

2.0 REVIEW OF EXISTING DATA

This Chapter provides a summary of the review of existing information on sewer separation projects in the Wellington Avenue CSO Facility tributary catchments.

2.1 REVIEW OF EXISTING REPORTS, MEMORANDA AND PLANS

The following reports, memoranda and plans were reviewed as part of this project:

- Report to Hon. Mortimer A. Sullivan, Mayor Upon The Sewerage and Drainage of The City of Newport R.I., prepared by Metcalf & Eddy, September 25, 1928;
- Report to The City of Newport, Rhode Island Upon Sewerage, Sewage Disposal and Drainage, prepared by Metcalf & Eddy, October 5, 1949;
- Summary Report to the City of Newport, Rhode Island on A Program of Immediate and Long Range Improvements to Sewerage and Drainage Systems, Metcalf & Eddy, December 29, 1971;
- Various Sewer Separation Contracts prepared by Keyes Associates, 1974-1979 (see Section 2.1.2);
- Report to the City of Newport on Recommended Sewerage Facilities for Newport Neck, prepared by Metcalf & Eddy, February 29, 1980;
- Report to the City of Newport, Rhode Island on Combined Sewer Overflow Abatement Alternatives, prepared by Metcalf & Eddy, August, 1986;
- Report on the Marine CSO Monitoring Program, prepared by Metcalf & Eddy, March, 1994;
- City of Newport Rhode Island, Combined Sewer Overflow Technical Memorandum 1, Baseline Conditions Report, prepared by Malcolm Pirnie, August 31, 1999; and
- City of Newport Rhode Island, Combined Sewer Overflow Technical Memorandum 3, Wellington Avenue CSO Facility Assessment, prepared by Malcolm Pirnie, August 31, 1999.

The following provides a summary of the review of the earlier reports with regard to sewer separation. Review of the documents from 1928 through 1971 indicated that sewer separation has been historically recommended to alleviate overflows within the Newport sewerage system and that extraneous flow from infiltration and inflow sources in the sewerage system was an ongoing issue. These summaries put into context the historical sewer separation planning and construction that occurred during this period leading up to the City's

comprehensive sewer separation program conducted in the mid to late 1970s. The review of the 1970s sewer separation plans is presented in Section 2.1.2. Review of the later reports from 1980 through 1999 is included in Section 2.1.3.

2.1.1 Review of Sewer Separation Planning: 1928 to 1971

In the 1928 report to the City, it was noted that the sewerage collection system was well designed to convey sanitary sewage but had an “insignificant allowance for storm water.” It further mentioned that “at the present time, many catch basins, roof drains and the like have been connected to the sewers, every considerable rain surcharges them and storm water mingled with sewage flows out upon the streets and causes much trouble.” The report further stated that the existing sewerage system was inadequate to convey stormwater. The report included sewer separation plans and recommendations throughout the City and included the recommended design for a pump station to be located in the Marchant Street District (Wellington Avenue tributary area) located in King Park. This station was the precursor to the Wellington Avenue CSO Facility.

In the 1949 Report to the City, it was noted that subsequent to the 1928 report noted above some of the recommended improvements were constructed, but “much recommended storm drainage work remains to be done.” Again, this report noted that the system was not designed to convey stormwater and that “many catch basins and stormwater inlets have been constructed and connected to the sewers, and many roof and cellar drains have also been connected.” The report noted that to prevent discharge of stormwater overflows from the sewerage system would “require the disconnection of the majority of the surface water inlet connections and roof and cellar drains throughout the system and does not appear practical.” It was also noted that on Marchant Street and Wellington Avenue, increases in flows in the sewers at high tides could be observed (later confirmed by the field investigations; information presented in Section 3 of this report). This report also included recommendations for the rehabilitation of existing sewers to “repair leaks” and to continue with sewer separation throughout the City. The report noted that if roofs were connected to the existing sewers, lateral drains should be provided to connect the roof drainage to the storm drain system.

In the 1971 report to the City, it was noted that “the existing combined sewers, with few exceptions, have inadequate capacity to function as storm drains.” Surveys conducted in a few “typical areas of Newport” and discussions with City officials indicated that a substantial number of dwellings have roof drains connected to the sewer system. In addition, high rates of infiltration recorded during high groundwater periods indicated the probable existence of basement drains connected to the sewer system.

