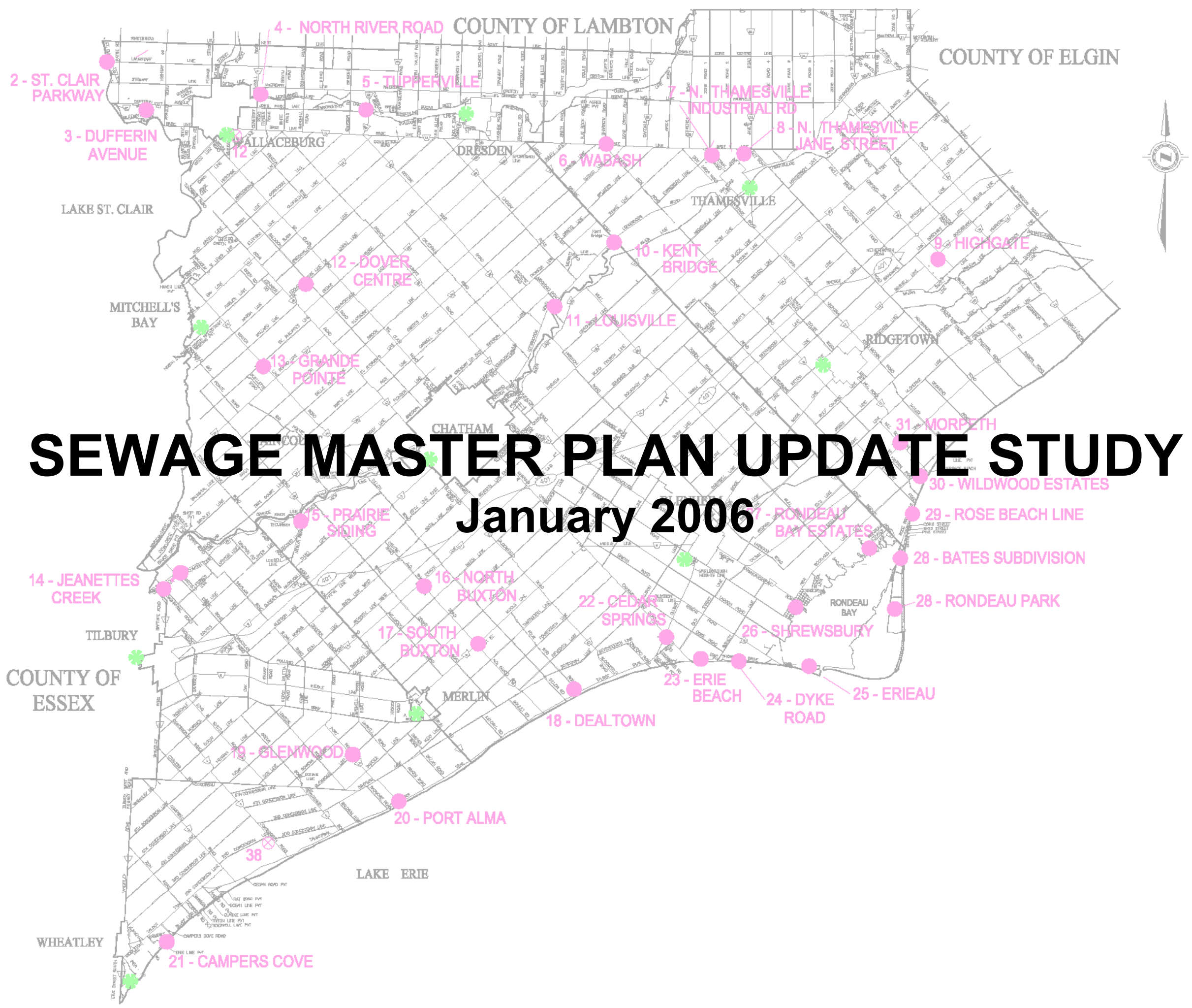
MUNICIPALITY OF CHATHAM-KENT



SEWAGE MASTER PLAN UPDATE STUDY

January 2006

Stantec

TODGHAM & CASE ASSOCIATES INC.

Consulting Civil Engineers

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Prepared for:

Municipality of Chatham-Kent

Prepared by:

Stantec Consulting Ltd.
&
Todgham & Case Associates Inc.

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Executive Summary

The Municipality of Chatham-Kent completed the Water and Wastewater Master Plan in May 2000. The Master Plan contained recommendations for expansions and upgrades to existing water and sewage infrastructure and outlined a schedule for implementing these improvements. A number of these projects have been undertaken and are in various stages of development. The Master Plan also identified several rural areas that lacked reliable water supplies and sewage systems and therefore required further study to identify and evaluate servicing options. This study was undertaken for the Chatham-Kent Public Utilities Commission (PUC) and considers options for providing sewage service to thirty-one rural areas which are shown on Figure 1 in Appendix B. Sewage systems for these rural areas would be constructed only to address current environmental situations. These areas are known to have malfunctioning septic tank systems that are contributing to pollution of the municipal stormwater drainage systems and natural watercourses. The rural areas included in this study were identified on the basis of previous reports of beach closures and failures of septic systems, together with the results of a strategic sampling program. The PUC retained Stantec Consulting Ltd. in association with Todgham & Case Associates Inc. to carry out the study and report.

A strategic sampling program was developed as part of the study and undertaken by the municipality to verify existing pollution in roadside ditches, municipal drains, and storm sewers. Forty-two samples were collected from twenty-one areas between April 27 and May 13, 2004 and laboratory analyses of these samples confirmed the presence of fecal contamination. The results of the sampling program are summarized in Table 1 in Appendix A.

In order to determine the preliminary requirements for sewage service to the identified areas, it was necessary to undertake several tasks. The physical boundaries of the area were established and the designated land use and development potential were determined from the Official Plan, The existing and projected 20-year populations were determined for each area. The corresponding sewage flows were calculated to establish the required capacities for sewers, pumping stations and treatment facilities. The population and flow projections are summarized in Table 2. Design criteria for sewage collection systems and treatment facilities were taken from Ministry of the Environment Guidelines.

Various options for sewage collection systems and treatment facilities were reviewed. Servicing options for each of the identified areas were identified and summarized in Table 3 in Appendix A. Preliminary layouts of sewage collection systems including pumping stations and forcemains were developed for each area. These are shown in Figures 2 to 35 inclusive in Appendix B. Cost estimates for sewage collection systems, transmission systems, and treatment facilities are provided in Tables 5 to 10 inclusive and in Charts 1 & 2. The estimated costs of the servicing options for each rural area are summarized in Table 11.

The estimated homeowner costs shown in Table 11 indicate that servicing the rural areas is very costly. Funding assistance from senior levels of government should be explored before undertaking the projects.

In reviewing the costs in Table 11, it appears that servicing an isolated or remote rural community by connecting to an existing municipal system is the most cost-effective option. However, it should be noted that there would be additional costs associated with an expansion of the existing treatment facility to accommodate the additional sewage flows. Certainly, when the Class Environmental Assessment (Class EA) is undertaken for the individual projects, the total costs including collection and treatment will become more evident. This would apply to Tupperville, Highgate, Kent Bridge, Louisville, Jeanette’s Creek, Camper’s Cove, North Buxton, South Buxton, and perhaps Dealtown. It has been reported that Dover Centre and Grande Pointe will eventually connect to the Pain Court system.

The cost of providing sewage collection and treatment through a communal system may be prohibitive for the smaller communities. On site systems may turn out to be the most cost effective but not necessarily the most environmentally suitable option. The communities of Wabash, Prairie Siding, Glenwood and Port Alma may fall into this category.

For suburban residential areas that have relatively convenient access to existing municipal sewage facilities, the obvious choice is an extension of the existing municipal sewage collection system to accommodate the suburbs. These areas would include St. Clair Parkway, Dufferin Avenue and North River Road which are effectively in the Wallaceburg suburbs. Similarly, Industrial Road and Jane Street are suburbs of Thamesville.

The communities in the Erie Beach area may benefit from an area scheme that would include Cedar Springs, Erie Beach, Dyke Road, Erieau, Shrewsbury and possibly Dealtown with the sewage directed to a single new treatment plant. A suggested site for the treatment plant is near Bisnett Road. This location is approximately 2 km downstream from the existing Chatham water treatment plant intake. Alternatively, the sewage from these communities could be directed to the existing treatment facilities in Blenheim. Further investigation of these alternatives would be undertaken during a Class EA.

Similarly, the communities in the Rondeau Bay area, including Rondeau Bay Estates, Bates Subdivision, Rose Beach Line, Morpeth and perhaps Rondeau Provincial Park and Wildwood Estates could be serviced by an area scheme with a new treatment plant located near McKinlay Road. Alternatively, the sewage could be directed to the existing treatment facilities in Ridgetown. Again, the evaluation of these alternatives would be undertaken during a Class EA.

MUNICIPALITY OF CHATHAM-KENT
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CHAPTER 1.0 INTRODUCTION

1.1 TERMS OF REFERENCE

This study was undertaken for the Chatham-Kent Public Utilities Commission (PUC) and considers options for providing sewage service to selected rural communities within the Municipality of Chatham-Kent. The PUC retained Stantec Consulting Ltd. in association with Todgham & Case Associates Inc. to carry out the study and report.

The information provided by this study will enable Chatham-Kent to prioritize rural area sewage projects, identify budget requirements, and integrate them with other projects in the long term planning for Chatham-Kent.

Initially, twenty-three service areas were identified by the PUC for the study and upon further review, a total of thirty-one areas were included. The identified areas are currently serviced with individual septic tank systems, many of which are quite old and no longer functioning properly. As a result, these systems are contributing to pollution of roadside ditches and municipal drainage systems, groundwater and beaches. The study included the development of a strategic sampling program that was implemented by Chatham-Kent to verify the level of pollution that previous investigations and reports had indicated in many of the identified areas.

1.2 BACKGROUND

In 1998 the City of Chatham and 22 other municipalities in the County of Kent were amalgamated to form the Municipality of Chatham-Kent. One of the initial steps taken by the new municipality was the development of the Water and Wastewater Master Plan (Master Plan) that was completed in May 2000. A number of environmental concerns were raised by area residents during public information sessions held in eight separate communities throughout the municipality during the preparation of the Master Plan. Comment forms received from community residents referred to the need for safe and reliable water supplies and the health risks from malfunctioning septic tank systems. The Master Plan refers to these and other documentation concerning the risks to groundwater supplies of contamination from individual septic systems, oil and gas drilling and agricultural operations.

The Master Plan contained recommendations for expansions and upgrades to existing water and sewage infrastructure and outlined a schedule for implementing these improvements. A number of these projects have been undertaken and are in various stages of development. The Master Plan also identified several rural areas that lacked reliable water supplies and sewage systems and therefore required further study to identify and evaluate servicing options.

The Municipality developed the Chatham-Kent Community Strategic Plan in 2001 that covered a broad range of community initiatives. The Municipality is currently in the process of developing a New Official Plan as a tool for implementing the Community Strategic Plan and to manage the community growth. The proposed Official Plan was approved by Council on January 10, 2005. For purposes of this study, reference to the Official Plan means the proposed Official Plan.

In November 2002, the Municipality completed the Community of Chatham-Kent Sewerage System Study that outlined a phased sewerage system development plan to accommodate future growth in Chatham, the largest urban centre in the community.

The aforementioned documents provided guidance for this study in evaluating servicing options in the rural areas. For purposes of this report, the terms wastewater and sewage are used interchangeably. This report includes preliminary information regarding the options for collection and treatment of wastewater in the selected rural areas and the estimated costs to implement these options. The construction of communal sewage collection systems together with new, expanded and upgraded treatment facilities will address the public concerns regarding protection of the environment and particularly the sources of drinking water.

In 2003, the Ontario government formed two committees to advise the province on planning and implementation for source water protection. The Technical Experts Committee was established to provide advice on a process for assessing threats to sources of drinking water, and the Implementation Committee was established to recommend strategies to implement and fund source protection. These committees have submitted reports to the government containing numerous recommendations. Draft drinking water source protection legislation, released to the public by the Ministry of the Environment in June 2004, proposes legislative provisions necessary for the development of source protection plans. The forthcoming Drinking Water Source Protection Act and its Regulations are expected to address all aspects of source water protection including planning implementation and funding.

It is anticipated that this report will be useful in preparing for the new legislation on source water protection. It will also be an important document with respect to applications for funding assistance from senior levels of government.

It should be noted that this report provides an overview of the options for sewage service for the identified areas and preliminary estimates of the cost of these options. Further detailed studies will be necessary prior to undertaking any of the projects.

1.3 SERVICE AREAS

Thirty-one service areas were identified for consideration in this study. The service area boundaries were selected for study purposes only and do not imply that development will be permitted everywhere within the boundary. Development will be dictated by the Official Plan policies. The service areas were included in the study for several reasons but primarily because these areas are known to have many old and malfunctioning septic tank systems that are suspected of contributing to pollution in roadside ditches and municipal drainage systems. Also, the Official Plan indicates that limited development will be permitted in these areas subject to the provision of suitable water and sewage systems.

The communities of Pain Court and Bothwell are not currently serviced by communal sewage systems but have not been included in this study. At the time of preparation of this report, a sewage system is under design for Pain Court that will included sanitary sewers with pumping facilities and a sewage forcemain to discharge sewage to the Chatham sewage system. With respect to Bothwell, a Class Environmental Assessment for sewage works is in progress.

Figure 1, Key Plan shows the location of the thirty-one service areas which are identified as follows:

- St. Clair Parkway (Northwest of Wallaceburg)
- Dufferin Avenue (West of Wallaceburg)
- North River Road (East of Wallaceburg)
- Tupperville
- Wabash
- North Thamesville-Industrial Road
- North Thamesville-Jane Street
- Highgate
- Kent Bridge
- Louisville
- Dover Centre
- Grande Pointe
- Jeanette's Creek
- Prairie Siding
- North Buxton
- South Buxton
- Dealtown
- Glenwood
- Port Alma

- Camper's Cove at Wheatley
- Cedar Springs
- Erie Beach
- Dyke Road (Erie Shore Drive between Erie Beach & Erieau)
- Erieau
- Shrewsbury
- Rondeau Bay Estates
- Rondeau Park
- Bates Subdivision (east of Rondeau Park)
- Rose Beach Line (east of Bates Subdivision)
- Wildwood Estates
- Morpeth

CHAPTER 2.0 STRATEGIC SAMPLING PROGRAM

2.1 DEVELOPMENT OF PROGRAM

The strategic sampling program was developed through discussions and meetings attended by representatives from the Consultants, PUC, and Chatham-Kent Departments of Engineering, Public Works, Building, Health and Drainage. A sampling protocol was established that included procedures, data to be gathered and the extent of laboratory analyses required. Service area boundaries were established and sampling locations were identified for the selected service areas. For the most part, samples were collected from roadside ditches, municipal drains, catch basins and storm drainage outlets.

2.2 IMPLEMENTATION

Forty-two samples from twenty-one areas were collected by Chatham-Kent Public Utilities Commission and Engineering staff between April 27 and May 13, 2004. The samples were analyzed by PSC Analytical Services in London. (PSC has since merged with Maxxam Analytics Inc.).

2.3 RESULTS

The sample locations, field notes and observations, and the results of the laboratory analyses are shown in Table 1.

The laboratory analyses include 5-day Biochemical Oxygen Demand (BOD_5), Suspended Solids (SS), Total Phosphorus (P), Fecal Streptococci, and Fecal Coliforms.

BOD is the amount of oxygen needed by bacteria and other microorganisms to decompose organic matter in water. The greater the BOD, the greater the degree of pollution. Biochemical oxygen demand is a process that occurs over a period of time and is commonly measured for a five-day period, referred to as BOD_5. The BOD_5 in the samples collected for this study ranged from <2 to 1,080 mg/l. Typically, domestic sewage has a BOD_5 ranging from 100 to 300 milligrams per litre (mg/l)

Suspended Solids are small particles of solid pollutants that resist separation by conventional methods. SS (along with BOD) is a measurement of water quality. The SS in the samples ranged from <5 to 35,990 mg/l. Suspended Solids in domestic sewage typically range from 150 to 300 mg/l.

Total P is the total concentration of phosphorus. Phosphorus is a nutrient and acts as a fertilizer, increasing the growth of plant life such as algae. Total P in the samples ranged from 0.02 to 4.49 mg/l. Domestic sewage typically has Total P levels ranging from 4 to 10 mg/l.

All samples exhibited some degree of fecal contamination. Members of two bacteria groups, coliforms and fecal streptococci, are used as indicators of possible sewage contamination because they are commonly found in human and animal feces. Although they are generally not harmful themselves, they indicate the possible presence of pathogenic (disease-causing) bacteria, viruses, and protozoans that also live in human and animal digestive systems. Therefore, their presence in streams suggests that pathogenic microorganisms might also be present and that swimming and eating shellfish might be a health risk. Since it is difficult, time-consuming, and expensive to test directly for the presence of a large variety of pathogens, water is usually tested for coliforms and fecal streptococci instead. Sources of fecal contamination to surface waters include wastewater treatment plants, on-site septic systems, domestic and wild animal manure, and storm runoff. A potential health hazard exists if the fecal coliform count exceeds 100 per 100 ml.

Total coliforms are a group of bacteria that are widespread in nature. All members of the total coliform group can occur in human feces, but some can also be present in animal manure, soil, and submerged wood and in other places outside the human body. Thus, the usefulness of total coliforms as an indicator of fecal contamination depends on the extent to which the bacteria species found are fecal and human in origin. Water quality is considered impaired when the total coliform count exceeds 1000 per 100 ml. For recreational waters, total coliforms are no longer recommended as an indicator. For drinking water, total coliforms are still the standard test because their presence indicates contamination of a water supply by an outside source. Fecal coliforms, a subset of total coliform bacteria, are more fecal-specific in origin.

Fecal streptococci generally occur in the digestive systems of humans and other warm-blooded animals. Fecal streptococci can best be used in conjunction with the fecal coliforms as an indication of the nature of the potential fecal source. If the ratio of fecal coliforms to fecal streptococci exceeds 4, the source of the discharge is likely to be human in origin. For reliable ratio data, the fecal coliform density should approach or exceed 100 per 100 ml.

CHAPTER 3.0 DESIGN CONSIDERATIONS

3.1 POLLUTION

The existence of pollution in roadside ditches and municipal drainage systems as determined from sampling programs is a most important factor in considering communal sewage collection and treatment systems in the rural areas identified in this study. Public health records of failing septic tank systems and beach closures are also important considerations. These sources of information were reviewed to establish the need for municipal sewage systems.

3.2 LAND USE

The Official Plan notes that the community structure of Chatham-Kent comprises an Urban component and a Rural component. The Urban component includes Primary Urban Centres, Secondary Urban Centres, Suburban Residential Areas, Hamlet Areas and Rural Settlement Areas. The Rural component includes Agricultural Areas, Estate Residential Areas, Recreational Residential Areas, Recreational Areas, Rural Industrial, Highway Commercial and Aggregate Resource Areas. The Official Plan further notes that the majority of new population and employment growth in Chatham-Kent will be directed to the Primary Urban Centres. Some new population and employment growth will also take place in Secondary Urban Centres which are served by full municipal services. Growth in Hamlets that are serviced by municipal piped water supply and private sanitary sewage will be through infilling and/or rounding out of existing development areas. In the privately serviced Rural Settlement Areas, development will be limited to infilling.

The service areas included in this study fall into several land use designations including Suburban Residential Areas, Recreational Residential, Hamlet Areas and various Rural Settlement Areas. The land use designation for each service area is identified later in this report. This designation is significant in establishing the projected growth in the individual areas and in determining sewage servicing boundaries and sewage treatment capacity requirements.

3.3 POPULATION

Population figures for many of the selected service areas are not on record because the areas have previously been included as part of a larger municipal unit such as a township or hamlet. Accordingly, census data applicable solely to some of the service areas is not readily available. Where available, population figures previously recorded for established communities such as Shrewsbury, Erieau, etc were used in this study. In other cases, the existing population of the service areas was determined by counting dwellings from Chatham-Kent aerial photography files and applying 2.5 persons per dwelling.

The projected 20-year population in the service areas was determined by applying a growth rate of 1% per year to the existing population. This is consistent with the growth rates utilized in the development of the Water and Wastewater Master Plans Study, Volume 1, May 2000. Although this growth projection is slightly higher than the subsequent growth projections prepared for the Official Plan, it is considered suitable for purposes of this study. Due to the growth limitations imposed by the Official Plan and the limited available space for growth in some of the service areas, the projected 20-year populations will approximate full development in many of these service areas. Table 2 shows the existing and projected 20-year populations for the service areas in this study.

3.4 SEWAGE FLOW

3.4.1 Average Daily Flow

The projected 20-year average daily sewage flow for each service area was determined by multiplying the 20-year population by 280 litres/person/day as suggested in the Master Plan.

Average daily infiltration and inflow (I/I) was determined by multiplying the 20-year population by 90 litres/person/day. This figure is taken from the Ministry of the Environment (MOE) Design Guidelines for Sewage Works.

The total 20-year average flow is the sum of the sewage flow plus the I/I.

3.4.2 Peak Daily Flow

The projected 20-year peak daily sewage flow was determined by applying the Harmon Formula to the average daily sewage flow in accordance with MOE Guidelines.

Peak I/I was determined by multiplying the 20-year population by 225 litres/person/day in accordance with MOE Guidelines.

The peak daily flow is the sum of the peak daily sewage flow plus the peak I/I.

Table 2 shows the average and peak flows for each service area.

3.5 SEWAGE COLLECTION SYSTEM

Based on the projected 20-year peak sewage flows for the service areas, conventional gravity sewers will generally be 200 mm diameter in accordance with minimum sizes established by MOE Guidelines. The capacity of a 200 mm diameter sewer at the minimum gradient of 0.40% is approximately 1,900 cubic meters per day (m^3/d). The preliminary sewage collection system layouts proposed for the service areas are intended to service existing development as well as projected growth within the service area boundary. Sewers have not been included in currently undeveloped parts of the service area since it is more practical to extend the proposed sewers when necessary. In most cases, the proposed 200 mm diameter sewers will have adequate capacity to service the growth within the defined service area. In general, the preliminary sewer layouts are based on a minimum sewer depth of 1.8 meters and maximum depth of 6.7 meters.

These depths are subject to reduction where poor soil and groundwater conditions are expected.

Where the topography is generally flat, the selected sewer depths and gradients will establish a spacing of approximately 1,225 meters for pumping stations unless stream crossings or other obstacles are encountered. The availability of a suitable site for the pumping station can also affect the spacing. Pumping stations would be designed with two submersible pumps (one duty and one standby) housed within a 3-meter diameter circular precast concrete underground wet well. Requirements for standby power at the pumping stations will depend on sewer system hydraulics and the reliability of the local power distribution system. If the circumstances are appropriate, a trailer-mounted generator set can be transported to the pumping station site as required.

Based on MOE Guidelines, forcemains would be designed for minimum and maximum flow velocities of 0.8 and 2.4 meters/sec respectively. For the range of peak sewage flows from the service areas in this study, the forcemain diameters will range from 50 mm to 150 mm. For long forcemains, there may be a need for chemical additions to control the possible formation of hydrogen sulphide and the associated odors. The forcemain should be placed into operation before any chemical system is provided to determine whether or not an odor problem has developed and to allow experimentation with different chemicals and dosages to determine the optimum solution.

3.6 SEWAGE TREATMENT

In most cases, the preferable sewage treatment option is to discharge sewage from the service area to the nearest available municipal sewage system. However, where this is not practical or cost-effective, a new communal treatment facility or individual on-site treatment systems may be warranted.

For very small service areas where discharge to an existing sewage system or construction of a new treatment facility is very costly, there will be a need for special criteria covering the replacement of on-site systems especially on small lots with inadequate space for replacement of systems to current regulations.

Where the feasibility of a new treatment facility is considered, effluent quality criteria will be very stringent because the receiving body for the effluent in most cases will be a small creek or municipal drain with little or no flow to assimilate the effluent except during wet weather.

In those cases, the design parameters for sewage treatment would be based on typical domestic sewage characteristics and effluent quality criteria as shown in the following table.

Item	**Raw Sewage**	**Effluent**	**Monthly Average Non-Compliance**
BOD	200	5	10
Suspended Solids	200	5	10
Total Phosphorus	8	0.3	0.5
TKN	30		
NH_3-N	20	Freezing 2.0	3.0
		Non-freezing 1.0	1.5
Chlorine Residual		0	0.01
E Coli		150/100ml	200/100ml
D.O.		>5.0	-
Temperature	8°C winter 24°C summer		

Should further consideration be given to the concept of area treatment facilities to accommodate the service areas in the vicinity of the Lake Erie shoreline, a Class Environmental Assessment would be required to evaluate the merits of effluent discharge to a local stream versus effluent discharge through an outfall pipe into Lake Erie.

