5.0 CONCLUSIONS AND RECOMMENDATIONS

The Phase 1 Part 1 CSO Control Plan for the Wellington Avenue CSO Facility included the following:

- Review of existing information relative to Newport's sewer system and CSO facilities and as well as the levels of sewer separation;
- Flow and rainfall data collection to prepare estimates of the volume of infiltration and inflow generated by its tributary catchments;
- Manhole inspections and line lamping to assess the condition of the Thames Street Interceptor;
- Development of the scope and cost of the sewer system evaluation survey to be performed in priority catchments in the next phase of work; and,
- Evaluation of historical CSO frequency and volume data and control alternatives to reduce CSO volume and frequency at the Wellington Avenue CSO Facility.

The following are the conclusions of Phase 1 Part 1 and the recommendations for Phase 1 Part 2:

1. The Sewer System Evaluation Survey presented on Page 5-2 is recommended in the priority catchments to identify infiltration and inflow sources. Identification of these sources is critical to develop the appropriate sewer system rehabilitation program to reduce infiltration and inflow to the City's sanitary sewers. This will directly reduce flow to the Newport Water Pollution Control Plant and reduce the frequency and volume of CSO at the Wellington Avenue CSO Facility. The Scope of the SSES is presented in Table 5.1. The cost estimate for the Sewer System Evaluation Survey was presented in Chapter 4, Table 4.5, and is $331,000.

2. Based on the preliminary evaluation of the CSO data and the assessment of CSO control alternatives presented in Chapter 4, removal of 4,000,000 gallons of flow from the tributary catchments to the Wellington Avenue CSO Facility, which include the catchments in Newport as well as the flow contribution from the Wave Avenue Pump Station in Middletown, will potentially reduce CSO frequency at this facility by over 90%.

TABLE 5.1

PHASE 1 PART 2 SEWER SYSTEM EVALUATION SURVEY SCOPE OF WORK PRIORITY CATCHMENTS 1, 3, 4 AND 7

SSES Activity	Quantity	Priority Catchments	Purpose
Flow Isolation	71,000 feet of sewer	3, 4 and 7	Identify sewer segments with high levels of infiltration
Cleaning and Television Inspection	35,500 feet of sewer	3, 4and 7	Identify infiltration sources within sewer segments with high infiltration
Manhole Inspections	388	3, 4 and 7	Identify infiltration sources such as leaks in manhole walls and floor
Building Inspections	2,008	1, 3 and 4	Identify inflow sources such as sump pumps, area drains and roof drains
Smoke Testing	90,000 feet of sewer	1, 3 and 4	Identify inflow sources such as sump pumps, area drains and roof drains
Dye Testing	90	1, 3 and 4	Verify suspect sources identified by building inspections and smoke testing

3. As discussed in Section 4.1.2, the flow metering results for Catchment Area 6 were inconclusive with respect to determining the inflow contribution to the sewer system. Further field investigation, consisting of additional flow metering in Catchment Area 6, is recommended as part of the Phase 1 Part 2 SSES to determine the infiltration and inflow contribution to the sewer system from this catchment. The cost to perform the flow metering is $12,000.

4. Review of the manhole and line lamping inspections of the Thames Street Interceptor are presented in Chapter 3. Since the Thames Street Interceptor is one of the most critical conveyance conduits in the Newport sewer system, more detailed field investigation of the pipeline and its connecting sewers is warranted to provide the necessary data to develop a rehabilitation plan to ensure its long term reliability. Closed circuit televising of the interceptor will provide the information necessary to assess the structural condition of the pipe, evaluate appropriate rehabilitation alternatives and to develop appropriate rehabilitation strategies. The unit cost to light clean and televise the Thames Street Interceptor is $3/LF. Based on a total length of

approximately 6,200 feet, the cost to light clean and televise the Thames Street Interceptor is approximately $19,000.

5. It is recommended that the City implement sewer use regulations that include the requirement that any community, such as Middletown, or private users such as the Newport Naval Station or the Fort Adams area that contribute wastewater flow to Newport's sewer system develop and implement programs to identify and eliminate extraneous infiltration and inflow sources from their systems.

6. As noted in the review of the results of the analysis of the flow metering data, the flow discharged from Middletown's Wave Avenue Pump Station during wet weather is significant. Review of the flow metering data indicates that the flows from the tributary collection system to the pump station increase during wet weather. Review of the flow metering data indicated that dry weather flows of 3 to 4 mgd increase by 2 to 3 mgd during wet weather. It is clear that infiltration and inflow reduction by the Town of Middletown are warranted to reduce its impact on the conveyance capacity of the Thames Street Interceptor. The high flows discharged to the Thames Street Interceptor cause sewer system surcharging, which results in backflow to the Wellington Avenue diversion structure which in turn, impacts CSO volumes. It is recommended that RIDEM and the Town of Middletown develop an appropriate program to reduce inflow and infiltration discharges to the City of Newport.

7. As noted in Chapter 2, review of existing information indicated that field investigations performed by others, prior to the investigations in this study, indicated that catch basins were connected to the sanitary sewer system in the following locations:

   - 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); and,

- Morton Park (tributary to Wellington Avenue CSO Facility CSO Facility).