2.1.2 Review of Sewer Separation Plans: 1974-1979

In the 1970s, Newport undertook a comprehensive sewer separation program that was funded by the United States Environmental Protection Agency’s Infiltration/Inflow Program. During this program, the majority of the storm drain connections to the sewer system were removed. The program also included construction of relief sewers to improve the systems conveyance capacity.

Earth Tech met with staff from the Engineering Division of the Department of Public Works to review sewer separation projects completed in the areas of interest for this Phase 1, Part 1 project. Most of the sewer separation work was performed in the mid to late 1970s for most of the areas of interest. The work was done exclusively by Fenton G. Keyes Engineering. The designs were completed between 1974 to 1976, with construction following. Record drawings for each contract were generally received around 1978 to 1979.

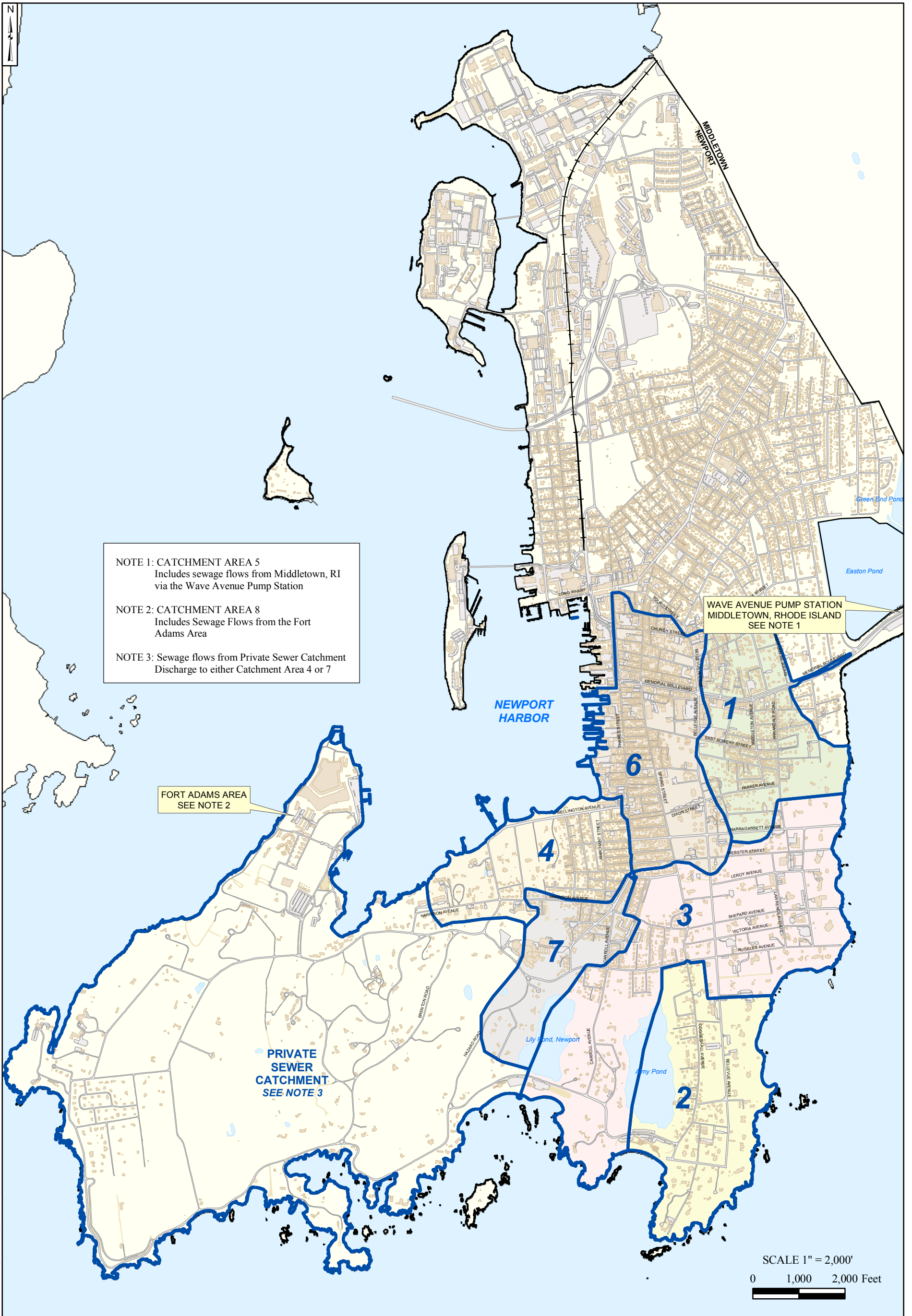
The Sewer Separation Contracts included the following:

- Contract S-1: Historic Hill 1975
- Contract 1: Washington Street Connecting Sewer 1974
- Contract 2: Alterations to Long Wharf Pump Station 1974
- Contract 4: Bliss Mine Road 1975
- Contract 5: Broadway Sewer 1974
- Contract 7: Long Wharf Force Main
- Contract 9: Lawrence Avenue Sewer Separation 1978 (As Built)
- Contract 10: Thames Street Sewer Separation 1974 (1978 As Built) – Lee’s Wharf South
- Contract 11: Almy Pond Sewer 1975 – Courts Streets east of Almy Pond
- Contract 12: Washington Street Sewer Separation 1974
- Contract 13: Coggeshall Avenue Sewer Separation 1975
- Contract 14: Narragansett Street Sewer 1975-1976
- Contract 15: Carroll Avenue Sewer Separation 1975 (1978 As Built)
- Contract 16: Wellington Avenue Sewer Separation 1974 (1978 As Built)

Information obtained from the above contracts is presented below for the catchment areas included in this investigation. A complete list of sewer separations contracts with a description of the location and work performed is included in Appendix A. The catchment areas are depicted in Figure 2.1.

Catchment Area 1 is approximately bordered by Catherine Street on the northern side, Bellevue Avenue on the western side, Rhode Island Avenue and Cliff Avenue on the eastern side, and Narragansett Avenue on the southern side. The City's Engineering Division staff indicated that the separation of sewers on Middleton Avenue, Berkeley Avenue, East Bowery Street, Annandale Road, Merton Road, Liberty Street, Sunnyside Place, and Downing Street were separated prior to the mid-1970's likely in the late 1950's to mid-1960's. As this catchment is mostly medium density residential land use, this area does permit some infiltration of precipitation into the ground. Several areas viewed during the field visits, did not have curbing at the edge of pavement and permitted the runoff to enter grassy areas along the road. Many of the observed houses in this catchment had rain gutters discharging to the ground surface.

Catchment Area 2 is approximately bounded by Almy Pond on the western side, the Rhode Island Sound on the southern and eastern sides, and Ruggles Avenue on the northern side. A majority of the separation effort in this catchment was completed between 1974 and 1978 under Contract 13 – Coggeshall Avenue Sewer Separation Project and Contract 11 – Almy Pond Sewer Project. The City's Engineering Division staff indicated that 2 or 3 catch basins are connected to the 10-inch sewer at the southern most end of Bellevue Avenue. It was also indicated that the Contracts listed above typically did not include work in Bellevue Avenue. The City's Engineering Division staff indicated that the State of Rhode Island may have performed the installation of drains in Bellevue Avenue, which typically tied into drains constructed up to but not under Bellevue Avenue. Drawings for this work were not available. Drains were installed in Rovensky Avenue, Lakeview Avenue, Ledge Road, and Coggeshall Avenue



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- LEGEND:**
- Sewer District Boundary
 - Buildings
 - Docks
 - Paved Roads and Parking
 - Unpaved Roads and Parking

FIGURE 2.1
WELLINGTON AVENUE CSO FACILITY
TRIBUTARY CATCHMENT AREAS
PHASE I PART I CSO CONTROL PLAN

and drain to an outlet in Almy Pond at Wheatland Court. This system was expanded to include sections of Bellevue Avenue between Bancroft Avenue and the southernmost end of Bellevue Avenue.