CHAPTER 4.0 SEWAGE COLLECTION SYSTEM OPTIONS

4.1 CONVENTIONAL GRAVITY SEWERS

Conventional gravity sewers have proven to be reliable and require minimal maintenance. They are a preferred alternative where soil and groundwater conditions are favorable and dwellings requiring service are relatively close together. The minimum size of pipe for conventional gravity sewers is 200 mm diameter to facilitate sewer-cleaning equipment. PVC is the most common pipe material for gravity sewers up to 450 mm diameter. Conventional gravity sewers were considered for all the service areas in this study.

4.2 LOW PRESSURE SEWERS

Low pressure sewers are small diameter pipelines installed relatively shallow and following the ground surface profile. Typical main diameters are 50 mm to 150 mm and PVC is the usual piping material. Sewage from individual dwellings is discharged to the pressure sewer mainline with a grinder pump through a 25 to 38 mm diameter PVC service line. A check valve on the service line prevents backflow and a redundant check valve is included at the pumping unit. Isolating valves and cleanouts are required throughout the sewer system to facilitate maintenance. Air release valves are also required at high points in the system.

Low pressure sewers were considered only in selected service areas because most of the advantages of low pressure sewers are gained only in special circumstances. For example, in areas where dwellings are close together and underground utilities and other services are in place, the installation of low pressure sewers faces the same difficulties of interference from utilities and storm drains as would be encountered during installation of gravity sewers. In addition, low pressure sewers must be installed at a minimum depth of 1.5 m to provide sufficient cover to protect against frost damage. Unless there are difficult soil and groundwater conditions, which would make deeper installation of gravity sewers considerably more costly, low pressure sewers have few other advantages. In addition, the supply and installation of grinder pumps presents problems of access to private property unless the onus is placed on the property owner to undertake the installation and maintenance of the pump. This can be unattractive to the property owner. For these and other reasons, low pressure sewers were considered in only a few service areas where conditions appeared to justify consideration.

4.3 VACUUM SEWERS

A vacuum sewer system consists of three major components: the services, the collection piping, and the vacuum station. The principles of operation of a vacuum sewer system involve a complex two-phase system.

Sewage flows by gravity from the dwelling to a holding tank/valve pit located at the property line and connected to the collection system through a vacuum valve. When the sewage reaches a preset level in the holding tank, the vacuum valve opens to allow the sewage to be drawn into the collection system which is under vacuum conditions. When the tank is emptied the vacuum valve closes.

The collection system usually consists of 100 and 150 mm diameter PVC piping installed in a vertical sawtooth pattern that generally follows the ground surface contours.

The vacuum station is the heart of the vacuum sewer system. The equipment in the station includes a collection tank, a vacuum reservoir tank, vacuum pumps, sewage pumps, pump controls and an emergency generator.

Vacuum sewers were not considered for any of the selected areas. Like low pressure sewers, vacuum sewers have the advantage of shallow installation where soil and groundwater conditions are difficult. However, the pipe must be installed at minimum depth of 1.5 meters and the installation faces the same difficulties of interference with existing underground utilities and storm drains as is experienced with other sewer systems. Vacuum sewer pumping stations are more complex and expensive than gravity sewer pumping stations. There is little local experience with the construction and operation of vacuum systems.

4.4 SMALL DIAMETER GRAVITY SEWERS

Small diameter gravity sewers are used in conjunction with interceptor tanks and pumps to discharge the tank effluent to the sewer. Such an arrangement is referred to as a STEP (Septic Tank Effluent Pumping) system. Since the solids have been removed from the sewage by settlement in the interceptor tank, pipe sizes and slopes can be substantially reduced. Regular removal and disposal of the solids from the interceptor tanks is required. Small diameter gravity sewers were not considered for this study although there may be justification for reviewing this alternative during a Class EA Phase 3 evaluation. In particular, a STEP system may have some benefit along Dyke Road and some of the lakeshore properties in Erie Beach where the elevation of the properties is somewhat lower than the roadway.

CHAPTER 5.0 SEWAGE TREATMENT OPTIONS

5.1 ON SITE TREATMENT

For purposes of this study, on site systems are septic tank systems or aerobic treatment systems, both of which discharge the effluent into the subsoil.

A septic tank system includes a tank in which sewage solids settle to the bottom where they undergo anaerobic decomposition, and the oil and grease rises to form a scum layer at the surface and is retained in the tank by a baffle. The liquid that is separated from the solids flows into a leaching bed consisting of rows of perforated PVC pipe bedded in crushed stone. The liquid percolates into the subsoil where it is further treated by soil bacteria. The settled solids and scum must be periodically removed from the septic tank for disposal, usually at a municipal sewage treatment plant.

There are a number of proprietary aerobic systems that are available for on-site treatment of domestic wastewater. Typically the wastewater from the dwelling is pretreated in a settling chamber where solids are removed prior to secondary treatment using the extended aeration process. This process consists of aeration and mixing of the wastewater, usually with diffused air, followed by secondary clarification to separate the biomass from the liquid. Since the effluent quality is better than that from a septic tank, the effluent can usually be discharged on-site to a sand filter bed that has a smaller surface area than a typical leaching bed. Aerobic systems are usually costlier than septic systems and require regular attention and maintenance to ensure proper operation and performance.

On-site systems are the only feasible option where the rural service area is too small to justify a communal system, and too remote from an existing municipal treatment facility. If the existing on-site system has failed, and the lot is not large enough to accommodate current design requirements for on-site systems, consideration can be given to reconstructing the on-site system to the previous standards, recognizing that the system has a limited service life.

5.2 NEW TREATMENT FACILITY

A new treatment facility is considered a treatment option where the service area is large enough to justify a communal system and sufficiently remote from existing municipal systems to make a new treatment facility cost-effective. The capacity and type of new treatment facility will depend, in part, on the projected 20-year population of the service area. Several treatment options must be evaluated to determine the most environmentally suitable and cost-effective treatment system for each service area. This evaluation would be undertaken in Phase 3 of the Class EA process. For purposes of this study, the selected treatment option is a rotating biological contactor (RBC) for capacities up to 1,000 m^3/day and a sequencing batch reactor (SBR) for capacities over 1,000 m^3/day. Previous studies have shown these processes to be very appropriate in the capacity ranges indicated.

The RBC consists of a series of discs mounted on a shaft which is driven so that the discs rotate in a trough at right angles to the flow of settled sewage. The discs are usually made of plastic and are arranged in groups or packs with baffles between each group to minimize surging or short-circuiting. With small units the trough is covered and large units are often housed within buildings to reduce the effect of weather on the active biofilm which becomes attached to the disc surfaces. Smaller RBC units are usually installed in fiberglass reinforced plastic tanks while the larger units are installed in a concrete tank that also serves as the primary clarifier. The surface of the wastewater passing through the tank almost reaches the shaft. This means that about 40% of the total surface area of the disks are always submerged. The shaft continually rotates at 1 to 2 rpm, and a layer of biological growth 2 to 4 mm thick is soon established on the wetted surface of each disc. The biological growth that becomes attached to the disks assimilates the organic materials in the wastewater. Aeration is provided by the rotating action, which exposes the disks to the air after contacting them with the wastewater. Excess biomass is sheared off in the tank, where the rotating action of the disks maintain the biosolids in suspension. Eventually, the flow of the wastewater carries these solids out of the system and into a clarifier, where they are separated. By arranging several sets of disks in series, it is possible to achieve a high degree of organic removal and nitrification. In order to achieve the effluent quality previously outlined in section 3.6, the RBC effluent is directed to a sand filter and the filtered effluent then passes through an ultra violet (UV) disinfection system. In addition, alum storage and feed facilities are required to achieve the necessary effluent quality with respect to Total Phosphorus.

The SBR is a fill-and-draw activated sludge system for wastewater treatment. Wastewater is added to a single “batch” reactor, treated to remove undesirable components, and then discharged. Equalization, aeration and clarification can all be achieved using a single batch reactor. To optimize the performance of the system, two or more batch reactors are used in a predetermined sequence of operations. SBR systems have been successfully used to treat both municipal and industrial wastewater. They are uniquely suited for wastewater treatment applications characterized by low or intermittent flow conditions. Influent wastewater generally passes through screens and grit removal prior to the SBR. The SBR system consists of a tank, aeration and mixing equipment, a decanter, and a control system. The system also includes a UV disinfection system and alum storage and feed facilities for Phosphorus removal.

5.3 EXISTING TREATMENT FACILITIES

There are ten existing municipal wastewater treatment facilities in Chatham-Kent. These facilities range from seasonal discharge facultative lagoons and aerated lagoons with intermittent sand filtration, to modified and conventional activated sludge systems. In addition, there is a sewage treatment plant at the South-West Regional Centre which is not municipally owned. Table 4 shows the location, capacity and flow data relating to the municipal plants as provided by Chatham-Kent. Based on the data in Table 4, all the existing plants currently have residual capacity to accept additional wastewater flows. However, the residual capacity at some of these plants has already been allocated to projected growth in the community. The introduction of additional wastewater flow from rural areas could necessitate an expansion of the treatment facility and perhaps an upgrade in the treatment process. The terms of reference for this study do not include a review of the allocated residual capacity or an evaluation of the merits of expanding and/or upgrading the existing treatment facilities versus the construction of new local treatment facilities to accommodate additional wastewater flow from the rural service areas.

CHAPTER 6.0 REVIEW OF OPTIONS FOR SERVICE AREAS

6.1 GENERAL REVIEW

Each of the service areas was carefully reviewed to identify the most feasible options for providing the area with sewage service. This review included an examination of the classification of the area provided in the Official Plan since this is a factor in determining the future growth permitted in the area. The review also included examination of available information regarding the type and density of existing development, soil and groundwater conditions, local topography, and the proximity to existing municipal sewage systems. All the areas are serviced with municipal water. On the basis of these and other factors, the options for wastewater collection and treatment were identified and are summarized in Table 3. While these options are the most feasible at the time of this study, they may change subject to a more detailed review during the design stage following the EA process.

6.2 ST. CLAIR PARKWAY

This service area is located northwest of Wallaceburg and extends along St. Clair Parkway from Whitebread Line to Running Creek as shown in Figure 2. Existing residential development is primarily along the east side of St. Clair Parkway from Whitebread Line to Langstaff Line, with additional development in the area of Stewart Line between Payne Road and Bishop Road. The Chenal Ecarte extends along the entire west boundary of this service area. The Official Plan classifies the area as Recreational Residential.

Conventional gravity sewers and low pressure sewers were identified as the collection system options. The collection system would terminate at Running Creek where a pumping station would be located to discharge wastewater from the area through a forcemain to Dufferin Avenue. Due to the strip-like development of this relatively flat service area and the limitations on maximum sewer depths, the gravity sewer system would require two intermediate pumping stations in addition to the pumping station at Running Creek as shown in Figure 2. The low pressure sewers would be located similar to the gravity sewers but intermediate pumping stations would not be required. However, individual grinder pumps would be required for each dwelling. Since Dufferin Avenue is also identified as a service area in this study, the servicing of St. Clair Parkway could not proceed until Dufferin Avenue is serviced.

The proximity of this service area to Wallaceburg, makes the Wallaceburg wastewater treatment plant the only practical option for treatment of wastewater from this area.

6.3 DUFFERIN AVENUE

As shown in Figure 3, this service area includes residential development along Dufferin Avenue from the west limit of Wallaceburg westerly to St. Clair Parkway. Also included in this service area is the residential development along Irwin Road, Maple Street, Crocus Street, Bluewater Line, Pine Street and Merwin Road. A golf course is located at the northeast corner of Dufferin and St. Clair Parkway. The Official Plan designates the area as Suburban Residential. The area is relatively flat with clay soil, and Running Creek crosses Dufferin Avenue at two locations.

Gravity sewers is the selected option for the wastewater collection system, and would include five pumping stations as shown in Figure 3. The pumping station on Merwin Road near Bluewater Line would discharge through a forcemain extending to Dufferin Avenue. The system would discharge into the Wallaceburg municipal sanitary sewers and wastewater would be treated at the Wallaceburg wastewater treatment plant.

6.4 NORTH RIVER ROAD

This service area is located adjacent to the east limit of Wallaceburg as shown in Figure 4. The area includes residential development along North River Road on the north shore of the Sydenham River, Kimball Road, and an area bounded by McCreary Line, Kimball Road and Abraham Line. The area is classified as Suburban Residential and is characterized by relatively flat topography and clay soils.

Gravity sewers is the selected collection system for the existing development. However, isolated dwellings located in the northern portion of the service area may be serviced by low pressure sewers if the existing septic tanks systems have failed and replacement is not cost effective. The wastewater collection system would discharge through a pumping station to the Wallaceburg municipal sanitary sewers and treatment would be provided at the Wallaceburg wastewater treatment plant.

6.5 TUPPERVILLE

Tupperville is classified as a Rural Settlement and is located on the south bank of the Sydenham River approximately 8 km east of Wallaceburg. The proposed collection system is shown in Figure 5 and consists of gravity sewers discharging by pumping station and forcemain to Dresden or Wallaceburg. The forcemain to Dresden is slightly shorter. Servicing for the North River Road area must first be completed, if discharge to Wallaceburg is the preferred option. Treatment options include the existing treatment facilities at Dresden or Wallaceburg, or a new local treatment facility.

6.6 WABASH

Wabash is a Rural Settlement located approximately 7 km west of Thamesville where Baseline Road intersects with Sharrow Road and Huff's Side Road. Figure 6 shows the proposed collection system of gravity sewers along the aforementioned roads discharging through a pumping station and forcemain to Thamesville. The treatment options include the existing treatment facilities in Thamesville or a new treatment facility in Wabash. Before the Thamesville option can be implemented, servicing must be completed on Industrial Road in the North Thamesville area.

6.7 NORTH THAMESVILLE-INDUSTRIAL ROAD

North Thamesville is classified as Rural Industrial and Suburban Residential and includes a mixture of residential and industrial development along Industrial Road from Jane Street in Thamesville northerly to Baseline Road, Evergreen Line, Zone 1 Road, Station Road and Baseline Road as shown in Figure 7. The proposed collection system would include gravity sewers and two pumping stations discharging into the Thamesville sanitary sewers near the intersection of Jane Street and Industrial Road. There is an existing pumping station servicing an industrial site near Evergreen Line with a forcemain extending to the Thamesville sanitary sewers. When the servicing of Industrial Road is undertaken, consideration should be given to the feasibility of incorporating the existing pumping station and forcemain into the collection system for Industrial Road. Wastewater from the Industrial Road area would be treated in the Thamesville wastewater treatment facilities.

6.8 NORTH THAMESVILLE-JANE STREET

This service area extends along Jane Street from Industrial Road easterly along the north limit of Thamesville and beyond to Baseline Road. The portion of Jane Street east of Thamesville is designated as Suburban Residential. Development along Jane Street is mainly residential. The existing sanitary sewers in Thamesville extend north to Jane Street but do not have sufficient depth to extend service to the dwellings on the north side of Jane Street. The proposed collection system would include a gravity sewer along Jane Street as shown in Figure 8 with a pumping station located near Gordon Street. The sewer between Gordon Street and Industrial Road would be designed to discharge into the existing local sewers that terminate near Jane Street. Wastewater from the Jane Street area would be treated in the Thamesville wastewater treatment facilities.

6.9 HIGHGATE

Highgate is designated as a Hamlet. It is located approximately 9 km east of Ridgetown. The topography of the area is relatively flat and underlain by sand and clay soils. The proposed collection system is shown in Figure 9 and includes gravity sewers with a pumping station and forcemain discharging to the existing pumping station located at the Ridgetown sewage lagoons where wastewater from Highgate would be treated. Another option for wastewater treatment is a new treatment facility in Highgate.

6.10 KENT BRIDGE

Kent Bridge is designated as a Rural Settlement in the Official Plan. It is located on the north bank of the Thames River, approximately 8 km southwest of Thamesville. Existing development is residential. The proposed collection system is shown in Figure 10 and includes gravity sewers with a pumping station and forcemain discharging to the existing sanitary sewers in Thamesville or to a possible future sewer system in Louisville, located approximately 5 km to the southwest. Wastewater from Kent Bridge could be treated at the Thamesville treatment facility, or at a new treatment facility in Kent Bridge or in Louisville that would service both Kent Bridge and Louisville. Another treatment option is to discharge the wastewater to a new sewer system in Louisville where it would combine with the Louisville wastewater for discharge to the Chatham system.

6.11 LOUISVILLE

Louisville is designated as a Rural Settlement and is located on the north bank of the Thames River approximately 8 km northeast of Chatham. The area is relatively flat with clay soils. Existing development is residential. Figure 11 shows the proposed gravity sewer system that includes a pumping station and forcemain discharging to Kent Bridge or Chatham. Wastewater treatment options include a new treatment facility in Louisville that would service both Louisville and Kent Bridge. Another treatment option is to discharge the wastewater to a new sewer system in Kent Bridge where it would combine with the Kent Bridge wastewater for discharge to the Thamesville system. Treatment in the Chatham system is another option.

6.12 DOVER CENTRE

Dover Center is located approximately 12 km northwest of Chatham and is designated as a Rural Settlement. The area is relatively flat with clay soils. Figure 12 shows the proposed collection system that would include gravity sewers and a pumping station and forcemain discharging to a proposed sewer system in Grande Pointe, located approximately 7 km to the southwest, where the combined wastewater from the two communities would be discharged approximately 7 km to the Pain Court system that is currently in final design. The Pain Court system includes a pumping station and forcemain that discharges to the Chatham system and has been designed to accept wastewater from Dover Centre and Grande Pointe.

6.13 GRANDE POINTE

Grande Pointe is designated as a Rural Settlement and is located approximately 10 km northwest of Chatham. Figure 13 shows the proposed collection system that would include gravity sewers and a pumping station and forcemain discharging to the Pain Court system. As noted in section 8.0, the wastewater from Grande Pointe, Dover Centre and Pain Court would be discharged to the Chatham system for treatment.

6.14 JEANETTE’S CREEK

The Jeanette’s Creek service area is located approximately 3 km north of Tilbury. It includes residential development in the Rural Settlement of Jeanette’s Creek along Tecumseh Line and Jeanette’s Creek Road, as well as development along Dashwheel Road, Roel’s Line and Tecumseh Line to Baptiste Creek. Gravity sewers and low pressure sewers were considered for this service area and the proposed layout is shown in Figure 14. A gravity sewer system would include three pumping stations. A low pressure sewer system requires one pumping station, together with a grinder pump for each dwelling. Due to the proximity of the Tilbury system, wastewater from Jeanette's Creek would be treated at the Tilbury treatment facilities. Accordingly, for either the gravity or low pressure systems, a pumping station would be located at the west end of Tecumseh Line at Baptiste Creek, where the wastewater would be discharged through a forcemain to the Tilbury sewer system.

6.15 PRAIRIE SIDING

Prairie Siding is designated as a Rural Settlement and is located on the south bank of the Thames River approximately 10 km west of Chatham. Gravity sewers were considered for this service area as shown in Figure 15. The system would include a pumping station and forcemain discharging the wastewater to the Chatham system. Due to the small size of this community and its remote location with respect to neighboring municipal sanitary sewage works, the cost of providing a communal sewage system is prohibitive. Accordingly, consideration should be given to continuing with on-site treatment utilizing individual septic systems.

6.16 NORTH BUXTON

North Buxton is located approximately 6 km southwest of Chatham. It is designated as a Rural Settlement. The area is relatively flat with clay soils. Gravity sewers were considered for the collection system for this service area as shown in Figure 16. The system would include three pumping stations and a forcemain to the Bloomfield Road pumping station in Chatham for subsequent treatment in the Chatham treatment facilities. The system could be designed to include wastewater from South Buxton. Consideration was also given to discharging the wastewater to South Buxton where a new treatment plant could be constructed to serve both communities. Alternatively, the wastewater from both North and South Buxton could be discharged to the Merlin system.

6.17 SOUTH BUXTON

South Buxton is a Rural Settlement located approximately 5 km east of Merlin. Gravity sewers were considered for this area as shown in Figure 17 and the system includes a pumping station with a forcemain discharging to the proposed North Buxton system that would subsequently discharge wastewater from both communities to the Chatham system. Alternatively, wastewater from South Buxton could be discharged to the Merlin system, or a new treatment facility could be constructed in South Buxton to treat wastewater from both North and South Buxton.

6.18 DEALTOWN

Dealtown is a Rural Settlement located on the north shore of Lake Erie approximately 12 km west of Blenheim. The area is relatively flat although there is a sharp drop from Talbot Trail (Hwy 3) down to the Lake Erie shoreline. Soils in the area consist of clay and gravelly loam. The collection system would consist of gravity sewers and a pumping station as shown in Figure 18. Due to its location, Dealtown has several options for wastewater treatment in existing municipal systems, including Merlin (through South Buxton), Chatham (through South and North Buxton), and Blenheim (through Cedar Springs). Another option that should be investigated is to discharge the wastewater to the nearby existing treatment facility that currently services the South-West Regional Centre. Dealtown could also be included in an area scheme that would have Cedar Springs, Erie Beach, Erieau, Dyke Road and Shrewsbury serviced by a new treatment facility located in the Erie Beach area. Further details of this area scheme are outlined later in this report.

6.19 GLENWOOD

Glenwood is a Rural Settlement located approximately 6 km southwest of Merlin. The area is relatively flat with clay soils. Consideration was give to a collection system consisting of gravity sewers as shown in Figure 19. The system would include a pumping station and forcemain discharging to the existing Merlin system. Consideration was also given to discharging the wastewater approximately 4 km southeast to a new treatment facility in Port Alma serving both communities. However, due to the small size of the community, the cost of a communal system is prohibitive and consideration should be given to continuing with on-site treatment in individual septic systems.

6.20 PORT ALMA

Port Alma is located on the north shore of Lake Erie approximately 7 km southwest of Merlin. The area is identified as a Rural Settlement in the Official Plan. Consideration was given to a collection system of gravity sewers as shown in Figure 20. The system would include a pumping station and forcemain discharging to Glenwood for subsequent treatment in the Merlin system. Consideration was also given to a new treatment facility in Port Alma to serve both Glenwood and Port Alma. However, like Glenwood, the cost of a communal system in Port Alma is prohibitive and continuation of individual on-site septic systems should be considered.

6.21 CAMPER'S COVE

Camper's Cove is located on the north shore of Lake Erie, east of Wheatley. The area is designated as Recreational Residential in the Official Plan. The cottage development in this area is located between the shoreline and Cemetery Road and Erie Drive. A trailer park is located immediately east of the service area and any contemplated sewage works for the area should allow sufficient capacity to accept wastewater from a privately constructed internal collection system in the trailer park. A system of gravity sewers was considered for this area as shown in Figure 21. The system would include a pumping station and forcemain discharging to the Wheatley municipal system where the wastewater would be treated at the Wheatley treatment facilities.

6.22 CEDAR SPRINGS

Cedar Springs is a Hamlet located on Talbot Trail approximately 5 km west of Blenheim. The topography of Cedar Springs is steeply sloped to the south and the soils consist of clay, silt and sand. A system of gravity sewers was considered for the collection system as shown on Figure 22. One of the options for treatment of the wastewater includes pumping through a forcemain to the Blenheim treatment facilities. For this option, two pumping stations would be required—one intermediate pumping station to deliver the wastewater up the steep gradient from the south end of the service area to Talbot Trail, and a second pumping station at the east end of the service area to discharge the wastewater through the forcemain to Blenheim. Another option for wastewater treatment is to direct the wastewater through a gravity sewer to Erie Beach, taking advantage of the natural gradient to the south. The wastewater would be treated at a new Erie Beach Area WWTP located near Bisnett Line and designed to service Cedar Springs, Erie Beach, Dyke Road, Erieau and Shrewsbury.

6.23 ERIE BEACH

The Erie Beach service area extends along the north shore of Lake Erie west of Rondeau Provincial Park. It is referred to in the Official Plan as a Recreational Residential Area. It is developed with dwellings that are occupied seasonally and year around, and many of the dwellings are situated on small lots. According to a geotechnical investigation carried out previously for the construction of watermains in the area, the soil consists of silt underlain by stiff silty clay and the water table is 2 to 3 metres below the surface. Gravity sewers were considered for this area as shown on Figure 23. Due to the groundwater conditions, the sewer depths would be reduced and three pumping stations would be required to deliver the wastewater (including Cedar Springs) to a new area wastewater treatment facility located near Bisnett Line. Alternatively, the wastewater could be discharged through a forcemain approximately 15 metres uphill to Cedar Springs for subsequent discharge to the Blenheim system. This pumping arrangement would include wastewater from Dyke Road and Erieau.

6.24 DYKE ROAD

The Dyke Road area is located along the north shore of Lake Erie and situated between Erie Beach and Erieau. It is also referred to as Erie Shore Drive. Dyke Road is aptly named as it forms a barrier to flooding of the inland farm areas. The residential development in the area is confined to the south side of the road. A previous geotechnical investigation indicates stiff silt along much of the route but peat was encountered at depths between 2.3 and 3.7 metres. The groundwater table was reported to be approximately 2.5 metres below the surface. Gravity sewers at reduced depths were considered for the area as shown in Figure 24. Construction of the sewers will require special consideration involving either removal of the peat and replacement with engineered granular fill, or installation of piles and beams to support the sewer pipes. Three pumping stations are required to deliver the wastewater to a new Erie Beach Area WWTP near Bisnett Line. Alternatively, the wastewater could be discharged to Erie Beach and beyond to the existing Blenheim system via Cedar Springs.