Field investigations performed by Earth Tech as part of this study indicated that 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. As part of the Phase 1 Part 2 investigations, it is recommended that further field investigations of these areas be performed and that a preliminary design plan to separate flows from these catch basins from the sanitary sewer system. Use of catch basins at the foot of a slope in lieu of catch basins along an entire street as well as the use of dry wells or other means of infiltrating runoff will be considered on a case-by-case basis as an alternative to help the City meet its storm water management goals. A cost benefit analysis of the different methods will weigh the potential benefits of extended time of concentration and detention of surface water in gutters and existing streets and/or infiltration versus direct runoff and possible hazards created by maintaining runoff on the ground surface (i.e. icing, ponding, etc.). In addition, it is recommended that windshield surveys of the streets presently served by a sanitary sewer only in Catchments 1, 2, 3, 4, 6 and 7, as shown in Figure 2.3, be performed to identify other locations where catch basins may be directly connected to the sanitary sewer. The estimated cost to perform this work is $40,000.

8. The evaluations presented in Chapter 4 were based on the results of the flow metering program conducted in March through May 2005 and evaluation of CSO data collected at the Wellington Avenue CSO Facility from 1998 through 2005. Assumptions were made with regard to system capacity, flow reduction, and the impact of control alternatives to reduce the frequency and volume of CSO. The development of a hydraulic model of the City's entire collection system, including the sewers, pump stations, and CSO facilities, will be required at some point to accurately establish the system's baseline flow conditions and response to wet weather with regard to CSO events at each of the CSO facilities. It also will provide a tool to assess the effectiveness of CSO control alternatives with regard to the frequency and volume of CSO using both historical long term rainfall data and design storms such as the 1-year 6 hour storm required by RIDEM CSO Policy. As a first step for the development of a system wide hydraulic model for the City, the following activities are recommended to be performed as part of Phase 1 Part 2:

Review of available plans, perform field inspections to collect and verify data, and input sewer system attribute information into the GIS for use with the hydraulic model. The cost estimate for this activity is $50,000 and includes the cost to perform 400 sanitary manhole inspections to collect field data; and,

- Evaluation and selection of the most appropriate hydrologic/hydraulic model. The estimated cost for this activity is $15,000.

5.1 PHASE 1 PART 2 CSO CONTROL PLAN COST ESTIMATE

The estimated costs for the recommended Phase 1 Part 2 Program are summarized in Table 5.2.

TABLE 5.2

PHASE 1 PART 2 CSO CONTROL PLAN COST ESTIMATE

Recommendation	Phase 1 Part 2 Activity	Estimated Cost
1, 3	Priority Catchment Sewer System Evaluation Survey (includes Catchment Area 6 flow metering)	$331,000
4	Closed Circuit Television Inspection of the Thames Street Interceptor	$19,000
7	Field Investigations and Development of Preliminary Design of Separation Plans for Existing Catch Basins Connected to the Sanitary Sewer System	$35,000
7	Windshield Survey of Streets with Sanitary Sewer Only in Catchment Areas 1, 2, 3, 4, 6 and 7 to Identify Potential Connected Catch Basins	$5,000
8	Review Plans, Perform Field Investigations, and Input Sewer System Attribute Information into GIS	$50,000
8	Model Evaluation and Selection	$15,000
N/A	Preparation of the Phase 1 Part 2 CSO Control Plan Report: • Evaluations of Work Noted in Above Recommendations • Development of Recommendations and Scope of Work for Phase 2 CSO Control Plan	$50,000
N/A	Project meetings with the City of Newport, City Council, and RIDEM	$15,000
	Total	**$520,000**

5.2 PHASE 1 PART 2 CSO CONTROL PLAN IMPLEMENTATION SCHEDULE

The implementation schedule for the Phase 1 Part 2 Program is presented in Table 5.3.

TABLE 5.3

IMPLEMENTATION SCHEDULE FOR PHASE 1 PART 2

Activity	Schedule
Field program initiation, coordination and notifications	January - February 2006
Preparation of model evaluation and selection technical memorandum	January - February 2006
GIS Update: Review plans, perform field investigations and input sewer system attribute information into GIS	January 2006 - April 2006
Field investigations and development of separation plans for existing catch basins and windshield surveys of Catchments 1, 2, 3,4, 6, and 7	January 2006 - April 2006
Flow isolation, CCTV and manhole inspections (high groundwater activity)	March - April 2006
Catchment Area 6 flow metering	March - April 2006
Prepare and submit Technical Memorandum presenting the results and evaluation of the flow isolation, CCTV and manhole inspections	May 2006
Prepare and submit Technical Memorandum presenting the results of the GIS Update, Separation Plans, and Windshield Surveys	May 2006
CCTV of Thames Street Interceptor	June 2006
Smoke and dye testing (dry weather activity)	June 2006
Prepare and submit Technical Memorandum presenting the results of the smoke and dye testing	July 2006
Building inspections (dry weather activity)	August - September 2006
Prepare and submit Technical Memorandum presenting the results of the building inspections	October 2006
Prepare and submit Draft Phase 1 Part 2 CSO Control Plan Report	November 2006
City review/comment on Draft Phase 1 Part 2 CSO Control Plan Report	December 2006
Prepare Final Phase 1 Part 2 CSO Control Plan Report and submit to City and RIDEM	January 2007

The above schedule is predicated on certain activities being performed during appropriate weather and groundwater conditions and on prompt review and approval of all submittals by the City of Newport and RIDEM.