Under Contract 11, sanitary sewers were installed in Key Court, Almy Court, Murray Court, Casey Court, Maher Court, and Wheatland Court. The City's Engineering Division staff indicated that the existing piping in the previously mentioned roads, which originally flowed to Almy Pond and are shown as abandoned on the plans, may have been converted to drain lines. Earth Tech recommends that all connections to the sanitary sewer for houses on the eastern side of Almy Pond be verified as part of Phase 2. It was noted that much of Spouting Rock Drive is collected by a small drain system and discharges to Almy Pond. Drains in Bancroft Avenue, Bellevue Avenue, and the northern end of Coggeshall Avenue flow to Ruggles Avenue and are discharged to Almy Pond via a 54-inch pipe from Ruggles Avenue west of Coggeshall Avenue. Areas that do not have separated storm drainage systems include the eastern side of Almy Pond on Coggeshall Avenue between Key Court and Wheatland Court, and the southern end of Bellevue Avenue.

Catchment Area 3 is approximately bounded by Catchment 2 and the Rhode Island Sound on the eastern and southern sides, Lily Pond and Carroll Avenue on the western side, and Morton Avenue and Webster Avenue on the northern side. A majority of the separation effort in this catchment was completed between 1974 and 1978 under Contract 15 – Carroll Avenue Sewer Separation Project and Contract 10 – Lawrence Avenue Sewer Separation Project. Contract 15 included separation of sewers on Carroll Avenue, Gooseberry Road, Alpond Drive, and a section of Jeffery Drive with the storm drain discharging to the western side of Almy Pond.

Contract 9 collects separated flows from Ochre Point Avenue, parts of Webster Avenue, Lawrence Avenue, Shepard Avenue, and Ruggles Avenue. A drain line was added to Victoria Avenue east of Lawrence Avenue, sometime after the completion of Contract 9. The drain discharges flow to a 34-inch by 53-inch outfall into Rhode Island Sound. Leroy Avenue, the western end of Shepard Avenue, Victoria Avenue, west of Lawrence Avenue, and Ruggles Avenue between Wetmore Avenue and Bellevue Avenue contain

no drain lines. A section of new sanitary sewer was installed on Lawrence Avenue between Webster Avenue and immediately south of Leroy Avenue.

The Morton Park area has a series of catch basins on Spring Street, then a drain in Gordon Street, Vanderbilt Avenue, Andrew Street and Ruggles Avenue and discharges to Almy Pond via a 54-inch outlet. This part of the system drains the northern end of Coggeshall Avenue. The McCormick Road area is drained to Almy Pond via an 18-inch pipe.

Morton Park itself is not served by a drainage system. Flow collects near the southern end of the park as the ground slopes gently from Morton, steeply from Spring Street, and gently from a wooded area west of the park's open space. Topographically, this area appears to create a "bowl" as a low area near the southern fence of the park directly behind the park abuts Kerins Terrace. Two catch basins were observed to be connected to the sanitary sewer shown on the plans. Near the southern end at what appears to be the lowest point in the park, a catch basin with a grate was noted. Near the 45 degree turn in the sanitary sewer under the park, a manhole cover with 6 drain holes was noted. This area appears to be a potential major inflow source.

A storm drain may have been installed on the eastern most section of Shepard Avenue by Salve Regina College prior to a right of way dispute with the city. This drain, if it exists, is not shown on the plans. Storm drainage in Bellevue Avenue was constructed later due to the post construction restoration requirements associated with rigid, concrete paved roadways. This work was completed some time after the major separation initiative in the mid to late 1970's and the new Bellevue drains were tied in to the drains installed adjacent to Bellevue Avenue.

Catchment Area 4 is approximately bounded by Thames Street and Carroll Avenue on the eastern side, Harrison Avenue on the southern side, Newport Harbor on the northern side, and near Pen Craig Place. Contract 16 – Wellington Avenue sewer separation was completed between 1974 and 1979 and consisted of separating Halidon Avenue and additional separation of Marchant Street, Clinton Street, Houston Avenue, and Roseneath Avenue and vicinity. This improvement consisted of installation of a new

sanitary sewer in Halidon Avenue and additions to the existing drains in the Marchant/Roseneath area. Upon review of the drawings in this area, it appears separation or dedicated storm drains were installed before the mandates in the 1970s. Additional sewer separation improvements were likely included during the construction of the Wellington Avenue CSO Facility.

Catchment Area 5 consists of flow entirely from the Wave Avenue Pump Station from Middletown.