6.25 ERIEAU

Erieau is a Hamlet located on the north shore of Lake Erie immediately southwest of Rondeau Provincial Park. The area is developed with permanent and seasonally occupied dwellings. A geotechnical investigation carried out when the water system was constructed indicates the soil is sandy to a depth of 3.0 metres (end of borehole). Peat was encountered at Post Point Lane at the northeast end of the Hamlet. The water table was reported to be approximately 1.0 metre below the surface. Gravity sewers at reduced depths were considered for this area as shown in Figure 25. Three pumping stations would be required. Due to the high water table and sandy soil conditions, dewatering with well points will be required during sewer construction, and steel sheet pile cofferdams will be required for the pumping stations. The wastewater from Erieau would be discharged westerly to the Dyke Road sewer system for subsequent delivery to a new Erie Beach Area WWTP near Bisnett Line. Alternatively, the wastewater would be discharged to Blenheim via Dyke Road, Erie Beach and Cedar Springs.

6.26 SHREWSBURY

Shrewsbury is a Hamlet located on the west shore of Rondeau Bay. The land slopes gently to the southeast and soils in the area consist of loam underlain by silt, sand and clay. Gravity sewers and low pressure sewers were considered for this community and the sewer layout is shown in Figure 26. The gravity sewer system would include three pumping stations, one of which would be located on Communication Road at New Scotland Line and discharging through a forcemain approximately 23 metres uphill to the existing Blenheim system. Alternatively, this pumping station would be located on Fargo Road at New Scotland Line discharging through a forcemain on Fargo Road and Bisnett Line to a new Erie Beach Area WWTP. The low pressure sewer system would require only one pumping station and a forcemain discharging to either the existing Blenheim system or to a new Erie Beach Area WWTP similar to the arrangement for the gravity sewer system. In addition, the low pressure sewer system would include individual grinder pumps for each dwelling in the service area.

6.27 RONDEAU BAY ESTATES

Rondeau Bay Estates is designated as a Recreational Residential Area consisting of permanent and seasonal dwellings located along a series of man-made canals connected to Rondeau Bay. The area also has access to the municipal road system along Rondeau Estates Line. Since the water table is expected to be relatively shallow due to the canals in the area, consideration was given to low pressure sewers as well as gravity sewers and the layout of the sewer system is shown in Figure 27. In either case, a single pumping station would be required. This pumping station would discharge through a forcemain along Rondeau Estates Line and south along Kent Bridge Road to a new sewer system along Rose Beach Line (Chatham-Kent Road 17). Wastewater from the Rondeau Bay Estates would be treated at a new Rondeau Area WWTP located in the vicinity of McKinlay Road and Rose Beach Line. Alternatively, the wastewater would be delivered through a new sewer system serving Rose Beach Line and Morpeth and subsequently to the existing municipal sewer system in Ridgetown.

6.28 RONDEAU PROVINCIAL PARK

Rondeau Provincial Park is classified as a Natural Environment Park which is one that protects the landscapes and special features of the natural region in which it is located while providing ample opportunities for activities such as swimming and camping. The Park comprises 3,254 hectares on a sandy peninsula extending into Lake Erie. It is operated by Ontario Parks, a Branch within the Ontario Ministry of Natural Resources. The eastern portion of the Park is shown in Figure 28. Existing residential development in the Park includes approximately 290 dwellings. The future of the existing and any new development in the Park is uncertain. There have been reports of eliminating existing residential development upon the termination of current land leases and limiting any new structures in the Park to those necessary to service the Park's administration and visitor requirements. Accordingly, the need for a communal sewage system is dependent upon the future plans of Ontario Parks for the management of the Park. In any event, the provision of sewage service in the Park is the responsibility of Ontario Parks. Should there be a need to provide an outlet for wastewater from the Park, the municipal sewer system that will eventually be required for the adjacent Bates Subdivision and along Rose Beach Line can be designed to accept wastewater from the Park for treatment at a municipal facility. Alternatively, Ontario Parks may choose to provide on-site treatment systems as the need arises.

6.29 BATES SUBDIVISION

This service area is located on the north shore of Lake Erie between Rondeau Provincial Park and Kent Bridge Road as shown in Figure 28. The area is designated as Recreational Residential. The development includes a mixture of dwellings occupied by permanent and seasonal residents. The wastewater collection system would consist of gravity sewers and a pumping station integrated into a lakefront gravity sewer system that would service development along Rose Beach Line (Chatham-Kent Road 17) easterly to and including Morpeth. Wastewater would be treated in a new Rondeau Area WWTP located in the vicinity of McKinlay Road. Alternatively the wastewater could be delivered to the existing Ridgetown sewage system.

6.30 ROSE BEACH LINE

This service area includes residential development along Rose Beach Line on the north shore of Lake Erie from Kent Bridge Road easterly to Hill Road. Most of the development is situated on the south side of Rose Beach Line between Kent Bridge Road and McKinlay Road. From McKinlay Road to Hill Road, development is rather sparse. A gravity sewer system including three pumping stations would extend from Bates Subdivision to McKinlay Road, where the system would discharge to a new Rondeau Area WWTP as shown in Figure 29. The sparse development east of McKinlay Road would continue to be serviced by on-site systems. The Ridgetown wastewater treatment facilities would be another option for treatment of the wastewater from this service area. In this case, a pumping station in the vicinity of McKinlay Road would discharge through a forcemain easterly to the Wildwood Estates service area near

Hill Road, where it would be combined with wastewater from Wildwood Estates and pumped through another pumping station and forcemain to Morpeth and subsequently to Ridgetown.

6.31 WILDWOOD ESTATES

Wildwood Estates, also known as Wildwood by the Lake, is located on Rose Beach Line at Hill Road approximately 8 km southeast of Ridgetown. It is a privately owned mobile home park and campground with 492 developed sites as shown in Figure 30. The internal wastewater collection system is the responsibility of the owner of the development who may also provide a private wastewater treatment facility to service the development. Alternatively, the wastewater from the development could be treated at a municipal treatment facility. This would require a pumping station at the site to discharge the wastewater through a forcemain to Morpeth and then on to the existing municipal system in Ridgetown, or through a forcemain westerly along Rose Beach Line to a new Rondeau Area WWTP located in the vicinity of McKinlay Road.

6.32 MORPETH

Morpeth is a Hamlet located approximately 5 km southeast of Ridgetown at the intersection of the Talbot Trail (Chatham-Kent Road 3) and Hill Road (Chatham-Kent Road 17). The general ground elevation of Morpeth is approximately 30 metres lower than Ridgetown and 15 metres higher than the elevation of Road 17 at the Lake Erie shoreline. Gravity sewers were considered for the wastewater collection system as shown in Figure 31. Wastewater from Morpeth could be treated at the Ridgetown treatment facilities or at a new Rondeau Area WWTP in the vicinity of Rose Beach Line and McKinlay Road. If the wastewater is discharged to Ridgetown, the gravity sewer system will require three pumping stations to overcome the natural southerly gradient of the ground surface. One of the pumping stations would be located on Hill Road at the north limit of the service area and would discharge through a forcemain to the existing Ridgetown municipal sewer system. If the wastewater is discharged to a new Rondeau Area WWTP, the gravity sewers would outlet to a trunk gravity sewer extending southerly along Hill Road to the pumping station at Wildwood Estates which would discharge the wastewater from Wildwood Estates and Morpeth through a forcemain to the new Rondeau Area WWTP. An inverted siphon would be required across the open watercourse crossing Road 17 south of Morpeth. Another treatment alternative for Morpeth is the construction of a new local treatment facility in Morpeth.

6.33 ERIE BEACH AREA SYSTEM

6.33.1 New Wastewater Treatment Facility

The close proximity of several service areas to one another offers the opportunity to collect the wastewater from these areas for treatment at a central location in a single new treatment facility. A new area wastewater treatment facility, identified as the Erie Beach Area Wastewater Treatment Plant (WWTP), would serve Cedar Springs, Erie Beach, Dyke Road, Erieau, and Shrewsbury. It could also serve Dealtown if the existing treatment facility at the South-West

Regional Centre cannot accept wastewater from Dealtown. The Erie Beach Area WWTP would have a capacity of 1487 m^3/d which is the total of the 20-year wastewater flows from the service areas as shown in Table 2. The new facility would be located in the vicinity of Bisnett Line as shown in Figure 32.

6.33.2 Blenheim WWTP

A second option for an area system would include collection of wastewater from several adjacent service areas for treatment at an existing treatment facility. Cedar Springs, Erie Beach, Dyke Road, Erieau and perhaps Dealtown would be serviced by an area sewage collection system and the wastewater would be discharged through Cedar Springs for treatment at the Blenheim WWTP as shown in Figure 33. Wastewater from Shrewsbury would be pumped directly to Blenheim. This option would utilize the existing site at the Blenheim WWTP to expand the facilities to accommodate the additional wastewater flows since the residual capacity at the existing facility is allocated for growth in the immediate Blenheim area. By utilizing the existing Blenheim facility, the problem of identifying and acquiring another site for a new treatment facility would be avoided. However, additional property may be required adjacent to the existing Blenheim treatment facilities to accommodate the expansion.

6.34 RONDEAU BAY AREA SYSTEM

6.34.1 New Wastewater Treatment Facility

The service areas in the Rondeau Bay area could be serviced by an area system. As shown in Figure 34, wastewater from Rondeau Bay Estates, Bates Subdivision, Rose Beach Line, Morpeth, Rondeau Park and Wildwood Estates would be collected in an area sewer system for treatment at a new treatment facility, identified as the Rondeau Area WWTP, located at McKinlay Road off Rose Beach Line. The Rondeau Area WWTP would have a capacity of 1,417 m^3/d.

6.34.2 Ridgetown WWTP

Figure 35 shows another option for the Rondeau Bay area that would comprise an area collection system for the service areas identified in 6.34.1 above, with the wastewater directed through Morpeth for treatment at the Ridgetown WWTP. The use of the existing Ridgetown treatment facility would eliminate the need for acquiring another site for a new treatment facility. However, expansion of the Ridgetown treatment plant may be required if the existing plant capacity has been allocated to development in the Ridgetown community. If an expansion is necessary to accommodate the additional sewage flow from the Rondeau Area, additional property may be required.

CHAPTER 7.0 COST ESTIMATES

7.1 COLLECTION SYSTEMS

7.1.1 Gravity Sewers

Estimates of the cost to construct the gravity sewer systems for the identified service areas are shown in Table 5. The estimated cost outlined in Table 5 excludes transmission costs associated with conveying sewage flows from a specific service area to the intended sewage treatment facility or subsequent service area. Table 6 shows the transmission cost for each of the gravity sewer systems.

For the most part the service areas are flat with clay soils and low water table. The exception is along the Lake Erie shoreline, particularly Erieau and portions of Erie Beach. The range of flows in the sewers for the service areas generally falls within the capacity of a 200 mm dia. sewer at a minimum slope of 0.40% (approx 1,900 m^3/d). Sewer depths would range from a minimum of 1.8 m to a maximum of 6.7 m with an average depth of 4.25 m. In estimating the cost of the gravity sewers, the length of sewers was determined from the proposed system layouts shown on the respective Figure and a cost of $250/m (200 mm dia. at 4.25 m depth) was applied. In certain locations where wet and sandy soil conditions are anticipated, the unit sewer cost was adjusted. Similarly, where the sewer depths were reduced due to soil conditions or simply by virtue of the limited extent of the proposed sewers, the unit sewer cost was also adjusted. Areas where these adjustments applied are noted in the Comments column of Table 5.

A cost of $1,000 per service connection was used in the estimates. The number of service connections was based on the projected 20-year population divided by 2.5 persons/service connection.

A cost of $5,000 per manhole was used in the estimates. The number of manholes was estimated by dividing the total length of sewers by 100 m.

The location and number of pumping stations were determined on the basis of a minimum sewer depth of 1.8 m, pipe slope of 0.40%, and maximum sewer depth of 6.7 m (approximately 1,225 m maximum spacing). The cost of a pumping station was based on a 3.0 m dia. precast concrete circular wet well, 2 submersible pumps (1 duty + 1 standby) and a depth of 9.0 m. An estimated cost of $250,000 per pumping station was determined by examining the cost of a number of similar pumping stations constructed on recent projects. Where the depth of the sewers and pumping stations was reduced, the cost of the pumping station was adjusted accordingly and is noted in the Comment column of Table 5. The cost of standby power facilities was not included in the pumping station cost since the need will depend on local circumstances. A trailer-mounted generator set, suitable for most of the pumping stations involved is estimated to cost $50,000.

For the range of flows projected for the service areas, and applying a maximum flow velocity of 2.4 m/s with a minimum of 0.8 m/s, the forcemain diameter ranges from 50 mm to 100 mm. The length of forcemain was determined from aerial photos by scaling the distance along established roadways from the proposed pumping station to the point at which the forcemain would discharge into an existing sanitary sewer. A unit cost of $70/m was used in estimating the cost of forcemains.

An allowance of $20,000 was included for stream & rail crossings.

The estimates do not include an allowance for pavement restoration.

The total cost includes an allowance of 25% for contingencies and engineering.

Estimates are based on 2005 prices.

7.1.2 Low Pressure Sewers

The estimated cost to construct the low pressure sewer systems for the identified service areas are shown in Table 7. The estimated cost outlined in Table 7 excludes transmission costs associated with conveying sewage flows from a specific service area to the intended sewage treatment facility or subsequent service area. Table 8 shows the transmission cost for each of the low pressure sewer systems.

Mainline pipe sizes for the low pressure sewers in the service areas considered range from 37 mm to 75 mm dia. The length of pipe was determined from the proposed sewer system layout shown on the corresponding Figure. A unit price of $100/m was used for the estimates. This is higher than the unit price used for forcemains because of the potential for more interference from other underground utilities in the rural communities compared to the relatively open areas along rural roads used for the forcemain routes.

A cost of $1,500 per service was used in the estimates. This includes the isolating valve and check valve at the property line. The number of services was based on the projected 20-year population divided by 2.5 persons/service.

The number of mainline isolating valves was based on an approximate spacing of 500 m. The estimated cost of the isolating valves is $700 each.

The number of cleanouts for servicing the main lines was based on an approximate spacing of 500 m. The estimated cost of the cleanout including valve and fittings is $1,500 each.

The requirement for air relief valves depends in part on the topography of the service area. An approximate spacing of 500 m was used for the cost estimates. The estimated cost of the air relief valves including the valve chamber is $5,000 each.

The number of grinder pumps was based on providing one pump for each existing dwelling. The estimated cost of the installed pump is $8,000 including $4,000 for the pump (based on a quote from John Brooks Company for supplying 20 Simplex E/One pump units) and an allowance of $4,000 for installation.

A conventional pumping station and forcemain was provided to deliver sewage from the low pressure system to the nearest existing treatment facility. Estimated costs are similar to those used for the gravity systems.

As in the cost estimates for gravity sewers, the estimates are based on 2005 prices, do not include an allowance for pavement restoration, but include an allowance of 25% for contingencies and engineering.

7.2 TREATMENT FACILITIES

7.2.1 Rotating Biological Contactors

As noted in Section 5 of this report, the rotating biological contactor was selected as a typical treatment process for the capacity ranges considered for this study. Further review of treatment options would be undertaken during a Class Environmental Assessment when the project is undertaken.

Cost estimates were prepared for RBC treatment facilities having capacities of 10, 20, 40, 80, 120 and 200 m^3/d and are shown in Table 9. These cost estimates were plotted on Chart 1 and the resulting curve was used to determine the estimated cost for the specific treatment capacity applicable to the individual service area.

The typical RBC treatment facility considered for this study includes an RBC Building to house the RBC treatment units which are installed in reinforced concrete tankage. The building is a steel framed structure with insulated metal wall panels and prefinished standing seam metal roofing. The facility also includes a Control Building that houses the effluent filter, UV disinfection, alum storage and feed system, electrical and controls systems and an operator station. The Control Building includes reinforced concrete foundations and floor slab and the superstructure is similar to the RBC Building. Estimating prices for process equipment were obtained from P.J. Hannah Equipment Sales Corp.

The cost estimates for the treatment facilities do not include land costs. Raw sewage pumping facilities are not included as these have previously been included in the estimates for the sewage collection systems. The cost estimates include an allowance of 25% for contingencies and engineering. Estimates are based on 2005 prices.

It should be noted that the cost estimates provided for this study are based on construction standards typically required for municipal treatment facilities.

7.2.2 Sequencing Batch Reactors

The cost estimates for the SBR treatment facilities considered for this study are based on actual construction costs of two similar recently constructed treatment plants, and a cost estimate prepared for a Class Environmental Assessment relating to another similar treatment facility. The costs were suitably adjusted using the Engineering News Record Construction Cost Index and are shown in Table 10. Chart 2 shows the estimated costs for these plants. This chart was used to obtain cost estimates for the SBR facilities considered in this study.

The SBR treatment plant includes a Grit Removal Building that houses the inlet screens and grit removal equipment, a Control Building that houses the aeration equipment and control room, and two reinforced concrete SBR tanks and a reinforced concrete aerated sludge holding tank. UV disinfection and an alum system for Phosporus removal are also included.

The cost estimates do not include biosolids processing equipment. Biosolids from the aerated holding tanks would be transported to the Chatham WWTP or another treatment plant that is equipped to process biosolids. An outfall pipe into Lake Erie has not been included in the cost estimates as the need for an outfall pipe would be determined by a Class EA.

The SBR cost estimates do not include land or raw sewage pumping facilities. An allowance of 25% is included for contingencies and engineering. Estimates are based on 2005 prices.

7.3 SERVICING OPTIONS

The servicing options for each of the service areas are outlined in Table 3. The cost estimates for the servicing options are shown in Table 11. These estimates include the cost of the sewage collection and transmission systems taken from Tables 5 and 6 (gravity sewers) and Tables 6 and 7 (low pressure sewers), plus the cost of treatment facilities where new facilities are considered an option. The estimated cost of new treatment facilities were taken from Charts 1 and 2.

In those cases where a single new treatment facility was considered for servicing more than one service area, the estimated treatment cost was allocated to each service area in proportion to the projected 20-year sewage flows shown in Table 2.

The capacity of the Rondeau Area STP is 1,417 m^3/d and is proposed to service the following service areas:

• Rondeau Bay Estates	106 m^3/d
• Rondeau Park	327
• Bates Subdivision	148
• Rose Beach Line	153
• Wildwood Estates	555
• Morpeth	128
Total	1,417 m^3/d

The estimated cost of the SBR treatment facilities for the Rondeau Area is $4,961,000 taken from Chart 2.

The capacity of the Erie Beach Area STP is 1,487 m^3/d and is proposed to service the following service areas:

• Dealtown	80 m^3/d
• Cedar Springs	126
• Erie Beach	163
• Dyke Rd.	186
• Erieau	485
• Shrewsbury	447
Total	1,487 m^3/d

The estimated cost of the SBR treatment facilities for the Erie Beach Area is $5,055,000 taken from Chart 2.

Cost/dwelling is shown in Table 9 as the homeowner cost of the servicing option based on sharing the cost among the existing dwellings.

It should be noted that for proper comparison of servicing options, the estimated cost of expanding an existing treatment facility to accommodate the proposed additional sewage flow should be determined. The scope of this study did not include the examination of the cost of expanding existing treatment facilities.

Table 12 summarizes the costs for the Erie Beach Area System and the Rondeau Area System as taken from Table 11.

CHAPTER 8.0 RECOMMENDATIONS

The estimated homeowner costs shown in Table 11 indicate that servicing the rural areas is very costly. Funding assistance from senior levels of government should be explored before undertaking the projects.

In reviewing the costs in Table 11, it appears that servicing an isolated or remote rural community by connecting to an existing municipal system facility is the most cost-effective option. However, it should be noted that there will be additional costs associated with an expansion of the treatment facility to accommodate the additional sewage flows. Certainly, when the Class Environmental Assessment (Class EA) is undertaken for the individual projects, the total costs including collection and treatment will become more evident. This would apply to Tupperville, Highgate, Kent Bridge, Louisville, Jeanette's Creek, Camper's Cove, North Buxton, South Buxton, and perhaps Dealtown. It has been reported that Dover Centre and Grande Pointe will eventually connect to the Pain Court system.

The cost of providing sewage collection and treatment through a communal system may be prohibitive for the smaller communities. On site systems may turn out to be the most cost effective but not necessarily the most environmentally suitable option. The communities of Wabash, Prairie Siding, Glenwood and Port Alma may fall into this category.

For suburban residential areas that have relatively convenient access to existing municipal sewage facilities, the obvious choice is an extension of the existing municipal sewage collection system to accommodate the suburbs. These areas would include St. Clair Parkway, Dufferin Avenue and North River Road which are effectively in the Wallaceburg suburbs. Similarly, Industrial Road and Jane Street are suburbs of Thamesville.

The communities in the Erie Beach area may benefit from an area scheme that would include Cedar Springs, Erie Beach, Dyke Road, Erieau, Shrewsbury and possibly Dealtown with the sewage directed to a single new treatment plant. A suggested site for the treatment plant is near Bisnett Road. This location is approximately 2 km downstream from the existing Chatham water treatment plant intake. Alternatively, the sewage from these communities could be directed to the existing treatment facilities in Blenheim. Further investigation of these alternatives would be undertaken during a Class EA. In particular, the possible use of the existing sewage treatment plant currently serving the South-West Regional Centre near Dealtown should be explored with the Ontario government. While the plant may not be ideally situated or designed to satisfy the needs of the entire Erie Beach area communities, it may well be capable of providing service to the community of Dealtown.

Similarly, the communities in the Rondeau Bay area, including Rondeau Bay Estates, Bates Subdivision, Rose Beach Line, Morpeth and perhaps Rondeau Provincial Park and Wildwood Estates could be serviced by an area scheme with a new treatment plant located near McKinlay Road. Alternatively, the sewage could be directed to the existing treatment facilities in Ridgetown. Again, the evaluation of these alternatives would be undertaken during a Class EA.

