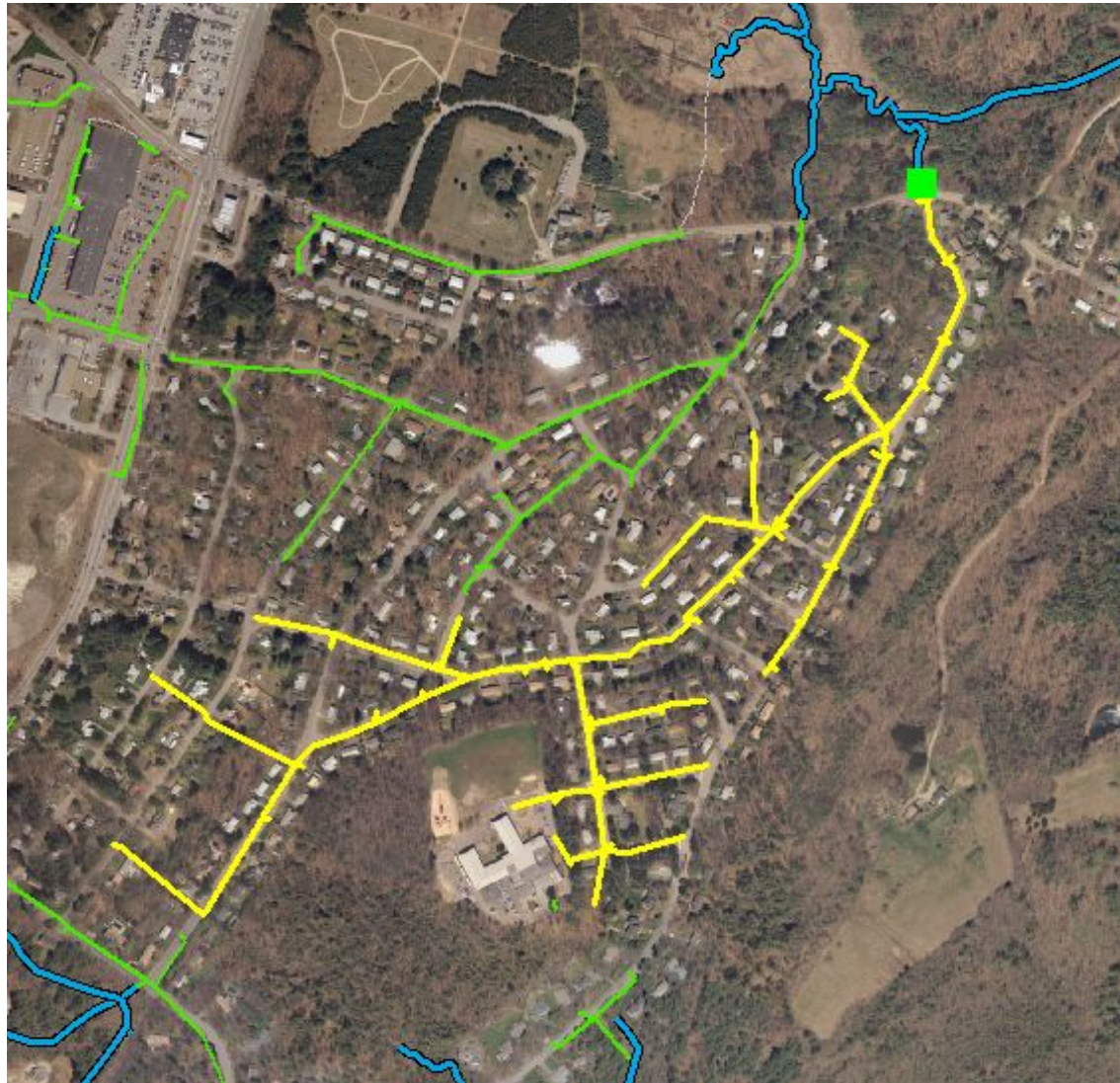
*Figure 2: A hillshade view derived from Portsmouth's digital elevation model (DEM).*



*Figure 3: Using a handheld computer, Portsmouth staff sketched the pipes (purple) that connected catchbasins, manholes, and outfalls.*



*Figure 4: The network model allowed Portsmouth to trace the path of water (red) from a catchbasin to an outfall.*



*Figure 5: Another function of the model is to identify all the pipes (yellow) that are upstream from a given outfall.*