Catchment Area 6 is approximately bounded by Bellevue Avenue on the eastern side, Morton and Webster Avenues on the southern side, Newport Harbor on the western side, and Washington Square on the northern side. A majority of the separation effort in this catchment was completed between 1974 and 1978 under Contract 10 - Thames Street Sewer Separation Project and Contract S-1 – Historic Hill Project. Contract 10 consisted of the separation of sanitary sewer and drains between Dennison Street and McAllister Street along Thames Street. This contract included a new storm drain in Thames Street in the following three areas: between McAllister and Dearborn Streets, Pope Street to Dearborn Street, and Dennison Street to Howard Street. The City's Engineering Division staff indicated that there were several overflows from the Thames Street interceptor to provide relief during high flow periods while the interceptor served as a combined sewer. As part of construction of Contract 10, many of the cross connections located along Thames Street were bypassed and sealed and the outfalls were converted to storm drains carrying flow from the new drains installed in Thames Street.

Catchment Area 7 is approximately bounded by Lily Pond, Binney Street, Florence Avenue and Vaughn Avenue on the eastern side, Ocean Avenue on the southern side, Hazard Road and Harrison Lane on the western side, and Harrison Avenue and the intersection of Thames Street, Morton Street, and Carroll Avenue on the northern side. It does not appear that any of the contracts in the mid 1970's included this drainage area. It was unclear from City records when the storm drains in the area were installed. Storm drains in the southern end of the catchment discharge to Lily Pond, while storm drainage in the northern section of the catchment discharge to Thames Street or Roseneath Avenue and discharge near the Wellington Avenue CSO facility. Private force mains discharge to the sanitary sewer in Hazard Road near Ocean Heights Road.

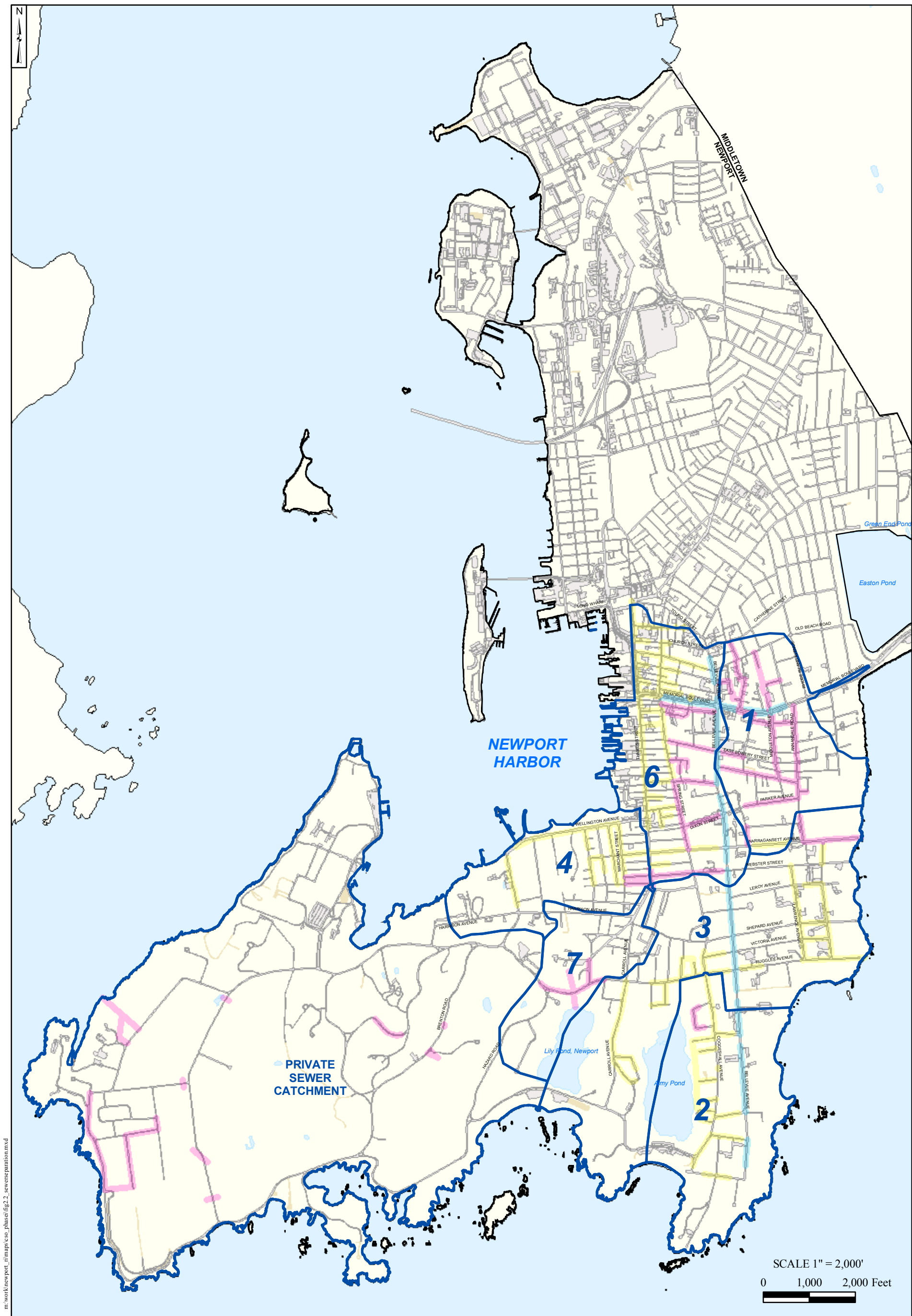
Figure 2.2 depicts the extent of sewer separation in the tributary catchments to the Wellington Avenue CSO Facility based on review of the sewer separation plans and GIS information. Figure 2.3 depicts the locations where only a sanitary sewer is present on the street. “Sanitary sewers only” refers to streets which contain sanitary sewer and no storm drain pipe.