APPENDIX A

TABLES

CHARTS

TABLES

TABLE 1
CHATHAM-KENT SEWAGE MASTER PLAN UPDATE STUDY
RESULTS OF SAMPLING PROGRAM

Sample ID	Sampled by	Date	Time	Map Figure	Description	Specific Location Description	Size and Type of Outlet	Weather	Observations	BOD	SS	P	Fecal Strep	Coliforms fecal
1	ROBIN DUDLEY	4/27/2004	9:30 AM	13	Grande Pointe	Hind drain at st.phillipes line, opposite public school at east end of town.	Unknown	Overcast, 40F, windy	Algae at bottom of drain. Odour present	9	10	0.39	18000	6400000
2	ROBIN DUDLEY	4/27/2004	9:45 AM	13	grande pointe	cb at front of mun# 7126 on st. phillipes line.	unknown	overcast, 40F, windy	Black sludge upon disturbance. Very present odour.	1080	35990	3.7	68000	300000
3	ROBIN DUDLEY	4/27/2004	10:00 AM	13	grande pointe	outlet to boyle drain, from behind mun# 7134 benoit drive.	250csp source unknown	overcast, 40F, windy	strong odour, grey water visible	15	7	1.73	38000	16000
4	ROBIN DUDLEY	4/27/2004	10:30 AM	12	dover centre	Concrete MH Structure front of mun# 26021 baldoon road	unknown	overcast, 32F, windy	present odour, water colour decent	4	<5	0.89	120	600
5	ROBIN DUDLEY	4/28/2004	8:30 AM	3	dufferin ave, wallaceburg	skinner drain, colby#3 outlet, pipe closest to rd.	?csp, unknown sources	partly sunny, 40F	odour, cloudy water	5	21	0.2	900	5600
6	ROBIN DUDLEY	4/28/2004	9:00 AM	3	dufferin ave. wallaceburg	standard cb, colby#2 DRAIN, back between mun# 3060 and field.	unknown sources	partly sunny, 40F	grey colour and odour present	62	64	3.09	3400	54000
7	ROBIN DUDLEY	4/28/2004	10:00 AM	3	dufferin ave. wallaceburg	standard 600 cb behind mun#5009	sources unknown	overcast, 45F, windy	very dark grey water, strong odour	456	11280	4.19	3100	5300
8	ROBIN DUDLEY	4/28/2004	10:15 AM	3	dufferin ave, wallaceburg	MH structure on irwin street opp. mun# 40. Carlson Drain, drains into dykeman	unknown sources	overcast, 42F, windy	brown in colour, some odour	<2	494	0.31	9	600
9	ROBIN DUDLEY	4/28/2004	10:30 AM	3	dufferin ave, wallaceburg	standard cb at baldoon golf course by maintenance	multiple from golf course property	overcast, 45F, windy	grass clipping evident, strong odours	123	1062	4.49	64000	11000
10	ROBIN DUDLEY	4/28/2004	11:30 AM	2	dufferin ave. wallaceburg	outlet into open ditch. Opp. Mun# 157, 165 whitebread line	250 csp, sources unknown	overcast, 42F, windy	odour present, grey colour	7	11	0.2	14	4000
11	ROBIN DUDLEY	4/28/2004	1:00 PM	4	north river road, wallaceburg	outlet into sydenham, at kimball rd inttersection. opposite Curling club.	700 csp, sources unknown	overcast, 42F, windy	strong odours, paper product at grate, algae growth obvious	4	55	0.07	100	0
12	ROBIN DUDLEY	4/28/2004	1:20 PM	-	wallaceburg outskirts	dicb front of mun# 855 murray street (elbow road d	unknown, sources vary	overcast, 42F, windy	strong odour, grey colour	21	18	0.16	100	3000
13	ROBIN DUDLEY	4/28/2004	1:30 PM	5	tupperville	outlet into sydenham at end of burns street	500 csp, sources unknown	mostly cloudy, 42F, windy	water clear, odour present	2	5	0.06	98	5800
14	ROBIN DUDLEY	4/28/2004	1:30 PM	5	tupperville	outlet into sydenham at end of burns street, desguised with plywood	? Csp, sources unknown	mostly cloudy, 42F, windy	clear and odourless but steady flow, outlet camoflagued intentionally	13	17	2.8	24	800
15	ROBIN DUDLEY	4/28/2004	2:00 PM	5	tupperville	outlet into sydenham, opp. Mun# 23 bank street	300 csp, sources unknown	mostly cloudy, 42F, windy	running heavy, obvious foam and detergent	11	10	0.58	9400	21000
16	ROBIN DUDLEY	4/28/2004	2:30 PM	5	tupperville	1200 conc mh in blvd btwn mun# 14, 12 JOHN PARK Line	sources unknown	partly sunny, 50F, windy	dark grey colour, strong odour, sludge present	127	3612	0.97	4400	12000
17	ROBIN DUDLEY	4/28/2004	3:00 PM	6	wabash	north side base line at littlebear creek drain, second from road	300 dia boss2000 sources unknown	partly sunny, 50F, windy	clear colour, some odour, strong flow	<2	<5	0.16	64	2300
18	ROBIN DUDLEY	4/28/2004	3:30 PM	6	wabash	north side of base line at littlebear creek drain, nearest roadway	400 csp unknown sources	partly sunny, 50F, windy	clear colour, some odour, steady flow	<2	<5	0.25	2	500
19	ROBIN DUDLEY	4/29/2004	11:30 AM	11	louisville	into thames, directly behind r.o.w. of spring street	200 perf plastic, source unknown	sunny, 70F, windy	clear but odour present and paper product on rodent grate	5	7	0.25	20	4400
20	ROBIN DUDLEY	4/29/2004	11:45 AM	10	kent bridge	immediate south of mun# 11584 CBMH at beg of curb into village on longwoods road	sources unknown	sunny, 70F, windy	clear, faint odour	3	51	0.19	0	30
21	ROBIN DUDLEY	4/29/2004	2:15 PM	31	morpeth	morpeth#2 drain, std. Cb at end of clark street	unknown, various sorces	sunny, 70F, windy	cloudy, faint odour	35	9	0.84	10000	12000

TABLE 1
CHATHAM-KENT SEWAGE MASTER PLAN UPDATE STUDY
RESULTS OF SAMPLING PROGRAM

Sample ID	Sampled by	Date	Time	Map Figure	Description	Specific Location Description	Size and Type of Outlet	Weather	Observations	BOD	SS	P	Fecal Strep	Coliforms fecal
22	ROBIN DUDLEY	4/29/2004	2:20 PM	31	morpeth	morpeth#2 drain, end of clark street	unknown sources	sunny, 70F, windy	cloudy, faint odour	119	52	0.37	0	180000
23	ROBIN DUDLEY	4/29/2004	2:30 PM	31	morpeth	standard cb s. side of hill road beside church mun#19026	unknown sources	sunny, 70F, windy	clear, faint odour	5	7	0.59	130	25000
24	ROBIN DUDLEY	4/29/2004	2:40 PM	31	morpeth	drain #7 north side hill rd opposite mun# 12559 hill	unknown sources	sunny, 70F, windy	cloudy, odour present	6	8	0.46	600	48000
25	ROBIN DUDLEY	4/29/2004	2:50 PM	31	morpeth	cbmh structure end of spring street at mun#12488 mill street.	unknown sources	sunny, 70F, windy	clear, odour present	<2	10	0.06	20	1000
26	ROBIN DUDLEY	5/6/2004	9:00 AM	23	erie beach, tawanda road	1800 csp into lake, under deck behind mun# 605 tawanda road	1800 csp (approx.) sources unknown	sunny, calm	water clear, odour present, steady flow	<2	15	0.05	120	1000
27	ROBIN DUDLEY	5/6/2004	9:10 AM	23	erie beach, tawanda road	open drain outlet into lake, betwn mun# 390,400	sources unknown	sunny, 70F, calm	clear, odour present, no algae growth in drain	<2	<5	0.04	40	4500
28	ROBIN DUDLEY	5/6/2004	9:30 AM	23	erie beach, tawanda road	18" round cb front of mun# 325 Tawanda	sources unknown	sunny, 70F, calm	clear, no odour. Problems were evident in past	<2	<5	0.02	6	6
29	ROBIN DUDLEY	5/6/2004	9:45 AM	25	erieau	end of 2'nd st. into bay, 200 boss, beside mun#300	sources unknown	sunny, 70F, calm	Dark Grey, strong odour	20	624	1.54	600	300
30	ROBIN DUDLEY	5/6/2004	11:00 AM	26	shrewsbury	north corner brock/prince intersection, open drain	sources unknown	sunny 70F, calm	grey cloudy colour, odour present	9	698	0.09	160	100
31	ROBIN DUDLEY	5/6/2004	12:00 PM	22	cedar springs	cb/mh structure w. side road opp. Mun#19453 charing cross	sources unknown	sunny, 70F, calm	clear appearance but strong odours and substantial flow exists.	3	29	0.02	44	44000
32	ROBIN DUDLEY	5/12/2004	12:00 PM	17	south buxton	cb struct. Front mun# 6584 middle line, roadside into moore drain	4" subdrain pipe visible, sources unknown	sunny, humid, 75F	slightly cloudy, odour present	8	254	0.65	1800	8000
33	ROBIN DUDLEY	5/12/2004	12:05 PM	17	south buxton	300 csp from SW into brady drain S. side of middle line.	sources unknown	sunny, humid, 75F	dark grey, strong odours, steady flow	16	15	1.45	1200	140000
34	ROBIN DUDLEY	5/12/2004	12:10 PM	17	south buxton	closed drain running NE into Brady drain S side middle line	sources unknown	sunny, humid, 75F	clear, strong odour present	10	17	0.79	2500	48000
35	ROBIN DUDLEY	5/12/2004	1:30 PM	15	prarie siding	std conc cb at 2nd conc railway culvert from east side merlin road	sources unknown	sunny, humid, 75F	slightly cloudy, strong odours, steady flow	3	7	0.16	4000	36000
36	ROBIN DUDLEY	5/13/2004	8:45 AM	19	glenwood	125 plastic outlet into south road ditch along glenwood line at main intersection.	sources unknown	sunny, humid, calm 78F	dark grey colour, strong odours	142	58	142	24	400000
37	ROBIN DUDLEY	5/13/2004	9:10 AM	20	port alma	mh at NW corner of port road and Talbot trail	sources unknown and minimal	sunny, humid, calm, 78F	Grey colour, minimal flow, strong odour	66	313	0.39	58	24000
38	ROBIN DUDLEY	5/13/2004	9:40 AM	-	coatsworth	std cb front of Mun# 21363 infront mennanite church coatsworth line.	sources unknown	sunny, calm, humid, 78F	grey colour, steady flow, odour present	169	8770	1.6	3900	36000
39	ROBIN DUDLEY	5/13/2004	10:30 AM	21	campers cove	at bottom of dwy culvert to campsite at campers cove rd.	sources unknown	sunny, humid, 78F	clear, no odour	3	9	<0.04	94	160
40	ROBIN DUDLEY	5/13/2004	11:20 AM	14	jeanettes creek	garbutt drain outlet, W side road S of Rail Tracks	sources unknown	sunny, humid, 78F	Dark Greyish colour, Strong odour, steady flow	18	7	1.92	5900	60000
41	ROBIN DUDLEY	5/13/2004	11:30 AM	14	jeanettes creek	W side Jeannettes Creek Road front mun# 24389	sources unknown	sunny, hot, 78F	grey colour, Strong odours, Small trickle	256	65	8.4	8	600000
42	ROBIN DUDLEY	5/13/2004	11:45 AM	14	jeannettes creek	300 csp outlet into archibald drain, E side Dashwhell road behind houses along tecumseh line.	300 csp sources unknown	sunny, hot, 78F	strong steady flow, clear, strong odour present	20	<5	0.22	14	1000

TABLE 2
CHATHAM-KENT SEWAGE MASTER PLAN UPDATE STUDY
POPULATION AND SEWAGE FLOW

FIG	SERVICE AREA	POPULATION		20-YEAR AVERAGE FLOW (m^3/d)			20-YEAR PEAK FLOW (m^3/d)		
		EXISTING	20 YEAR	SEWAGE	I/I	TOTAL	SEWAGE	I/I	TOTAL
1	Key Plan								
2	St. Clair Parkway	175	214	60	19	79	247	48	295
3	Dufferin Ave.	610	744	208	67	275	808	167	976
4	North River Road	68	83	23	7	31	99	19	118
5	Tupperville	200	244	68	22	90	281	55	336
6	Wabash	43	52	15	5	19	63	12	75
7	N. Thamesville-Industrial Rd	90	110	31	10	41	130	25	155
8	N. Thamesville-Jane Street	95	116	32	10	43	137	26	163
9	Highgate	417	509	142	46	188	566	114	680
10	Kent Bridge	143	174	49	16	65	204	39	243
11	Louisville	95	116	32	10	43	137	26	163
12	Dover Centre	83	101	28	9	37	120	23	143
13	Grande Pointe	100	122	34	11	45	144	27	172
14	Jeanettes Creek	230	281	79	25	104	321	63	385
15	Prairie Siding	25	31	9	3	11	37	7	44
16	North Buxton	270	329	92	30	122	375	74	449
17	South Buxton	93	113	32	10	42	134	26	160
18	Dealtown	178	217	61	20	80	251	49	300
19	Glenwood	35	43	12	4	16	52	10	61
20	Port Alma	83	101	28	9	37	120	23	143
21	Campers Cove	168	205	57	18	76	238	46	284
22	Cedar Springs	280	342	96	31	126	388	77	465
23	Erie Beach	360	439	123	40	163	492	99	591
24	Dyke Road	412	503	141	45	186	559	113	672
25	Erieau	1,075	1,312	367	118	485	1,366	295	1,662
26	Shrewsbury	990	1,208	338	109	447	1,267	272	1,538
27	Rondeau Bay Estates	235	287	80	26	106	328	65	393
28	Rondeau Provincial Park	725	885	248	80	327	949	199	1,148
28	Bates Subdivision	328	400	112	36	148	451	90	541
29	Rose Beach Line	338	412	115	37	153	464	93	556
30	Wildwood Estates	1,230	1,501	420	135	555	1,546	338	1,884
31	Morpeth	283	345	97	31	128	392	78	469
32&33	Erie Beach Area incl 18, 22, 23, 24, 25, 26	3,295.0	4,020	1,126	362	1,487	3,750	904	4,654
34&35	Rondeau Area incl 27, 28, 29, 30, 31	3,139.0	3,830	1,072	345	1,417	4,130	862	4,991

TABLE 3
CHATHAM-KENT SEWAGE MASTER PLAN UPDATE STUDY
SERVICING OPTIONS

SERVICE AREA		COLLECTION SYSTEM OPTIONS		TREATMENT FACILITY OPTIONS	
FIG NO.	DESCRIPTION	GRAVITY	PRESSURE	EXISTING	NEW
1.	Key Plan				
2.	St. Clair Parkway	Three PS to Dufferin Ave.	To Dufferin Ave	Wallaceburg STP	
3.	Dufferin Ave.	Five PS to Wallaceburg sewers		Wallaceburg STP	
4.	North River Road	PS to Wallaceburg sewers	Remotely located dwellings	Wallaceburg STP	On site system for remote dwellings
5.	Tupperville	PS & 6,600 m long forcemain to Dresden sewers, or 7,750 forcemain to Wallaceburg sewers, or PS to New Local Plant		Dresden STP Wallaceburg STP	Local Treatment Plant, 90 m^3/d
6.	Wabash	PS & 6,500 m long forcemain to N. Thamesville or, PS to New Treatment Plant		Thamesville STP	Local Treatment Plant, 19 m^3/d
7.	N. Thamesville-Industrial Road	Two PS to Thamesville sewers		Thamesville STP	
8	N. Thamesville- Jane Street East	PS to Thamesville sewers		Thamesville STP	
9	Highgate	PS & 8,900 m long forcemain to Ridgetown lagoons, or PS to New Local Plant		Ridgetown STP	Local Treatment Plant, 188 m^3/d
10.	Kent Bridge	PS & 8,400 m long forcemain to Thamesville, or PS & 4,800 m long forcemain to Louisville, or PS to New Treatment Plant		Thamesville STP, or Chatham STP via Louisville	Local Treatment Plant, 65 m^3/d or New Plant at Louisville, 108 m^3/d
11.	Louisville	PS & 7,700 m long forcemain to Chatham, or 4,800 m long forcemain to Kent Bridge, or New Treatment Plant		Chatham STP, or Thamesville STP via Kent Bridge	Local Treatment Plant, 108 m^3/d

TABLE 3
CHATHAM-KENT SEWAGE MASTER PLAN UPDATE STUDY
SERVICING OPTIONS

SERVICE AREA		COLLECTION SYSTEM OPTIONS		TREATMENT FACILITY OPTIONS	
FIG. NO.	**DESCRIPTION**	**GRAVITY**	**PRESSURE**	**EXISTING**	**NEW**
12.	Dover Centre	PS & 7,000 m long forcemain to Grande Pointe		Chatham STP via Grande Pointe and Paincourt	
13.	Grande Pointe	PS & 6,550 m long forcemain to Paincourt		Chatham STP via Paincourt	
14.	Jeanette's Creek	Three PS & 2,600 m long forcemain to Tilbury sewers	To Tilbury sewers	Tilbury STP	
15.	Prairie Siding	PS & 5,300 m forcemain to Chatham future sewers, or PS & 9,500 m long forcemain to Chatham		Chatham STP, or individual on site treatment	
16.	North Buxton	Three PS & 5,800 m long forcemain to Chatham (Bloomfield PS), or PS & 4,000 m long forcemain to S. Buxton.		Chatham STP or Merlin STP via S. Buxton	New Treatment Plant at S. Buxton
17.	South Buxton	PS & 4,100 m long forcemain to N. Buxton, or PS & 5,500 m long forcemain to Merlin		Chatham STP via N. Buxton, or Merlin STP	Local Treatment, 164 m^3/d (N & S Buxton)
18.	Dealtown	PS & 6,800 m long forcemain to Cedar Springs, or PS & 8,600 m long forcemain to S. Buxton, or PS to New Local Plant.		Chatham STP via S. Buxton & N. Buxton, or Merlin STP via S. Buxton, or Blenheim STP via Cedar Springs, (investigate possibility of connecting to STP at Cedar Springs Hospital)	Local Treatment Plant (80 m^3/d), or Erie Beach Area STP via Cedar Springs

TABLE 3
CHATHAM-KENT SEWAGE MASTER PLAN UPDATE STUDY
SERVICING OPTIONS

SERVICE AREA		COLLECTION SYSTEM OPTIONS		TREATMENT FACILITY OPTIONS	
FIG NO	**DESCRIPTION**	**GRAVITY**	**PRESSURE**	**EXISTING**	**NEW**
19.	Glenwood	PS & 5,700 m long forcemain to Merlin, or 4,300 m long forcemain to New Treatment Plant at Port Alma		Merlin, or individual on site treatment systems	Local Treatment Plant (53 m^3/d) at Port Alma)
20.	Port Alma	PS & 4,300 m long forcemain to Glenwood, or New Treatment Plant		Merlin STP via Glenwood, or individual on site treatment systems	Local Treatment Plant, 53 m^3/d
21.	Campers Cove	PS & 1,800 m long forcemain to Wheatley sewers		Wheatley STP	
22.	Cedar Springs	Gravity to Erie Beach, or two PS & 4,900 m long forcemain to Blenheim		Blenheim STP	Erie Beach Area STP
23.	Erie Beach	Three PS to Cedar Springs, or by gravity to Erie Beach Area STP		Blenheim STP via Cedar Springs	Erie Beach Area STP
24.	Dyke Road	Four PS to Erie Beach Area STP, or to Blenheim via Erie Beach sewers.		Blenheim STP via Erie Beach & Cedar Springs	Erie Beach Area STP
25.	Erieau	Three PS & 1,500 m long forcemain to Dyke Road sewers		Blenheim STP via Dyke Road, Erie Beach & Cedar Springs	Erie Beach Area STP
26.	Shrewsbury	Three PS & 6,400 m long forcemain to Blenheim sewers, or three PS & 6,200 m long forcemain to Erie Beach	To Blenheim or Erie Beach	Blenheim STP	Erie Beach Area STP
27.	Rondeau Bay Estates	PS & 2,800 m long forcemain to Rondeau Area sewer system	To Rondeau system	Ridgetown STP	Rondeau Area STP

TABLE 3
CHATHAM-KENT SEWAGE MASTER PLAN UPDATE STUDY
SERVICING OPTIONS

SERVICE AREA		COLLECTION SYSTEM OPTIONS		TREATMENT FACILITY OPTIONS	
FIG NO	DESCRIPTION	GRAVITY	PRESSURE	EXISTING	NEW
28.	Rondeau Provincial Park	Internal system by Ontario Parks	Internal system by Ontario Parks	Ridgetown STP	Rondeau Area STP
28.	Bates Subdivision	PS to area collection system		Ridgetown STP	Rondeau Area STP
29.	Rose Beach Line	Three PS to Rondeau area system, or three PS & 1,600 m forcemain to Morpeth		Ridgetown STP	Rondeau Area STP
30.	Wildwood Estates	Internal system by Owner, PS with PS and 1,600 m long forcemain to Rondeau Area STP, or PS & 2400 m forcemain to Morpeth	Internal system by Owner	Ridgetown STP	Local Treatment Plant or Rondeau Area STP
31.	Morpeth	Gravity sewer to Rondeau area system (inverted siphon at Creek crossing) or three PS & 4,700 m long forcemain to Ridgetown, or New Local Treatment Plant		Ridgetown STP	Rondeau Area STP, or Local Treatment Plant, 128 m^3/d

TABLE 4
CAPACITY OF EXISTING SEWAGE TREATMENT PLANTS
CHATHAM-KENT SEWAGE MASTER PLAN UPDATE STUDY

	Sewage	***Existing Plant Rated Capacity m³/day*** *(Rating found in CofA)*	***Existing Plant Rated Capacity m³/day*** *(Rating found in Master Plan)*	**2001 Total Influent Flow m³**	**2001 Average Day Flow m³/day**	***Future Plant Rated Capacity m³/day***	***Comments***	***Upgrade Completion Dates***
1	Blenheim WPCP	4,045	4,035	749,771	2,044			
2	Chatham WPCP	29,000	29,000	7,808,100	21,400	36,000	Chatham WPCP is being expanded.	November 2004
3	Dresden WPCP	4,546	4,545	589,606	1,619			
4	Merlin Lagoons	464	464	92,445	253			
5	Mitchell's Bay	509	509	52,595	144			
6	Ridgetown WPCP	1,537		459,374	1,264		Upgraded to New Hamburg Process	Aug-02
7	Thamesville WPCP	818	816	100,238	275			
8	Tilbury Lagoons	2,537	2,530	936,140	2,570	5,434	A new WWTP is being constructed for Tilbury.	December 2004
9	Wallaceburg WPCP	10,800	10,800	2,520,191	6,922			
10	Wheatley WPCP	2,752	2,752	512,897	1,406			

TABLE 5
COST ESTIMATES FOR GRAVITY SEWER SYSTEMS
CHATHAM-KENT SEWAGE MASTER PLAN UPDATE STUDY

FIG	SERVICE AREA	OUTLET	SEWERS		SERVICES		MANHOLES		PUMP STATIONS		FORCEMAIN		CREEK CROSSINGS		TOTAL COST	COMMENTS
			LENGTH (m)	COST	NO.	COST	NO.	COST	NO.	COST	LENGTH (m)	COST	NO.	COST		
2	St. Clair Parkway	Dufferin Avenue	4,410	$1,102,500	85	$85,000	50	$250,000	2	$500,000			2	$40,000	$2,472,000	
3	Dufferin Avenue	Wallaceburg sewers	7,850	$1,962,500	298	$298,000	80	$400,000	4	$1,000,000	900	$63,000	2	$40,000	$4,704,000	
4	North River Road	Wallaceburg sewers	1,780	$445,000	33	$33,000	18	$90,000	1	$250,000					$1,023,000	
5	Tupperville	Dresden sewers	2,330	$582,500	98	$98,000	24	$120,000							$1,001,000	
5	Tupperville	Wallaceburg sewers	2,330	$582,500	98	$98,000	24	$120,000							$1,001,000	
5	Tupperville	Local treatment plant	2,330	$582,500	98	$98,000	24	$120,000							$1,001,000	
6	Wabash	Thamesville sewers	930	$232,500	20	$20,000	12	$60,000							$391,000	depth & size of PS reduced
6	Wabash	Local treatment plant	930	$232,500	20	$20,000	12	$60,000							$391,000	depth & size of PS reduced
7	N Thamesville/Industri	Thamesville sewers	2,760	$690,000	40	$40,000	30	$150,000	1	$250,000			1	$20,000	$1,438,000	
8	N Thamesville/Jane	Thamesville sewers	2,030	$507,500	54	$54,000	21	$105,000							$833,000	
9	Highgate	Local treatment plant	4,365	$1,091,250	220	$220,000	50	$250,000							$1,952,000	
9	Highgate	Ridgetown lagoons	4,365	$1,091,250	220	$220,000	50	$250,000							$1,952,000	
10	Kent Bridge	Louisville/Chatham	800	$200,000	70	$70,000	14	$70,000							$425,000	
10	Kent Bridge	Thamesville sewers	800	$200,000	70	$70,000	14	$70,000							$425,000	
10	Kent Bridge	Local treatment plant	800	$200,000	70	$70,000	14	$70,000							$425,000	
11	Louisville	Chatham sewers	1,210	$302,500	46	$46,000	15	$75,000							$529,000	
11	Louisville	Kent Bridge/Thamesvill	1,210	$302,500	46	$46,000	15	$75,000							$529,000	
11	Louisville	Local treatment plant	1,210	$302,500	46	$46,000	15	$75,000							$529,000	
12	Dover Centre	Grand Pointe/Paincourt	1,040	$260,000	40	$40,000	12	$60,000							$450,000	depth & size of PS reduced
13	Grand Pointe	Paincourt/Chatham	1,450	$362,500	50	$50,000	14	$70,000							$603,000	
14	Jeanettes Creek	Tilbury sewers	3,780	$945,000	112	$112,000	40	$200,000	2	$500,000					$2,196,000	
15	Prairie Siding	Chatham future sewers	350	$87,500	13	$13,000	4	$20,000							$151,000	depth & size of PS reduced
15	Prairie Siding	Chatham STP	350	$87,500	13	$13,000	4	$20,000							$151,000	depth & size of PS reduced
16	North Buxton	Chatham sewers	4,190	$1,047,500	130	$130,000	45	$225,000	2	$500,000			1	$20,000	$2,403,000	
16	North Buxton	South Buxton	4,190	$1,047,500	130	$130,000	45	$225,000	2	$500,000			1	$20,000	$2,403,000	
17	South Buxton	Local treatment plant	1,240	$310,000	45	$45,000	12	$60,000							$519,000	
17	South Buxton	North Buxton/Chatham	1,240	$310,000	45	$45,000	12	$60,000							$519,000	
17	South Buxton	Merlin sewers	1,240	$310,000	45	$45,000	12	$60,000							$519,000	
18	Dealtown	South Buxton	1,900	$475,000	87	$87,000	20	$100,000							$828,000	
18	Dealtown	Cedar Springs	1,900	$475,000	87	$87,000	20	$100,000							$828,000	
18	Dealtown	Local treatment plant	1,900	$475,000	87	$87,000	20	$100,000							$828,000	
19	Glenwood	Merlin sewers	635	$127,000	17	$17,000	8	$40,000							$230,000	reduced sewer depth & size of PS
19	Glenwood	Port Alma	635	$127,000	17	$17,000	8	$40,000							$230,000	reduced sewer depth & size of PS
20	Port Alma	Glenwood/Merlin	950	$237,500	40	$40,000	12	$60,000							$422,000	
20	Port Alma	Local treatment plant	950	$237,500	40	$40,000	12	$60,000							$422,000	
21	Campers Cove	Wheatley sewers	1,630	$407,500	82	$82,000	18	$90,000							$724,000	
22	Cedar Springs	Erie Beach Area STP	2,845	$625,900	137	$137,000	30	$150,000							$1,141,000	
22	Cedar Springs	Blenheim sewers	2,845	$625,900	137	$137,000	30	$150,000	1	$250,000					$1,454,000	reduced depth of sewers
23	Erie Beach	Cedar Springs/Blenhein	1,840	$460,000	175	$175,000	20	$80,000	2	$500,000					$1,519,000	
23	Erie Beach	Erie Beach Area STP	1,840	$460,000	175	$175,000	20	$80,000	2	$500,000					$1,519,000	
24	Dyke Road	Erie Beach/Blenheim	4,480	$1,322,500	200	$200,000	50	$250,000	3	$750,000					$3,153,000	sewer cost includes add'l for peat removal
24	Dyke Road	Erie Beach Area STP	4,480	$1,322,500	200	$200,000	50	$250,000	3	$750,000					$3,153,000	sewer cost includes add'l for peat removal
25	Erieau	Erie Beach	5,810	$2,149,700	525	$525,000	60	$300,000	2	$630,000					$4,506,000	add'l for dewatering & steel cofferdam for PS
26	Shrewsbury	Blenheim sewers	11,890	$2,972,500	483	$483,000	120	$600,000	2	$500,000					$5,694,000	
26	Shrewsbury	Erie Beach Area STP	11,890	$2,972,500	483	$483,000	120	$600,000	2	$500,000					$5,694,000	
27	Rondeau Bay Estates	Rondeau Area STP	2,085	$521,250	115	$115,000	25	$125,000							$952,000	
27	Rondeau Bay Estates	Ridgetown sewers	2,085	$521,250	115	$115,000	25	$125,000							$952,000	
28	Rondeau Park	Bates/Rondeau Area STP														internal sewer system by MNR/Ontario Parks
28	Rondeau Park	Bates/Ridgetown														internal sewer system by MNR/Ontario Parks
28	Bates Subdivision	Rondeau Area STP	3,260	$815,000	150	$150,000	35	$175,000							$1,425,000	
28	Bates Subdivision	Ridgetown	3,260	$815,000	150	$150,000	35	$175,000							$1,425,000	
29	Rose Beach Line	Rondeau Area STP	3,635	$908,750	165	$165,000	40	$200,000	2	$500,000			3	$60,000	$2,292,000	
29	Rose Beach Line	Ridgetown	3,635	$908,750	165	$165,000	40	$200,000	2	$500,000			3	$60,000	$2,292,000	
30	Wildwood Estates	Rondeau Area STP														internal sewer system by owner
30	Wildwood Estates	Morpeth/Ridgetown														internal sewer system by owner
31	Morpeth	Rondeau Area STP	5,410	$1,352,500	138	$138,000	55	$275,000							$2,207,000	
31	Morpeth	Ridgetown	5,410	$1,352,500	138	$138,000	55	$275,000	2	$500,000					$2,832,000	
31	Morpeth	Local treatment plant	5,410	$1,352,500	138	$138,000	55	$275,000							$2,207,000	

TABLE 6
COST ESTIMATES FOR TRANSMISSION FROM GRAVITY SYSTEMS
CHATHAM-KENT SEWAGE MASTER PLAN UPDATE STUDY

FIG	SERVICE AREA	OUTLET	PUMP STATIONS		FORCEMAIN		CREEK CROSSINGS		TRANSMISSION	COMMENTS
			NO.	COST	LENGTH (m)	COST	NO.	COST	COST	
2	St. Clair Parkway	Dufferin Avenue	1	$250,000	1,060	$74,200			$405,000	
3	Dufferin Avenue	Wallaceburg sewers	2	$500,000	900	$63,000			$704,000	
4	North River Road	Wallaceburg sewers	1	$250,000					$313,000	
5	Tupperville	Dresden sewers	1	$250,000	6,600	$462,000			$890,000	
5	Tupperville	Wallaceburg sewers	1	$250,000	7,750	$542,500			$991,000	
5	Tupperville	Local treatment plant	1	$250,000					$313,000	
6	Wabash	Thamesville sewers	1	$200,000	6,500	$455,000			$819,000	depth & size of PS reduced
6	Wabash	Local treatment plant	1	$200,000					$250,000	depth & size of PS reduced
7	N Thamesville/Industria	Thamesville sewers	1	$250,000					$313,000	
8	N Thamesville/Jane	Thamesville sewers	1	$250,000					$313,000	
9	Highgate	Local treatment plant	1	$250,000					$313,000	
9	Highgate	Ridgetown lagoons	1	$250,000	8,900	$623,000			$1,091,000	
10	Kent Bridge	Louisville/Chatham	1	$250,000	4,800	$336,000			$733,000	
10	Kent Bridge	Thamesville sewers	1	$250,000	8,400	$588,000			$1,048,000	
10	Kent Bridge	Local treatment plant	1	$250,000					$313,000	
11	Louisville	Chatham sewers	1	$250,000	7,700	$539,000			$986,000	
11	Louisville	Kent Bridge/Thamesville	1	$250,000	4,800	$336,000			$733,000	
11	Louisville	Local treatment plant	1	$250,000					$313,000	
12	Dover Centre	Grand Pointe/Paincourt	1	$200,000	7,000	$490,000			$863,000	depth & size of PS reduced
13	Grand Pointe	Paincourt/Chatham	1	$250,000	6,550	$458,500			$886,000	
14	Jeanettes Creek	Tilbury sewers	1	$250,000	2,600	$182,000	1	$20,000	$565,000	
15	Prairie Siding	Chatham furure sewers	1	$200,000	5,300	$371,000			$714,000	depth & size of PS reduced
15	Prairie Siding	Chatham STP	1	$200,000	9,500	$665,000			$1,081,000	depth & size of PS reduced
16	North Buxton	Chatham sewers	1	$250,000	5,800	$406,000			$820,000	
16	North Buxton	South Buxton	1	$250,000	4,000	$280,000			$663,000	
17	South Buxton	Local treatment plant	1	$250,000					$313,000	
17	South Buxton	North Buxton/Chatham	1	$250,000	4,100	$287,000			$671,000	
17	South Buxton	Merlin sewers	1	$250,000	5,500	$385,000			$794,000	
18	Dealtown	South Buxton	1	$250,000	8,600	$602,000			$1,065,000	
18	Dealtown	Cedar Springs	1	$250,000	6,800	$476,000			$908,000	
18	Dealtown	Local treatment plant	1	$250,000					$313,000	
19	Glenwood	Merlin sewers	1	$200,000	5,700	$399,000			$749,000	depth & size of PS reduced
19	Glenwood	Port Alma	1	$200,000	4,300	$301,000			$626,000	depth & size of PS reduced
20	Port Alma	Glenwood/Merlin	1	$250,000	4,300	$301,000			$689,000	
20	Port Alma	Local treatment plant	1	$250,000					$313,000	
21	Campers Cove	Wheatley sewers	1	$250,000	1,800	$126,000			$470,000	
22	Cedar Springs	Erie Beach Area STP							$413,000	Transmisssion to Erie Beach includes 1230 m gravity sewer and 12 manholes
22	Cedar Springs	Blenheim sewers	1	$250,000	4,900	$343,000			$741,000	
23	Erie Beach	Cedar Springs/Blenheim	1	$250,000	1,200	$84,000			$418,000	
23	Erie Beach	Erie Beach Area STP	1	$250,000					$313,000	
24	Dyke Road	Erie Beach/Blenhein	1	$250,000					$313,000	
24	Dyke Road	Erie Beach Area STP	1	$250,000					$313,000	
25	Erieau	Erie Beach	1	$315,000	1,500	$225,000			$675,000	add'l for dewatering & steel cofferdam for PS
26	Shrewsbury	Blenheim sewers	1	$250,000	6,400	$448,000			$873,000	
26	Shrewsbury	Erie Beach Area STP	1	$250,000	6,200	$434,000			$855,000	
27	Rondeau Bay Estates	Rondeau Area STP	1	$250,000	2,800	$196,000			$558,000	
27	Rondeau Bay Estates	Ridgetown sewers	1	$250,000	2,800	$196,000			$558,000	
28	Rondeau Park	Bates/Rondeau Area STP	1	$250,000					$313,000	
28	Rondeau Park	Bates/Ridgetown	1	$250,000					$313,000	
28	Bates Subdivision	Rondeau Area STP	1	$250,000					$313,000	
28	Bates Subdivision	Ridgetown	1	$250,000					$313,000	
29	Rose Beach Line	Rondeau Area STP	1	$250,000	250	$25,000			$344,000	
29	Rose Beach Line	Ridgetown	1	$250,000	1,600	$112,000	1	$20,000	$478,000	
30	Wildwood Estates	Rondeau Area STP	1	$250,000	1,600	$112,000	1	$20,000	$478,000	
30	Wildwood Estates	Morpeth/Ridgetown	1	$250,000	2,400	$168,000	1	$20,000	$548,000	
31	Morpeth	Rondeau Area STP					1	$200,000	$1,163,000	Transmission to Wildwood includes 2440 m gravity sewer, 24 manholes and inverted siphon at drain S of Morpeth
31	Morpeth	Ridgetown	1	$250,000	4,700	$329,000			$724,000	
31	Morpeth	Local treatment plant	1	$250,000					$313,000	

TABLE 7
COST ESTIMATES FOR LOW PRESSURE SEWERS
CHATHAM-KENT SEWAGE MASTER PLAN UPDATE STUDY

	St. Clair Parkway-Outlet to Dufferin Ave	**Jeanettes Creek-Outlet to Tilbury Sewers**	**Shrewsbury-Outlet to Blenheim**	**Shrewsbury-Outlet to Erie Beach Area STP**	**Rondeau Bay Estates-Outlet to Rondeau Area STP**
Figure	2	14	26	26	27
Sewers-length (m)	4,410	3,780	11,890	11,890	2,085
Sewers-cost	$441,000	$378,000	$1,189,000	$1,189,000	$208,500
Services-no.	85	112	483	483	115
Services-cost	$127,500	$168,000	$724,500	$724,500	$172,500
Valves-no.	12	8	24	24	5
Valves-cost	$8,400	$5,600	$16,800	$16,800	$3,500
Cleanouts-no.	12	8	24	24	5
Cleanouts-cost	$18,000	$12,000	$36,000	$36,000	$7,500
AR Valves-no.	12	8	24	24	5
AR Valves-cost	$60,000	$40,000	$120,000	$120,000	$25,000
Grinder Pumps-no.	70	92	396	396	94
Grinder Pumps-cost	$560,000	$736,000	$3,168,000	$3,168,000	$752,000
Elec. Upgrades-no.	35	46	198	198	47
Elec. Upgrades-cost	$35,000	$46,000	$198,000	$198,000	$47,000
Creek Crossings-no.	2				
Creek Crossings-cost	$40,000				
Total Cost	**$1,612,000**	**$1,732,000**	**$6,815,000**	**$6,815,000**	**$1,520,000**

TABLE 8
COST ESTIMATES FOR TRANSMSION FROM LOW PRESSURE SYSTEMS
CHATHAM-KENT SEWAGE MASTER PLAN UPDATE STUDY

	St. Clair Parkway-Outlet to Dufferin Ave	Jeanettes Creek-Outlet to Tilbury Sewers	Shrewsbury-Outlet to Blenheim	Shrewsbury-Outlet to Erie Beach Area STP	Rondeau Bay Estates-Outlet to Rondeau Area STP
Figure	2	14	26	26	27
Pump Stations-no.	1	1	1	1	1
Pump Stations-cost	$250,000	$250,000	$250,000	$250,000	$250,000
Forcemain-length (m)	1,475	2,600	6,400	6,200	2,800
Forcemain-cost	$103,250	$182,000	$448,000	$434,000	$196,000
Creek Crossings-no.		1			
Creek Crossings-cost		$20,000			
Transmission Cost	**$442,000**	**$565,000**	**$873,000**	**$855,000**	**$558,000**

TABLE 9
COST ESTIMATES FOR RBC TREATMENT FACILITIES
CHATHAM-KENT SEWAGE MASTER PLAN UPDATE STUDY

CAPACITY m^3/d	**10**	**20**	**40**	**80**	**120**	**200**
Site Work	$40,000	$40,000	$45,000	$45,000	$50,000	$50,000
RBC Building-Exc & Bkfil	$2,600	$3,800	$11,300	$17,200	$14,600	$26,000
-Concrete	$27,800	$37,700	$67,600	$119,800	$140,300	$216,200
-Superstructure	$31,900	$39,700	$91,700	$159,000	$169,600	$311,000
Control Building-Exc & Bkfil	$1,400	$1,400	$1,500	$1,500	$1,800	$1,800
-Concrete	$8,500	$8,500	$9,200	$9,600	$11,400	$11,400
-Superstructure	$27,400	$27,400	$30,900	$32,900	$42,800	$42,800
Equipment	$181,000	$225,000	$368,800	$581,300	$818,800	$1,031,300
Mechanical	$54,000	$54,000	$72,000	$90,000	$108,000	$108,000
Electrical	$96,000	$96,000	$108,000	$120,000	$144,000	$144,000
Mob & Demob, Bonds, Insur.	$18,800	$21,300	$32,200	$47,100	$60,100	$77,700
Contingencies & Engineering	$122,400	$138,700	$209,600	$305,900	$390,400	$505,100
Total Cost	**$612,000**	**$694,000**	**$1,048,000**	**$1,529,000**	**$1,952,000**	**$2,525,000**

TABLE 10
COSTS FOR SBR TREATMENT FACILTIES
CHATHAM-KENT SEWAGE MASTER PLAN UPDATE STUDY

FACILITY	CAPACITY m^3/d	TOTAL COST
McLeod Avenue	1,020	$ 3,855,000
Edgewater Beach	3,200	$ 7,690,000
Essex	4,590	$ 8,794,000

TABLE 11
COST ESTIMATES FOR SERVICING OPTIONS
CHATHAM-KENT SEWAGE MASTER PLAN UPDATE STUDY

FIG	SERVICE AREA	DWELLINGS	OPTION	OUTLET	COLLECTION	TRANSMISSION	TREATMENT	TOTAL COST	COST/DWELLING			COMMENTS
									COLLECTION	TRANSMISSION	TREATMENT	
2	St. Clair Parkway	70	Gravity sewers	Dufferin Ave	$2,472,000	$405,000		$2,877,000	$35,314	$5,786		
2	St. Clair Parkway	70	Pressure sewers	Dufferin Ave	$1,612,000	$442,000		$2,054,000	$23,029	$6,314		
3	Dufferin Ave	244	Gravity sewers	Wallaceburg	$4,704,000	$704,000		$5,408,000	$19,279	$2,885		
4	North River Road	27	Gravity sewers	Wallaceburg	$1,023,000	$313,000		$1,336,000	$37,889	$11,593		
5	Tupperville	80	Gravity sewers	Dresden	$1,001,000	$890,000		$1,891,000	$12,513	$11,125		
5	Tupperville	80	Gravity sewers	Wallaceburg	$1,001,000	$991,000		$1,992,000	$12,513	$12,388		
5	Tupperville	80	Gravity sewers	Local STP	$1,001,000	$313,000	$1,700,000	$3,014,000	$12,513	$3,913	$21,250	
6	Wabash	17	Gravity sewers	Thamesville	$391,000	$819,000		$1,210,000	$23,000	$48,176		
6	Wabash	17	Gravity sewers	Local STP	$391,000	$250,000	$694,000	$1,335,000	$23,000	$14,706	$40,824	
7	N. Thamesville-Industrial Rd	36	Gravity sewers	Thamesville	$1,438,000	$313,000		$1,751,000	$39,944	$8,694		
8	N. Thamesville-Jane Street	52	Gravity sewers	Thamesville	$833,000	$313,000		$1,146,000	$16,019	$6,019		
9	Highgate	167	Gravity sewers	Local STP	$1,952,000	$313,000	$2,400,000	$4,665,000	$11,689	$1,874	$14,371	
9	Highgate	167	Gravity sewers	Ridgetown	$1,952,000	$1,091,000		$3,043,000	$11,689	$6,533		
10	Kent Bridge	57	Gravity sewers	Louisville or Chatham	$425,000	$733,000		$1,158,000	$7,456	$12,860		
10	Kent Bridge	57	Gravity sewers	Thamesville	$425,000	$1,048,000		$1,473,000	$7,456	$18,386		
10	Kent Bridge	57	Gravity sewers	Local STP at Louisville	$425,000	$733,000	$1,083,000	$2,241,000	$7,456	$12,860	$19,000	Shared treatment cost of Louisville STP
10	Kent Bridge	57	Gravity sewers	Local STP	$425,000	$313,000	$1,400,000	$2,138,000	$7,456	$5,491	$24,561	
11	Louisville	38	Gravity sewers	Chatham	$529,000	$986,000		$1,515,000	$13,921	$25,947		
11	Louisville	38	Gravity sewers	Kent Bridge/Thamesville	$529,000	$733,000		$1,262,000	$13,921	$19,289		
11	Louisville	38	Gravity sewers	Local STP	$529,000	$313,000	$717,000	$1,559,000	$13,921	$8,237	$18,868	Shared treatment cost of Louisville STP
12	Dover Centre	33	Gravity sewers	Grand Pointe/Paincourt	$450,000	$863,000		$1,313,000	$13,636	$26,152		
13	Grand Pointe	40	Gravity sewers	Paincourt/Chatham	$603,000	$886,000		$1,489,000	$15,075	$22,150		
14	Jeanettes Creek	92	Gravity sewers	Tilbury	$2,196,000	$565,000		$2,761,000	$23,870	$6,141		
14	Jeanettes Creek	92	Pressure sewers	Tilbury	$1,732,000	$565,000		$2,297,000	$18,826	$6,141		
15	Prairie Siding	10	Gravity sewers	Chatham future sewers	$151,000	$714,000		$865,000	$15,100	$71,400		
15	Prairie Siding	10	Gravity sewers	Chatham STP	$151,000	$1,081,000		$1,232,000	$15,100	$108,100		
16	North Buxton	108	Gravity sewers	Chatham	$2,403,000	$820,000		$3,223,000	$22,250	$7,593		
16	North Buxton	108	Gravity sewers	STP at South Buxton	$2,403,000	$663,000	$1,562,000	$4,628,000	$22,250	$6,139	$14,463	Shared treatment cost of South Buxton STP
17	South Buxton	37	Gravity sewers	Local STP	$519,000	$313,000	$538,000	$1,370,000	$14,027	$8,459	$14,541	Shared treatment cost of South Buxton STP
17	South Buxton	37	Gravity sewers	North Buxton/Chatham	$519,000	$671,000		$1,190,000	$14,027	$18,135		
17	South Buxton	37	Gravity sewers	Merlin	$519,000	$794,000		$1,313,000	$14,027	$21,459		
18	Dealtown	71	Gravity sewers	Cedar Springs/Erie Beach Area STP	$828,000	$908,000	$272,000	$2,008,000	$11,662	$12,789	$3,831	Shared treatment cost of Erie Beach Area STP
18	Dealtown	71	Gravity sewers	South Buxton/Chatham	$828,000	$1,065,000		$1,893,000	$11,662	$15,000		
18	Dealtown	71	Gravity sewers	Cedar Springs/Blenheim	$828,000	$908,000		$1,736,000	$11,662	$12,789		
18	Dealtown	71	Gravity sewers	Local STP	$828,000	$313,000	$1,600,000	$2,741,000	$11,662	$4,408	$22,535	

TABLE 11
COST ESTIMATES FOR SERVICING OPTIONS
CHATHAM-KENT SEWAGE MASTER PLAN UPDATE STUDY

FIG	SERVICE AREA	DWELLINGS	OPTION	OUTLET	COLLECTION	TRANSMISSION	TREATMENT	TOTAL COST	COST/DWELLING			COMMENTS
									COLLECTION	TRANSMISSION	TREATMENT	
19	Glenwood	14	Gravity sewers	Merlin	$230,000	$749,000		$979,000	$16,429	$53,500		
19	Glenwood	14	Gravity sewers	Port Alma	$230,000	$626,000	$392,000	$1,248,000	$16,429	$44,714	$28,000	Shared treatment cost of Port Alma STP
20	Port Alma	33	Gravity sewers	Glenwood/Merlin	$422,000	$689,000		$1,111,000	$12,788	$20,879		
20	Port Alma	33	Gravity sewers	Local STP	$422,000	$313,000	$908,000	$1,643,000	$12,788	$9,485	$27,515	Shared treatment cost of Port Alma STP
21	Campers Cove	67	Gravity sewers	Wheatley	$724,000	$470,000		$1,194,000	$10,806	$7,015		
22	Cedar Springs	112	Gravity sewers	Erie Beach Area STP	$1,141,000	$413,000	$428,000	$1,982,000	$10,188	$3,688	$3,821	Shared treatment cost of Erie Beach Area STP
22	Cedar Springs	112	Gravity sewers	Blenheim	$1,454,000	$741,000		$2,195,000	$12,982	$6,616		
23	Erie Beach	144	Gravity sewers	Cedar Springs/Blenheim	$1,519,000	$418,000		$1,937,000	$10,549	$2,903		
23	Erie Beach	144	Gravity sewers	Erie Beach Area STP	$1,519,000	$313,000	$554,000	$2,386,000	$10,549	$2,174	$3,847	Shared treatment cost of Erie Beach Area STP
24	Dyke Road	165	Gravity sewers	Erie Beach/Blenheim	$3,153,000	$313,000		$3,466,000	$19,109	$1,897		
24	Dyke Road	165	Gravity sewers	Erie Beach Area STP	$3,153,000	$313,000	$632,000	$4,098,000	$19,109	$1,897	$3,830	Shared treatment cost of Erie Beach Area STP
25	Erieau	430	Gravity sewers	Erie Beach	$4,506,000	$675,000	$1,649,000	$6,830,000	$10,479	$1,570	$3,835	Shared treatment cost of Erie Beach Area STP
26	Shrewsbury	396	Gravity sewers	Blenheim	$5,694,000	$873,000		$6,567,000	$14,379	$2,205		
26	Shrewsbury	396	Gravity sewers	Erie Beach Area STP	$5,694,000	$855,000	$1,520,000	$8,069,000	$14,379	$2,159	$3,838	Shared treatment cost of Erie Beach Area STP
26	Shrewsbury	396	Pressure sewers	Blenheim	$6,815,000	$873,000		$7,688,000	$17,210	$2,205		
26	Shrewsbury	396	Pressure sewers	Erie Beach Area STP	$6,815,000	$855,000	$1,520,000	$9,190,000	$17,210	$2,159	$3,838	Shared treatment cost of Erie Beach Area STP
27	Rondeau Bay Estates	94	Gravity sewers	Rondeau Area STP	$952,000	$558,000	$371,000	$1,881,000	$10,128	$5,936	$3,947	Shared treatment cost of Rondeau Area STP
27	Rondeau Bay Estates	94	Gravity sewers	Ridgetown	$952,000	$558,000		$1,510,000	$10,128	$5,936		
27	Rondeau Bay Estates	94	Pressure sewers	Rondeau Area STP	$1,520,000	$558,000	$371,000	$2,449,000	$16,170	$5,936	$3,947	Shared treatment cost of Rondeau Area STP
28	Rondeau Park	290	Unknown	Bates/Rondeau Area STP		$313,000	$1,145,000	$1,458,000		$1,079	$3,948	Shared treatment cost of Rondeau Area STP, internal collection system not included in cost
28	Rondeau Park	290	Unknown	Bates/Ridgetown		$313,000				$1,079		
28	Bates Subdivision	131	Gravity sewers	Rondeau Area STP	$1,425,000	$313,000	$518,000	$2,256,000	$10,878	$2,389	$3,954	Shared treatment cost of Rondeau Area STP
28	Bates Subdivision	131	Gravity sewers	Ridgetown	$1,425,000	$313,000		$1,738,000	$10,878	$2,389		
29	Rose Beach Line	135	Gravity sewers	Rondeau Area STP	$2,292,000	$344,000	$536,000	$3,172,000	$16,978	$2,548	$3,970	Shared treatment cost of Rondeau Area STP
29	Rose Beach Line	135	Gravity sewers	Ridgetown	$2,292,000	$478,000		$2,770,000	$16,978	$3,541		
30	Wildwood Estates	492	Unknown	Rondeau Area STP		$478,000	$1,943,000	$2,421,000		$972	$3,949	Shared treatment cost of Rondeau Area STP, internal collection system not included in cost
30	Wildwood Estates	492	Unknown	Mopeth/Ridgetown		$548,000		$548,000		$1,114		Cost includes P.S. and forcemain to Morpeth, internal collection system not included in cost
31	Morpeth	113	Gravity sewers	Rondeau Area STP	$2,207,000	$1,163,000	$448,000	$3,818,000	$19,531	$10,292	$3,965	Shared treatment cost of Rondeau Area STP
31	Morpeth	113	Gravity sewers	Ridgetown	$2,832,000	$724,000		$3,556,000	$25,062	$6,407		
31	Morpeth	113	Gravity sewers	Local STP	$2,207,000	$313,000	$2,000,000	$4,520,000	$19,531	$2,770	$17,699	

NOTE: Treatment costs are shown for options that include a new sewage treatment facility. For those options that involve treatment at an existing treatment facility in a neighboring community, the cost of treatment will depend on such factors as available treatment capacity, the need for expansion and/or upgrade to the existing treatment facility, and the cost sharing arrangements.