2.1.3 Review of Reports and Memoranda: 1980 to 1999

The following provides a summary of the review of the more recent reports with regard to sewer system improvements, sewer separation and the operation of the Wellington Avenue CSO Facility. The 1980 Report was prepared to evaluate the existing and future sewer system needs in the Newport Neck area of the City, which is the southwestern portion of the City consisting of the area bounded by Newport Harbor to the north, Ocean Avenue to the west and south, and Carroll Avenue to the east. This area includes the Wellington Avenue tributary catchment (i.e., Catchment 4 as shown on Figure 2.1). Some of the key items noted in this report included the following:

- Field investigations indicated that portions of the sewers in Wellington Avenue, Marchant Street, Houston Avenue, Clinton Avenue, Roseneath Avenue and streets adjoining Marchant Street are susceptible to infiltration of salt water during high tides;
- The report included the preliminary design of five new sewage pump stations at Castle Hill, Harrison Avenue, Moorland Road, Ocean Avenue and Hazard Road; and,
- Removal of excess infiltration and inflow from existing sanitary sewers in the Wellington Avenue and Carroll Avenue tributary systems was recommended.

In the 1986 report to the City, CSO abatement alternatives in the Washington Street area were evaluated. It was noted that although the City has a predominately separated system, infiltration and inflow are significant contributors of flow to the sewerage system. A large portion of the inflow was attributed to connected building roof and yard drains. Evaluation of the effectiveness of removing infiltration and inflow indicated that it would not be cost-effective to remove those sources of I/I. The evaluations were then used to determine the design capacity of the Washington Street CSO Facility, which provides storage and primary treatment of combined sewage flows.