TABLE 12
COST ESTIMATES FOR AREA SEWAGE SYSTEMS
CHATHAM-KENT SEWAGE MASTER PLAN UPDATE STUDY

ERIE BEACH AREA SYSTEM TO NEW WWTP

Service Area	Dwellings	Collection	Transmission	Treatment	Total Cost
Dealtown	71	$828,000	$908,000	$272,000	$2,008,000
Cedar Springs	112	$1,141,000	$413,000	$428,000	$1,982,000
Erie Beach	144	$1,519,000	$313,000	$554,000	$2,386,000
Dyke Road	165	$3,153,000	$313,000	$632,000	$4,098,000
Erieau	430	$4,506,000	$675,000	$1,649,000	$6,830,000
Shrewsbury	396	$5,694,000	$855,000	$1,520,000	$8,069,000
Total	1,318	$16,841,000	$3,477,000	$5,055,000	$25,373,000
Cost/Dwelling		$12,800	$2,600	$3,800	$19,200

RONDEAU AREA SYSTEM TO NEW WWTP

Service Area	Dwellings	Collection	Transmission	Treatment	Total Cost
Rondeau Bay Estates	94	$952,000	$558,000	$371,000	$1,881,000
Rondeau Park	290	Private	$313,000	$1,145,000	$1,458,000
Bates Subdivision	131	$1,425,000	$313,000	$518,000	$2,256,000
Rose Beach Line	135	$2,292,000	$344,000	$536,000	$3,172,000
Wildwood Estates	492	Private	$478,000	$1,943,000	$2,421,000
Morpeth	113	$2,207,000	$1,163,000	$448,000	$3,818,000
Total	1,255	$6,876,000	$3,169,000	$4,961,000	$15,006,000
Cost/Dwelling		$14,500	$2,500	$4,000	$21,000

ERIE BEACH AREA SYSTEM TO BLENHEIM

Service Area	Dwellings	Collection	Transmission	Treatment	Total Cost
Dealtown	71	$828,000	$908,000	TBD	TBD
Cedar Springs	112	$1,454,000	$741,000	TBD	TBD
Erie Beach	144	$1,519,000	$418,000	TBD	TBD
Dyke Road	165	$3,153,000	$313,000	TBD	TBD
Erieau	430	$4,506,000	$675,000	TBD	TBD
Total	922	$11,460,000	$3,055,000	TBD	TBD
Cost/Dwellling		$12,400	$3,300	TBD	TBD

Note: Shrewsbury not included in this area system because sewage would be transmitted directly to Blenheim. Costs associated with treatment at the Blenheim treatment facilities to be determined (TBD) when further studies are undertaken.

RONDEAU AREA SYSTEM TO RIDGETOWN

Service Area	Dwellings	Collection	Transmission	Treatment	Total Cost
Rondeau Bay Estates	94	$952,000	$558,000	TBD	TBD
Rondeau Park	290	Private	$313,000	TBD	TBD
Bates Subdivision	131	$1,425,000	$313,000	TBD	TBD
Rose Beach Line	135	$2,292,000	$478,000	TBD	TBD
Wildwood Estates	492	Private	$478,000	TBD	TBD
Morpeth	113	$2,832,000	$724,000	TBD	TBD
Total	1,255	$7,501,000	$2,864,000	TBD	TBD
Cost/Dwelling		$15,900	$2,300	TBD	TBD

Note: Costs associated with treatment at the Ridgetown treatment facilities to be determined (TBD) when further studies are undertaken.

CHARTS

Chart 1
Cost Estimates for RBC Treatment Facilities

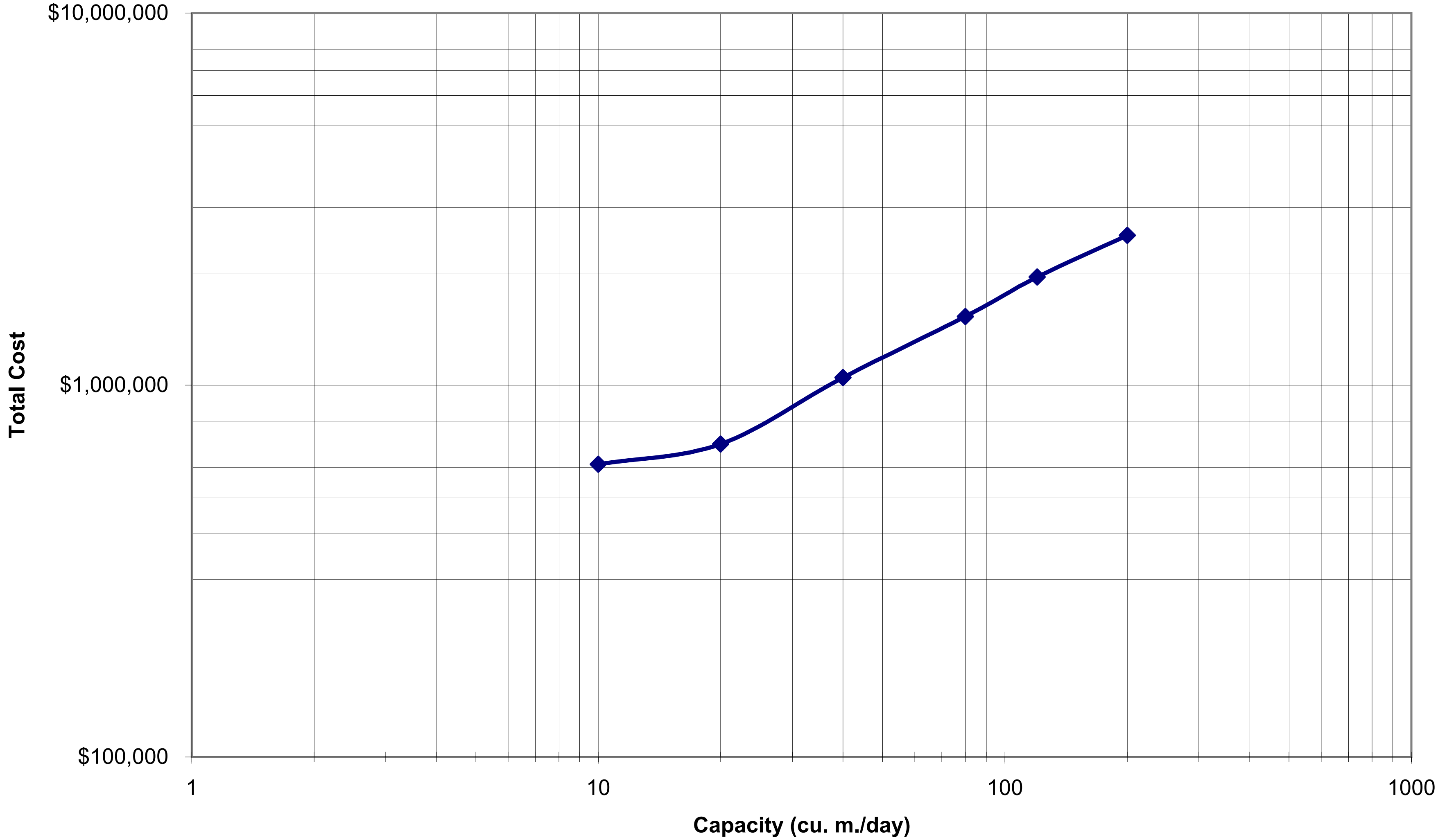
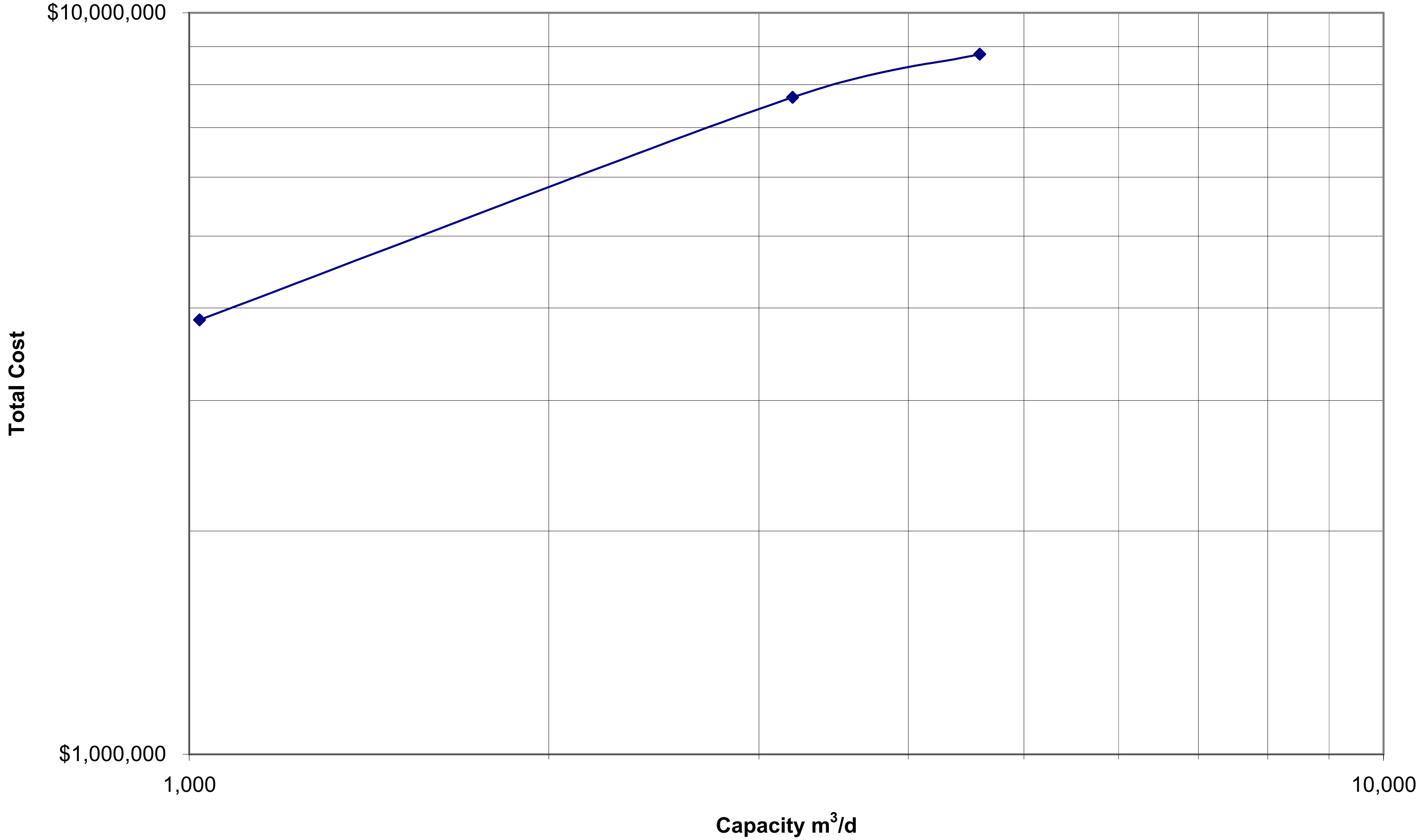
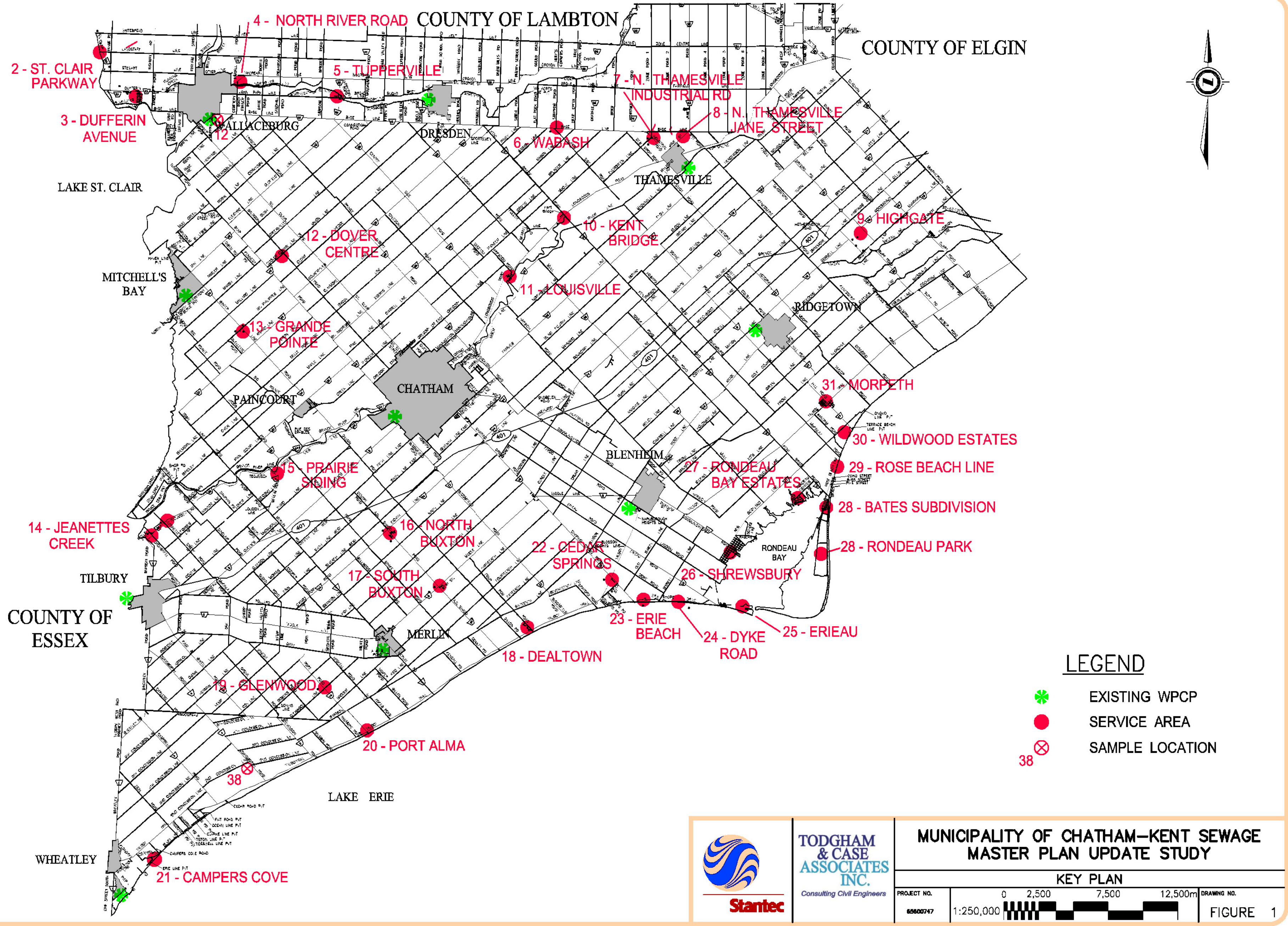


CHART 2
COSTS FOR SBR TREATMENT FACILITIES



APPENDIX B

FIGURES



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MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

KEY PLAN

PROJECT NO.			DRAWING NO.
65600747	1:250,000	0 2,500 7,500 12,500m	FIGURE 1

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE 1.dwg
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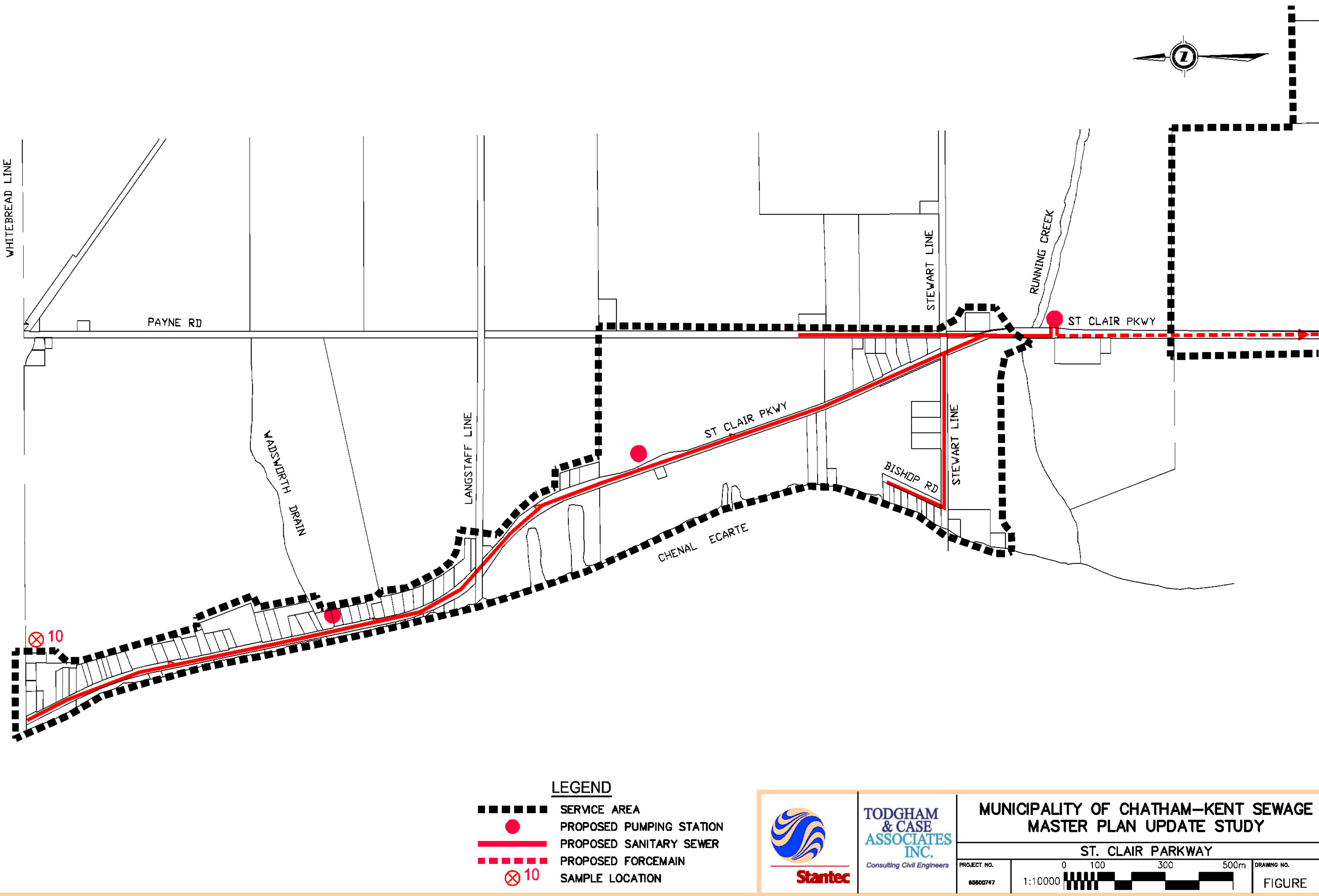

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MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

ST. CLAIR PARKWAY

PROJECT NO.	SCALE	DRAWING NO.
65600747	1:10000 (0, 100, 300, 500m)	FIGURE 2

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE 2-9.dwg
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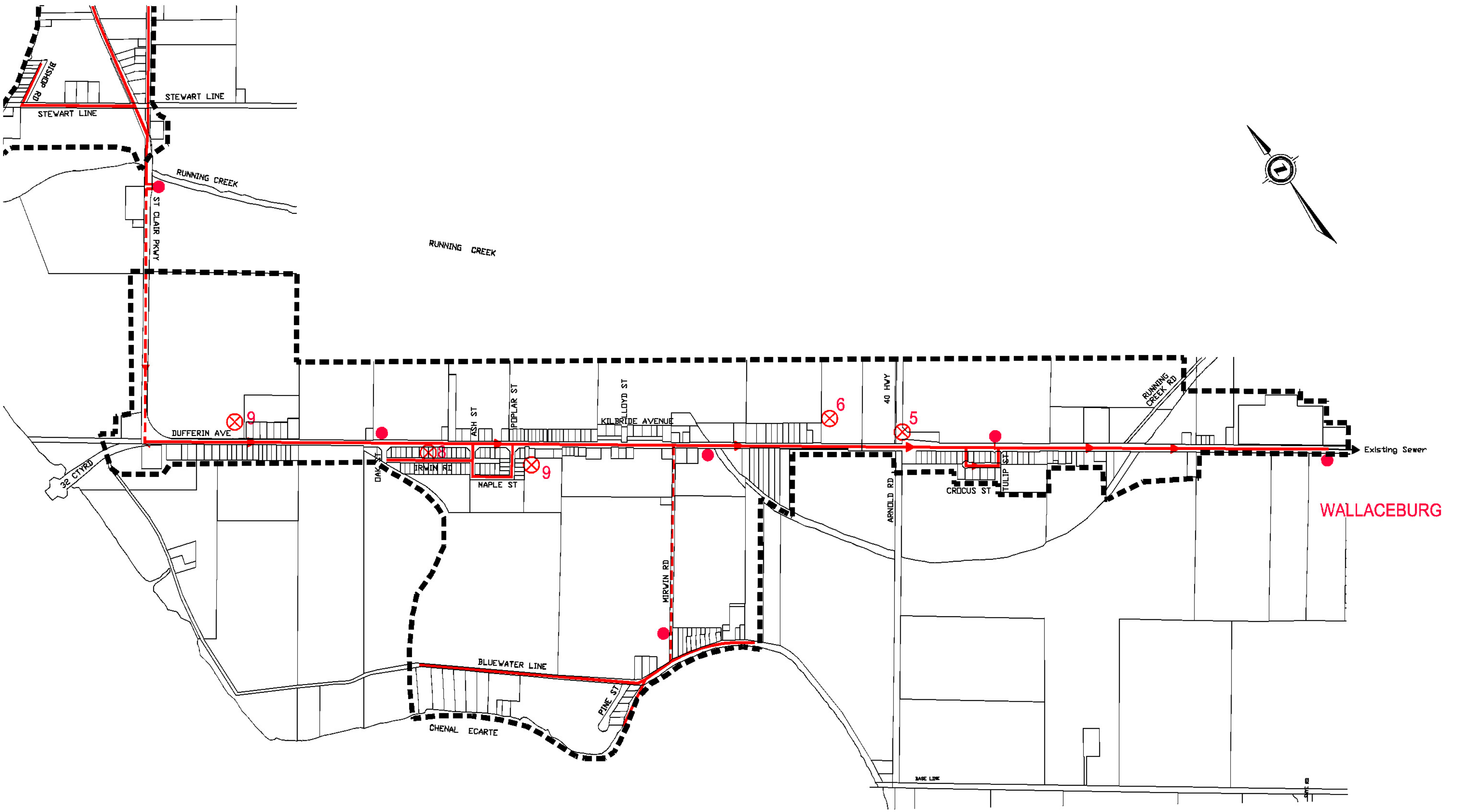

LEGEND

SERVICE AREA
PROPOSED PUMPING STATION
PROPOSED SANITARY SEWER
PROPOSED FORCEMAIN
10 SAMPLE LOCATION

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MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

DUFFERIN AVE.

PROJECT NO.		DRAWING NO.
65600747	1:15,000 0 150 450 750m	FIGURE 3

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE 2-9.dwg
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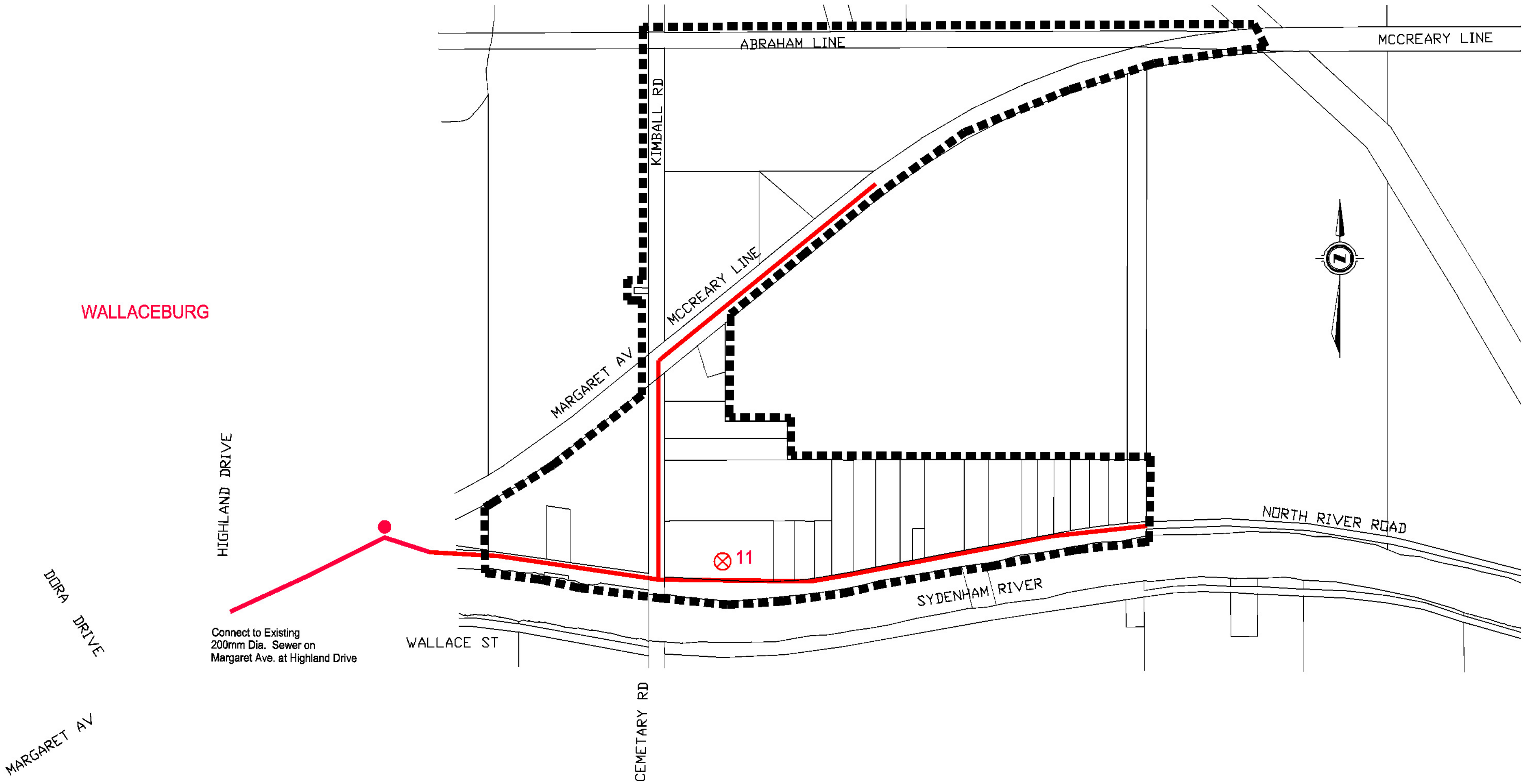

LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- 10 SAMPLE LOCATION

Stantec

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Consulting Civil Engineers

MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

NORTH RIVER ROAD

PROJECT NO. 65600747 | 1:5000 | 0 50 150 250m | DRAWING NO. FIGURE 4

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE 2-9.dwg
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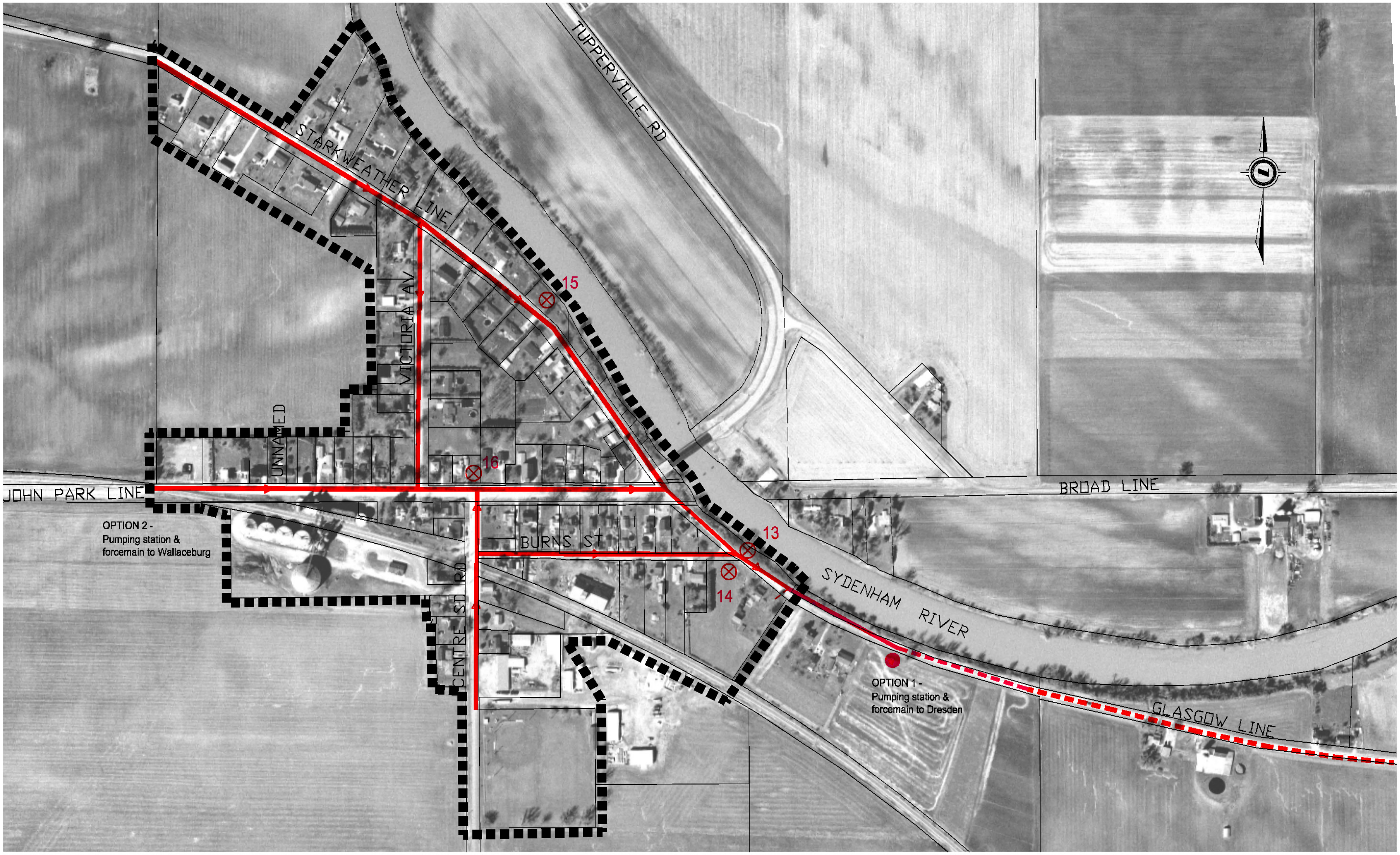

LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- 10 SAMPLE LOCATION

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MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

TUPPERVILLE

PROJECT NO.		DRAWING NO.
65600747	1:4000 0 40 120 200m	FIGURE 5

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE 2-9.dwg
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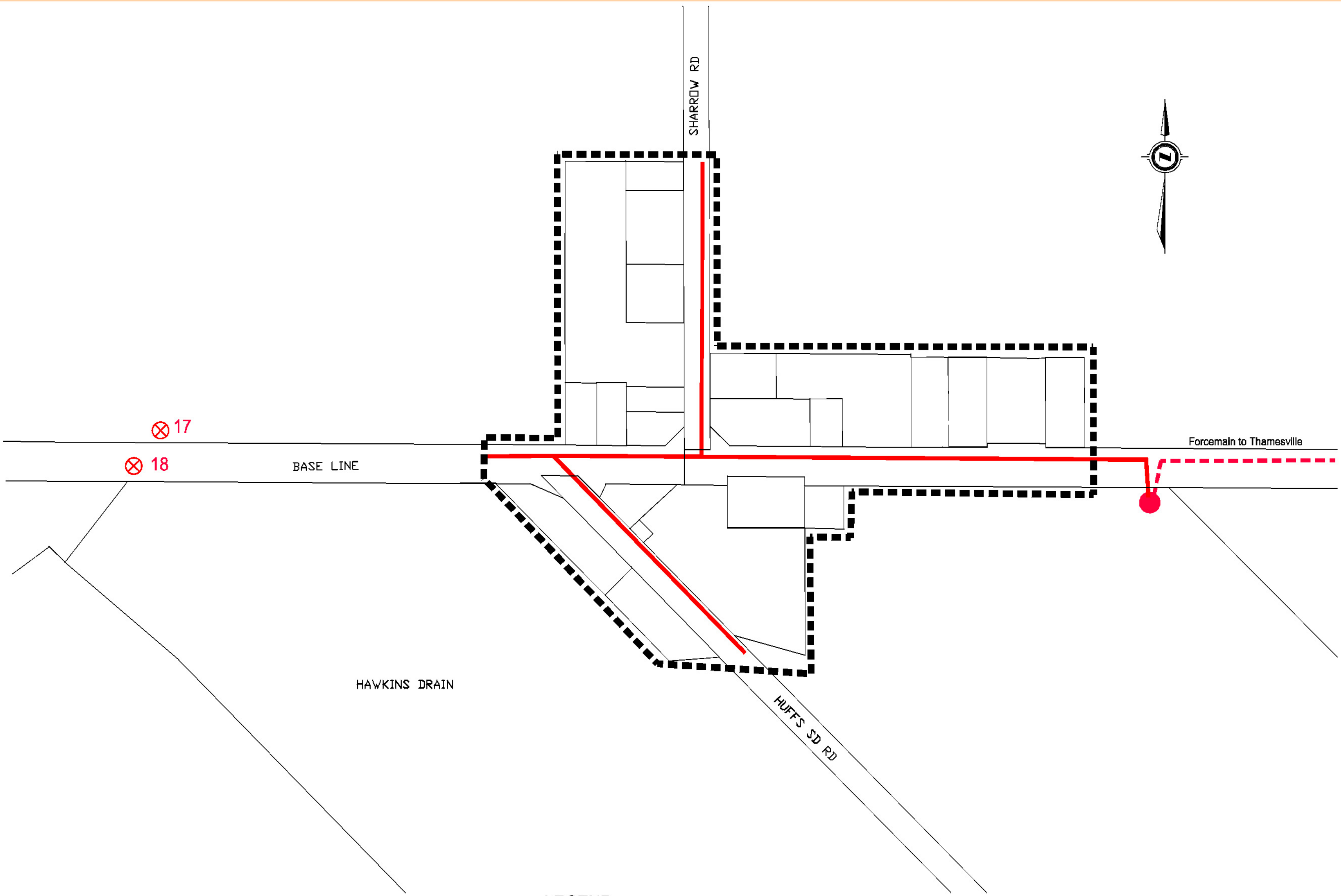

LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- 10 SAMPLE LOCATION

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MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

WABASH

PROJECT NO.		DRAWING NO.
65600747	1:3000 (0 30 90 150m)	FIGURE 6

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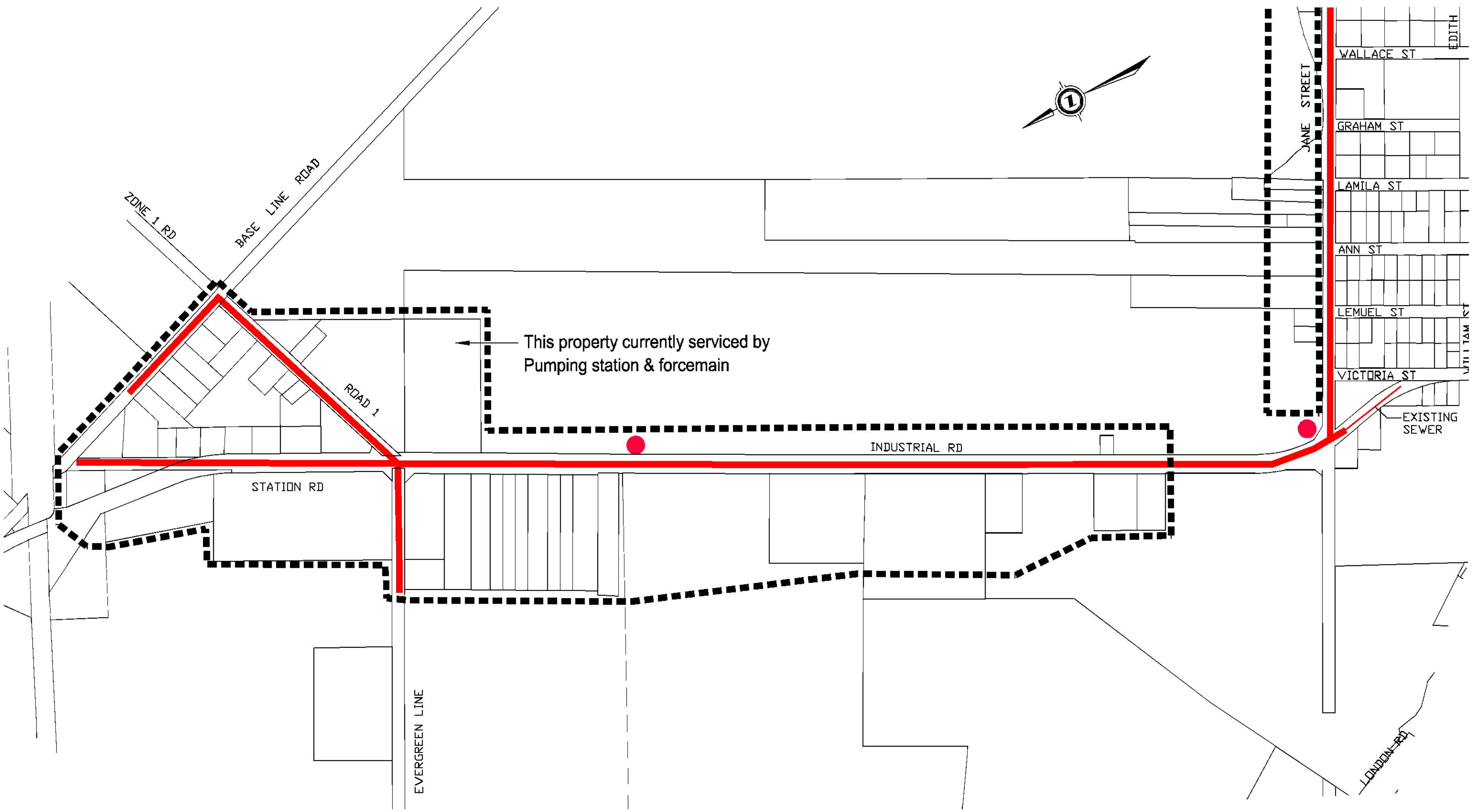

LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- ⊗ 10 SAMPLE LOCATION

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MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

NORTH THAMESVILLE – INDUSTRIAL ROAD

PROJECT NO. 65600747

1:6000 0 60 180 300m

DRAWING NO. FIGURE 7

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE 2-9.dwg
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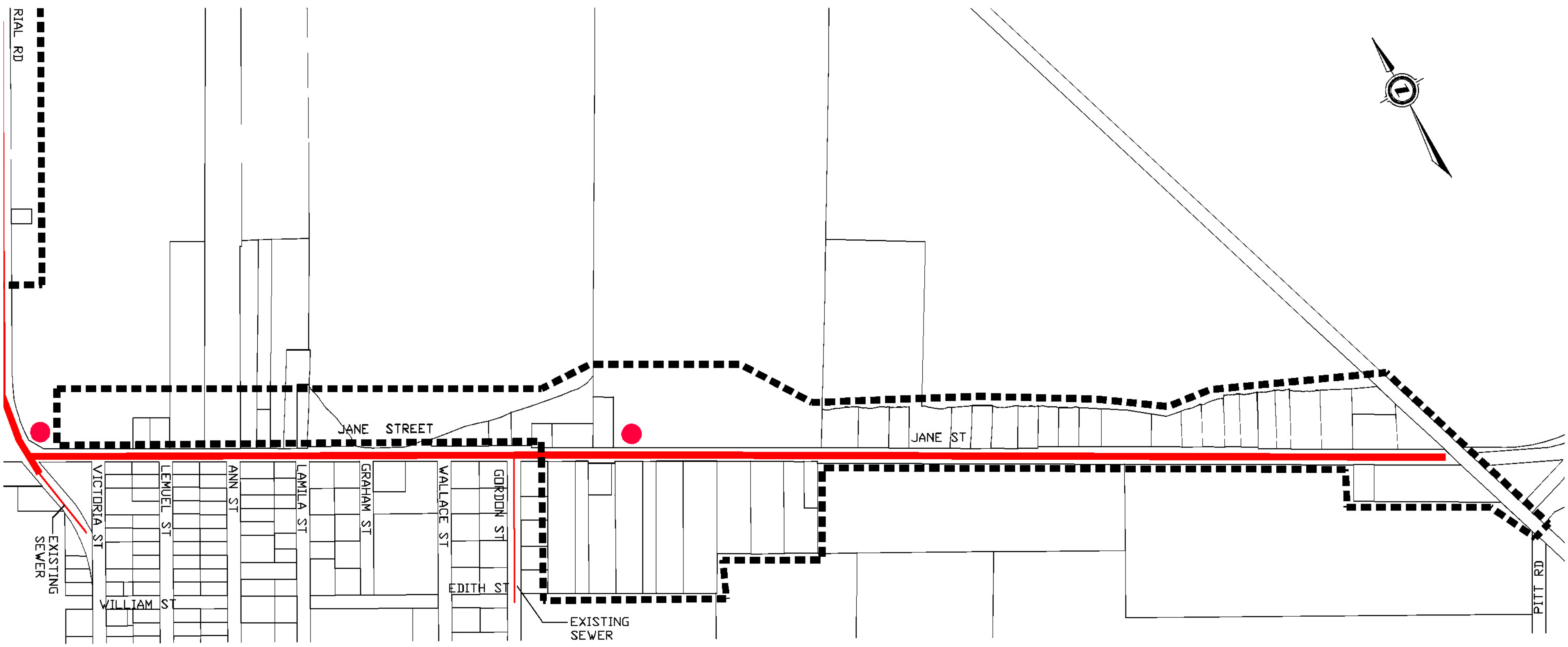

LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- ⊗ 10 SAMPLE LOCATION

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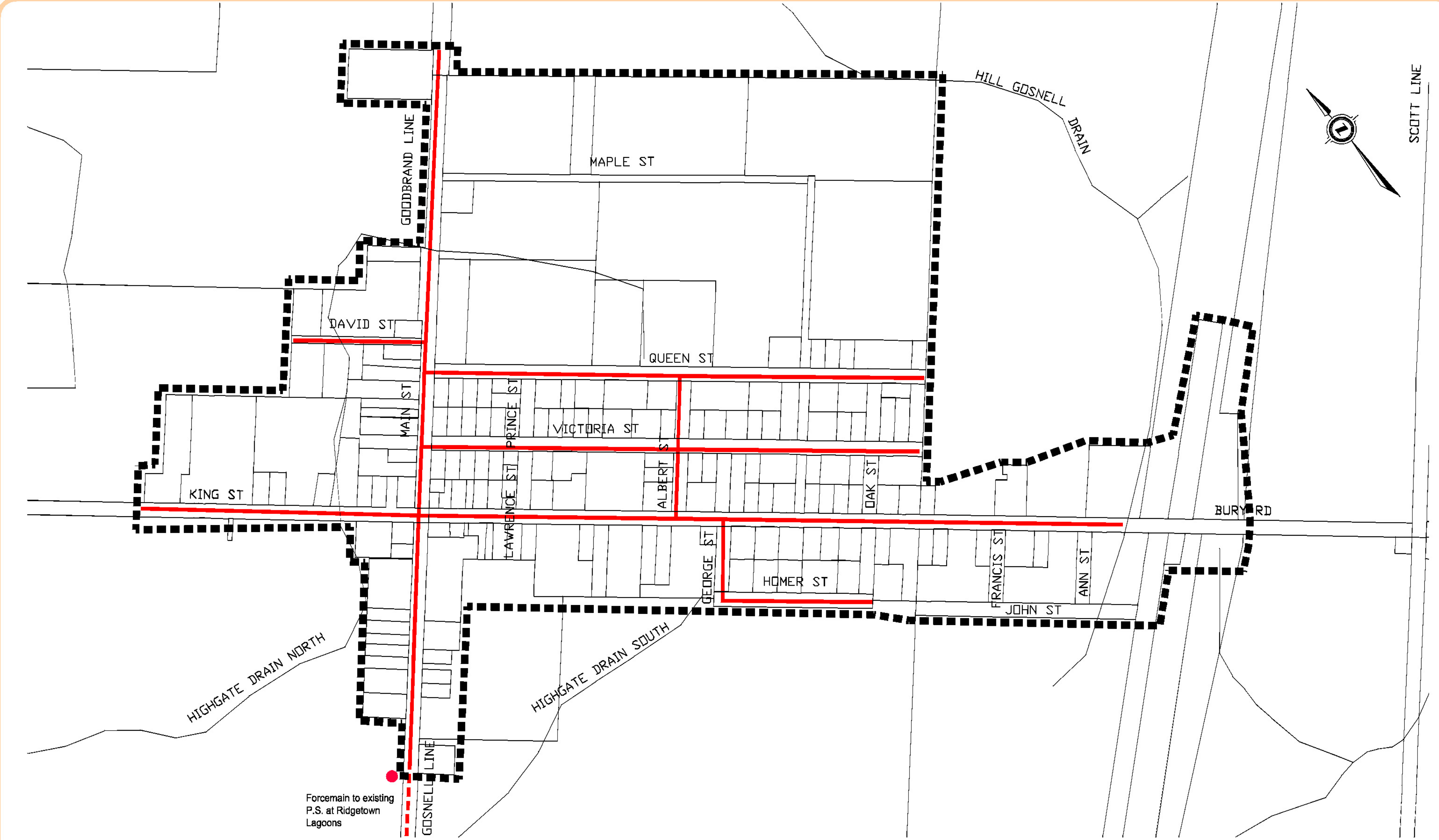
Consulting Civil Engineers

MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

NORTH THAMESVILLE – JANE STREET

PROJECT NO.		DRAWING NO.
65600747	1:6000 0 60 180 300m	FIGURE 8



LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- 10 SAMPLE LOCATION

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MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

HIGHGATE

PROJECT NO. 65600747

1:5000 — 0 50 150 250m

DRAWING NO. FIGURE 9

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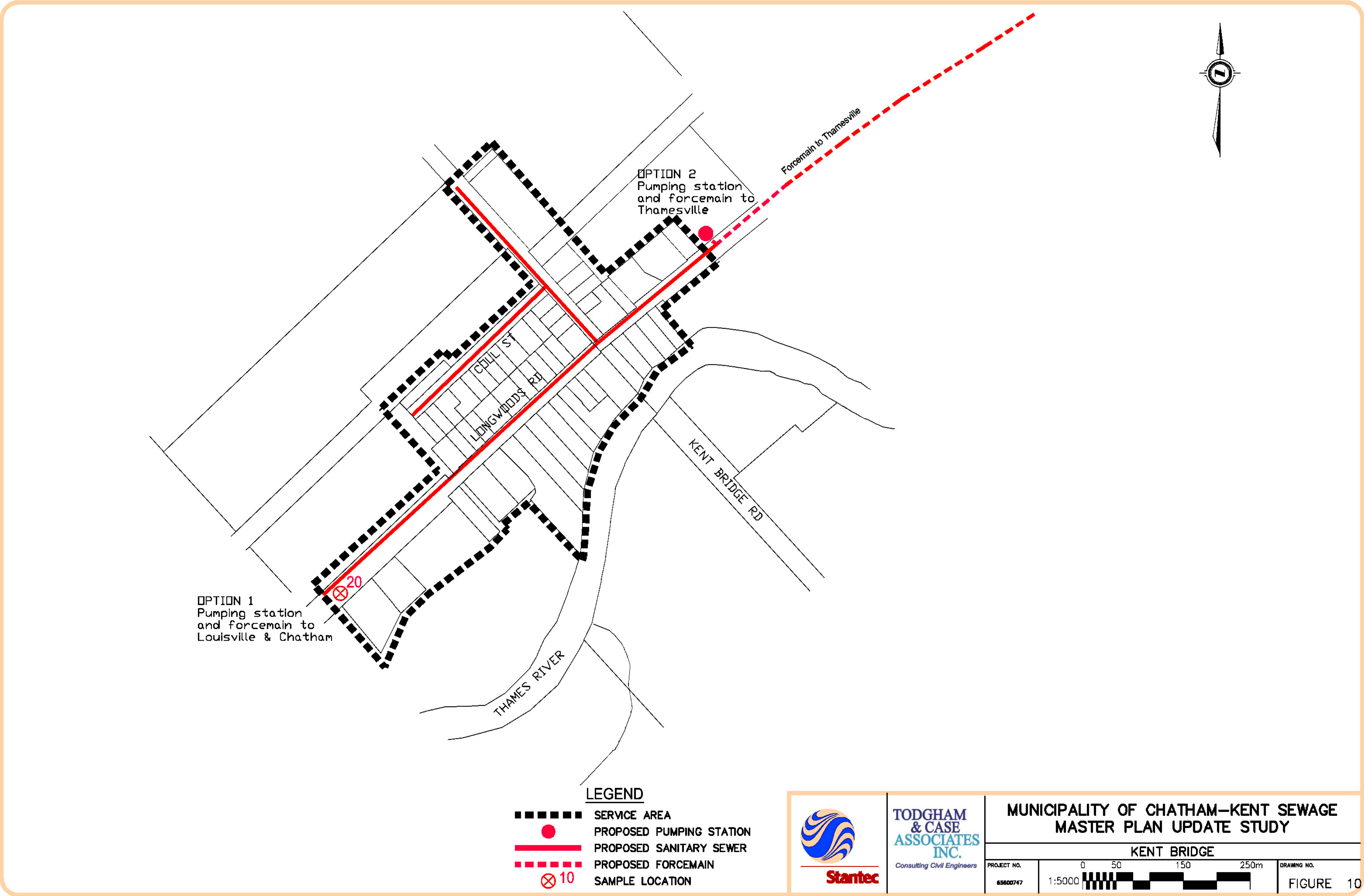