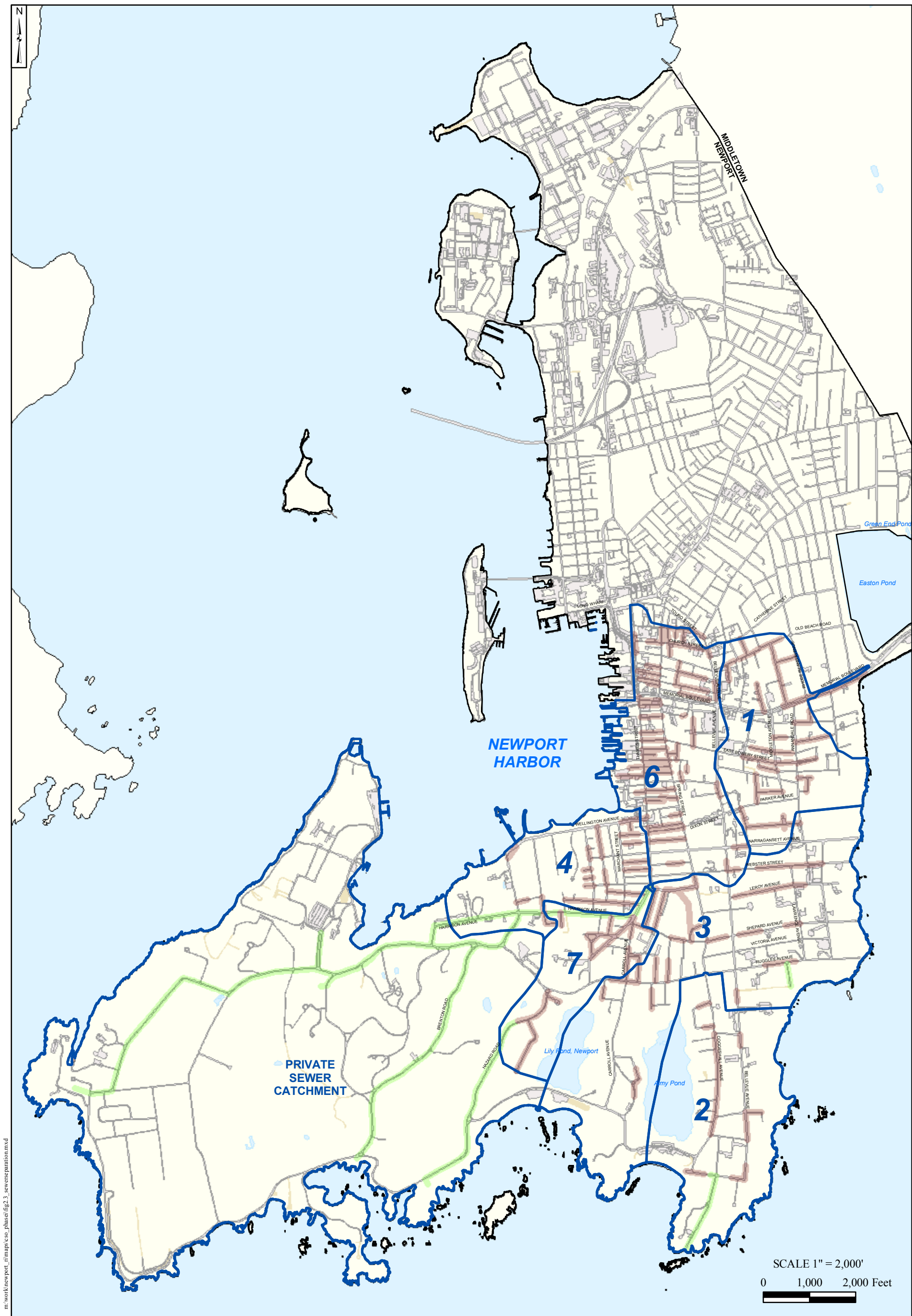


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- LEGEND:**
- Sewer District Boundaries
 - Docks
 - Paved Roads and Parking
 - Unpaved Roads and Parking
 - Sewer Separation: Areas separated by State of RI (Typically after 1979)
 - Areas separated based on review of GIS information
 - Areas separated between 1974 - 1979

FIGURE 2.2
EXTENT OF SEWER SEPARATION
PHASE I PART I CSO CONTROL PLAN



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- LEGEND:
- Sewer District Boundaries
 - Docks
 - Paved Roads and Parking
 - Unpaved Roads and Parking
 - Private Force Mains connecting to Catchment Areas 4 & 7 and Fort Adams Force Main (Catchment Area 8)
 - Sanitary Sewer only

FIGURE 2.3
SANITARY AND PRIVATE SEWERS
PHASE I PART I CSO CONTROL PLAN

In addition, the 1986 Report included a list of known catch basins that were connected to the sanitary sewer. These locations included the following:

- Cherry Street (dead end, tributary to Washington Street CSO Facility)
- Willow Street (dead end, tributary to Washington Street CSO Facility)
- Gladding Court (dead end, tributary to Washington Street CSO Facility)
- Broadway at Friendship Street (tributary to Washington Street CSO Facility)
- Harrison Lane (dead end, tributary to Washington Street CSO Facility)
- Newport Hospital – main entrance and parking lot on Powell Avenue (tributary to Washington Street CSO Facility)
- Findley Place (dead end, tributary to Washington Street CSO Facility)
- Long Wharf (tributary to Long Wharf Pump Station)
- Morton Park (tributary to Wellington Avenue CSO Facility CSO Facility)
- Gidley Street

Earth Tech performed field reconnaissance at these locations, and with the exception of Gidley Street where no catch basins were found, catch basins in these locations remain connected to the sanitary sewer system. It was also noted during the field reconnaissance that storm drains are not close by in these areas.

The 1999 Technical Memorandum No. 1, Baseline Conditions Report, summarized the existing and available information pertaining to the design and operation of the wastewater collection system and CSO treatment facilities, CSO discharge permit requirements, designated receiving water uses, regulatory issues and water quality issues.

With regard to sewer separation, the memorandum noted the following:

- Review of the City's General Sewerage Plan (dated 1988) and the general Drainage Map (revised 1998), reflect that approximately 90% of the sewers are separated from the storm drain system;
- Middletown has a separate wastewater collection system, but is subject to inflow and infiltration;

The 1999 Technical Memorandum No. 3 summarized the operation and maintenance of the Wellington Avenue CSO Facility, evaluated facility treatment performance, and identified recommended improvements to reduce the frequency and volume of CSOs. The Wellington Avenue CSO Facility treats flow from two distinct systems. During dry weather, the facility treats flows from Catchment Area 4, which consists of 185 acres (see Table 2.1). These catchments were depicted in Figure 2.1, and the areas of each catchment are presented in Table 2.1. During wet weather events, when the capacity of the Thames Street Interceptor is exceeded (3 mgd, flow is regulated by an inverted weir plate), flow is diverted to the facility either directly via the diversion structure at the intersection of Thames Street and Wellington Avenue and/or by surcharging and backflow of the Thames Street Interceptor downstream from the diversion structure, from the following catchments:

TABLE 2.1
TRIBUTARY CATCHMENTS TO WELLINGTON AVENUE CSO FACILITY

Catchment	Area (Acres)
1	223
2	288
3	516
4	185
5	Wave Avenue Pump Station
6	271
7	143
Total	1626

It should be noted that “Catchment Area 5”, shown in the table accounts for the tributary wastewater flow from Middletown’s Wave Avenue Pump Station and is not geographically tributary to the Wellington Avenue CSO Facility. Review of the table indicates that the wet weather catchment (1,626 acres) is approximately 9 times the size of the dry weather catchment (185 acres). Past engineering studies and hydraulic analyses (1986 Report) conducted in these catchments indicated that these catchments have been completely separated by installing new storm drain and converting the combined sewer to a sanitary sewer. In areas where rain leaders and yard and roof drains are prevalent, Earth Tech recommends testing to determine if these drains were disconnected from the combined sewer and reconnected to the new storm drain or

permitted to flow else where (i.e. ground discharge or dry well). In addition, sewer modeling performed as part of the 1986 report indicated that flows in the pipelines following a wet weather event were high for an extended period of time indicating inflow from basement sump pumps.

Initial evaluations of the Wellington Street area conducted as part of Technical Memorandum 3 suggested that total sewer separation with infiltration/inflow removal appeared to be a more cost effective and less environmentally disruptive alternative to retention/detention storage and outfall relocation alternatives. The retention/detention alternative was considered less attractive due to land requirements and associated long term operation and maintenance costs. Outfall relocation would be difficult from a regulatory permitting perspective as well as being cost prohibitive to relocate an outfall to a less sensitive area. Recommendations in the technical memoranda included addressing infiltration/inflow reduction in a phased approach for the long-term control of CSOs within the City.

2.1.4 Recent System Improvements

In 2003, the City completed the following capital improvements to the Wellington Avenue CSO Facility and Narragansett Avenue Storage Conduit:

- Installation of chlorine residual analyzers and SCADA and telemetry improvements;
- Installation of fine (0.25-inch clear spacing) mechanically cleaned bar screens to replace existing coarse screening equipment;
- Pump improvements at the Wellington Avenue CSO Facility; and
- Installation of a new knife gate valve, electric motor actuator and automated level controls and telemetry for the Narragansett Avenue Detention Sewer.

These upgrades have improved the functionality of the Wellington Avenue CSO Facility and the Narragansett Storage Conduit such that the frequency and volume of CSOs have been reduced. This is further discussed in Chapter 4.