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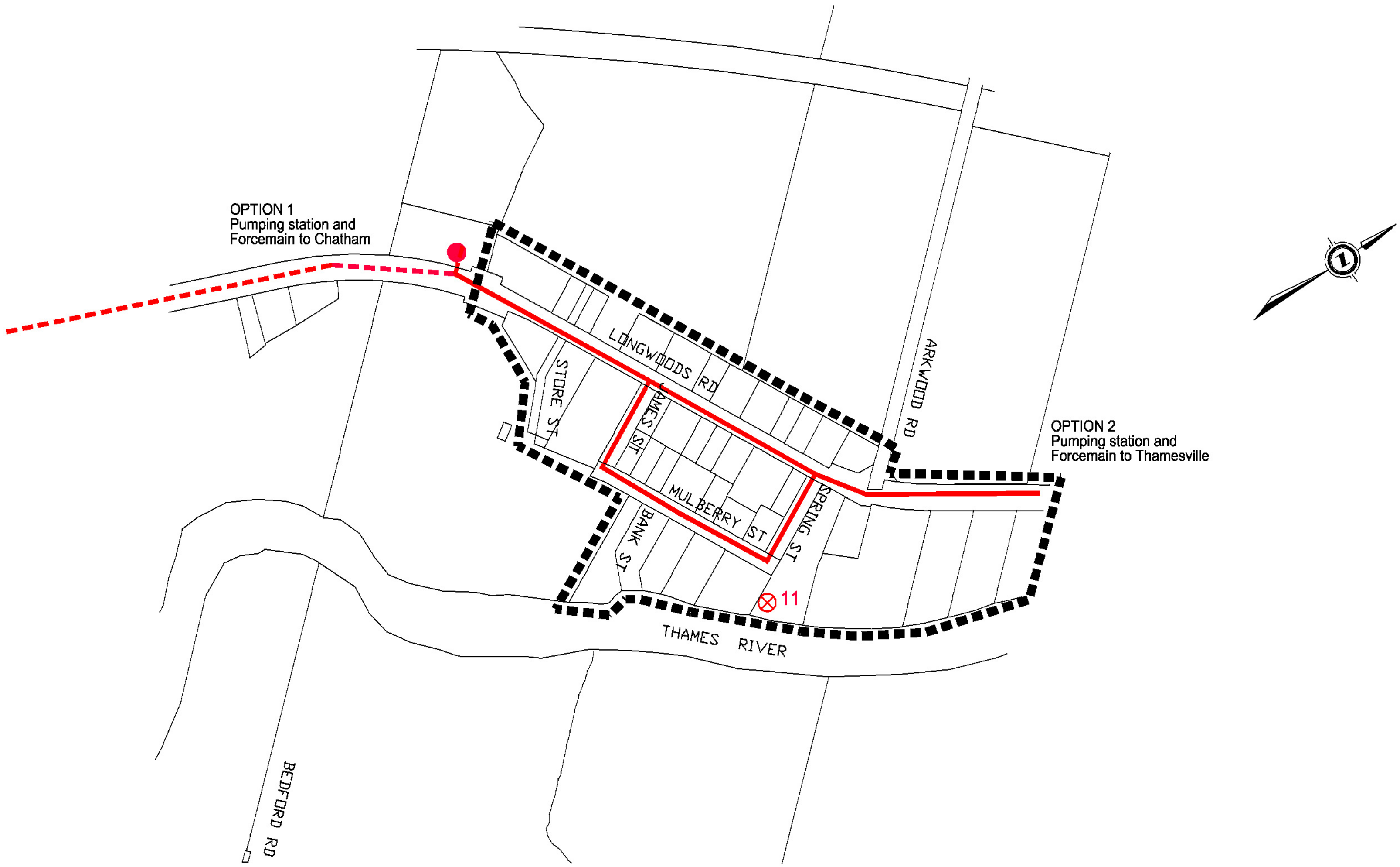

LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- 10 SAMPLE LOCATION

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MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

LOUISVILLE

PROJECT NO.	SCALE	DRAWING NO.
65600747	1:5000 (0, 50, 150, 250m)	FIGURE 11

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-10-16.dwg
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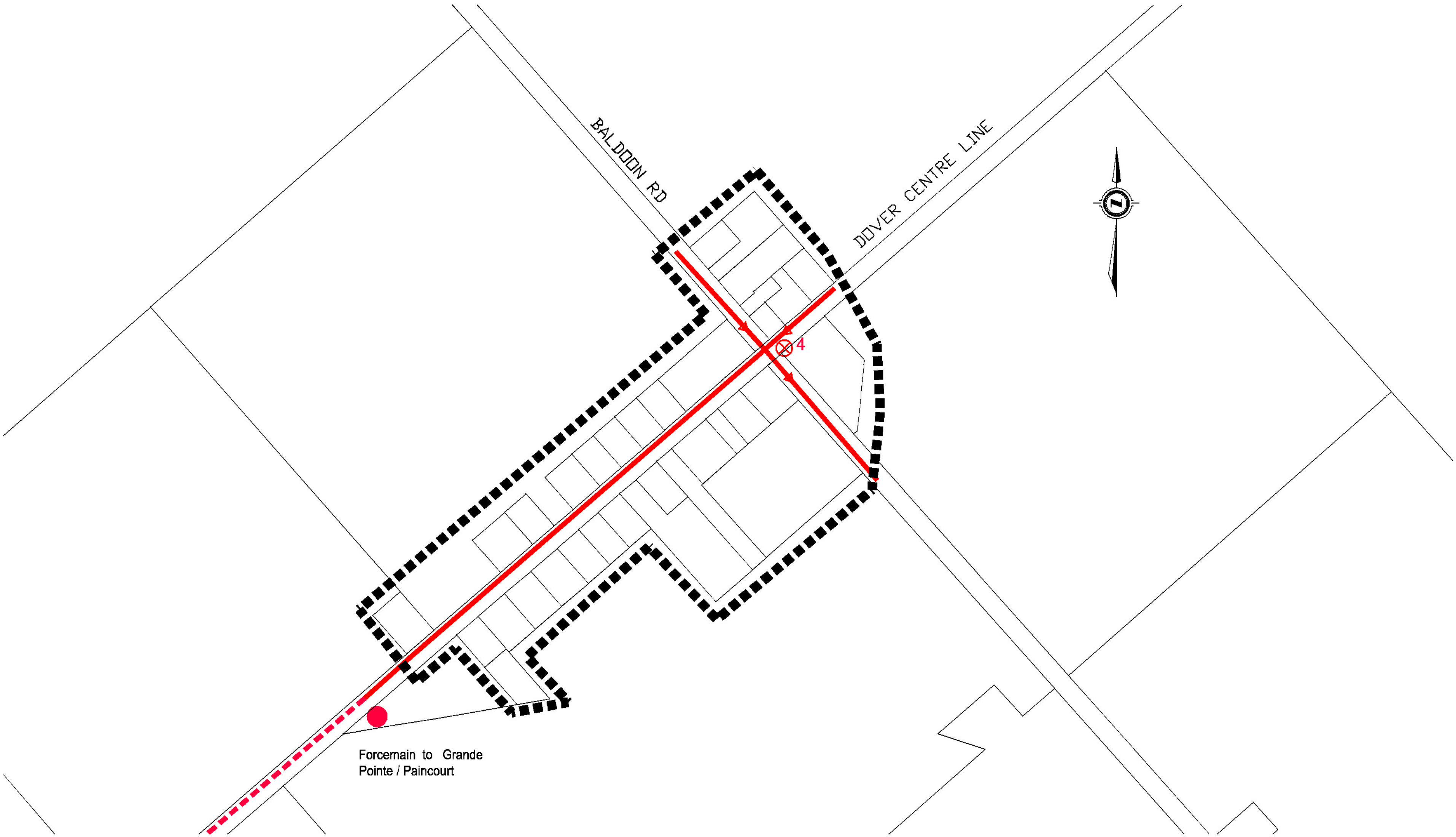

LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- 10 SAMPLE LOCATION

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MUNICIPALITY OF CHATHAM-KENT SEWAGE MASTER PLAN UPDATE STUDY

DOVER CENTRE

PROJECT NO.		DRAWING NO.
65600747	1:4000 0 40 120 200m	FIGURE 12

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-10-16.dwg
2005-09-14 11:28AM By: kfox

LEGEND

SERVICE AREA
PROPOSED PUMPING STATION
PROPOSED SANITARY SEWER
PROPOSED FORCEMAIN
10 SAMPLE LOCATION

Stantec

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Consulting Civil Engineers

MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

GRANDE POINTE

PROJECT NO. 65600747

1:5000 0 50 150 250m

DRAWING NO. FIGURE 13

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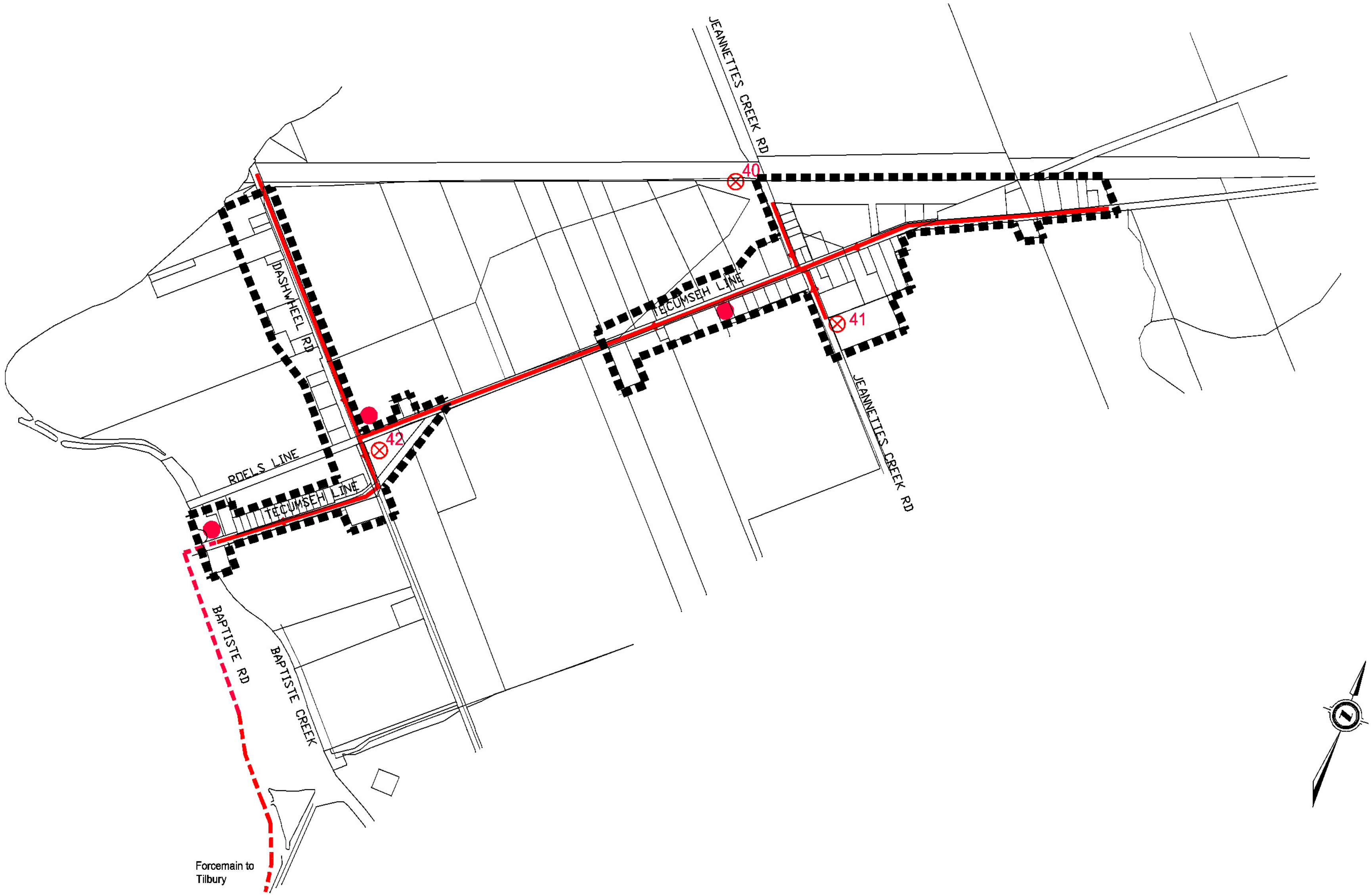

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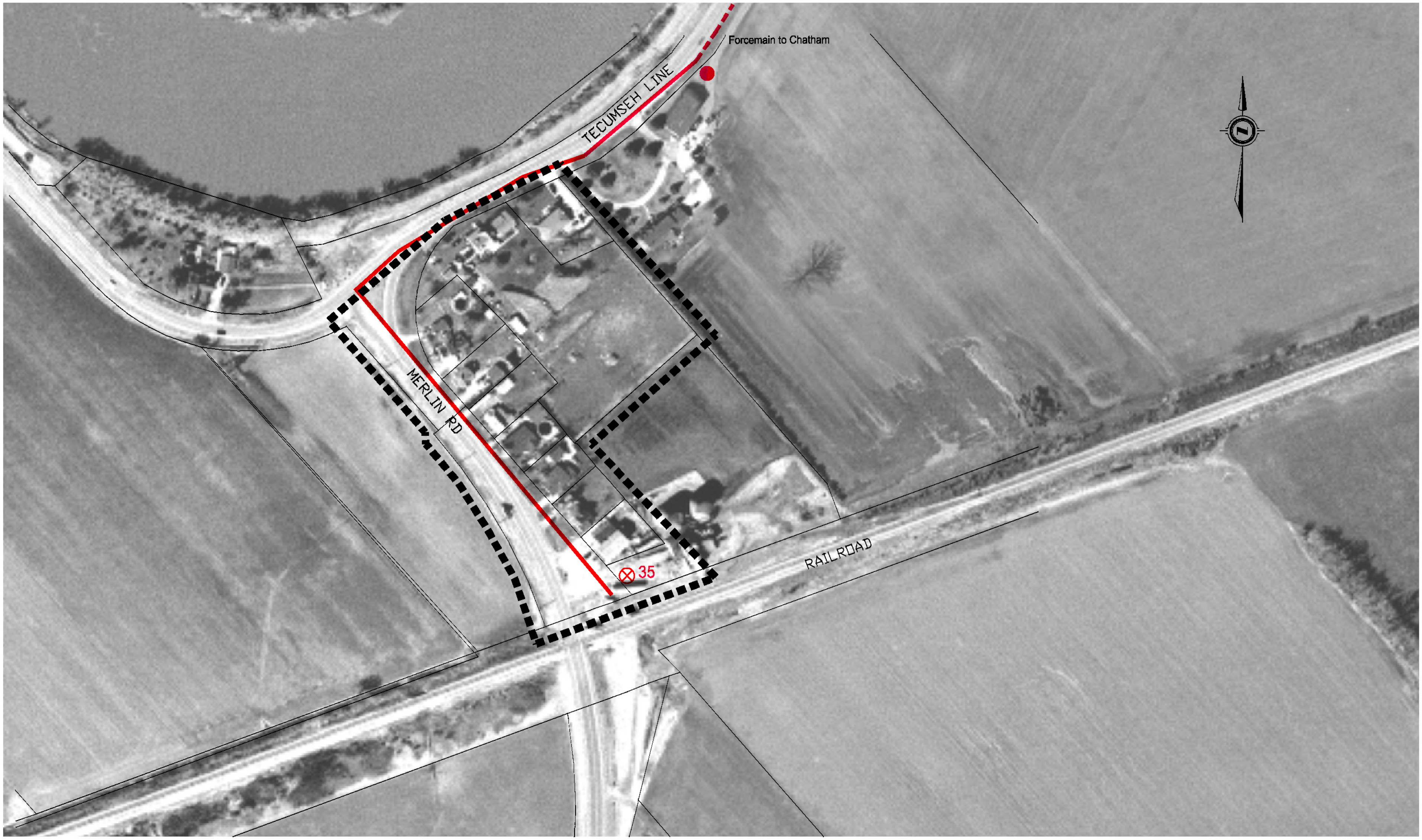
MUNICIPALITY OF CHATHAM-KENT SEWAGE MASTER PLAN UPDATE STUDY

JEANETTES CREEK

PROJECT NO. 65600747

1:10000 0 100 300 500m

DRAWING NO. FIGURE 14



LEGEND

SERVICE AREA
PROPOSED PUMPING STATION
PROPOSED SANITARY SEWER
PROPOSED FORCEMAIN
10 SAMPLE LOCATION

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MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

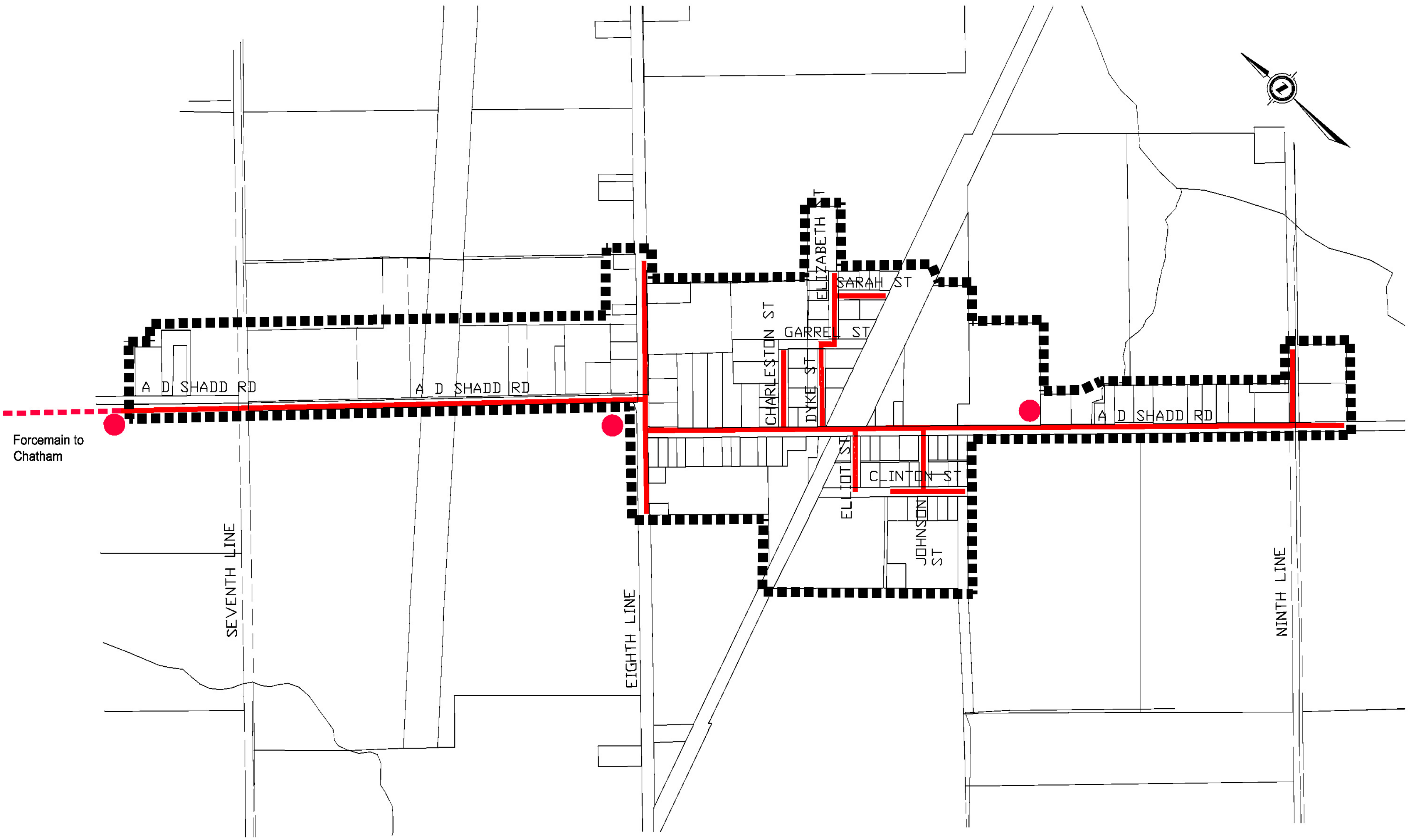
PRAIRIE SIDING

PROJECT NO. 63600747

1:2000 0 20 60 100m

DRAWING NO. FIGURE 15

W:\active\63600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-10-16.dwg
2005-09-14 11:27AM By: kfox



LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- ⊗ 10 SAMPLE LOCATION

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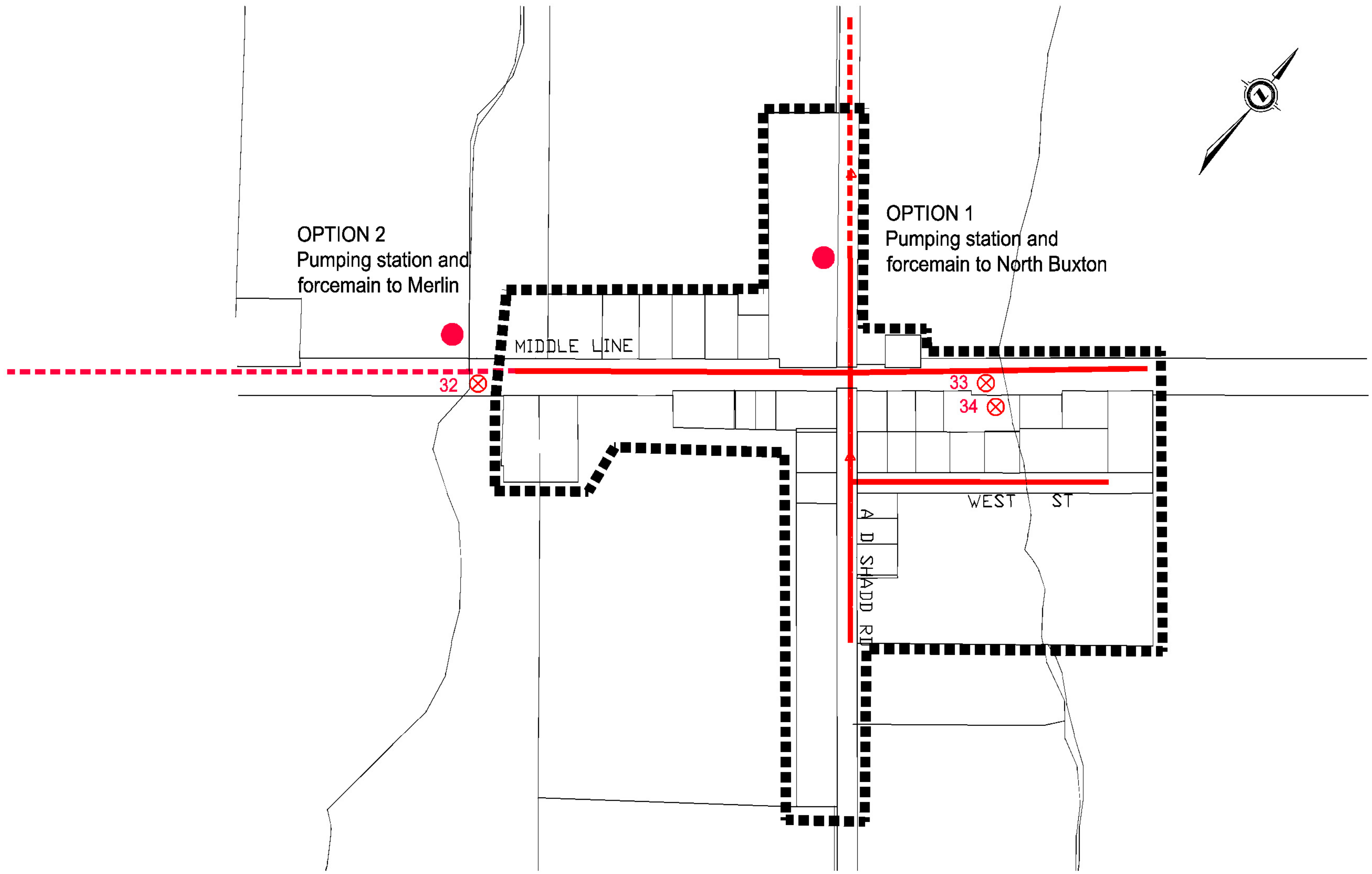
MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

NORTH BUXTON

PROJECT NO.		DRAWING NO.
65600747	1=7500 0 75 225 375m	FIGURE 16

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-10-16.dwg
2005-09-14 11:27AM By: kfox



LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- 10 SAMPLE LOCATION

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MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

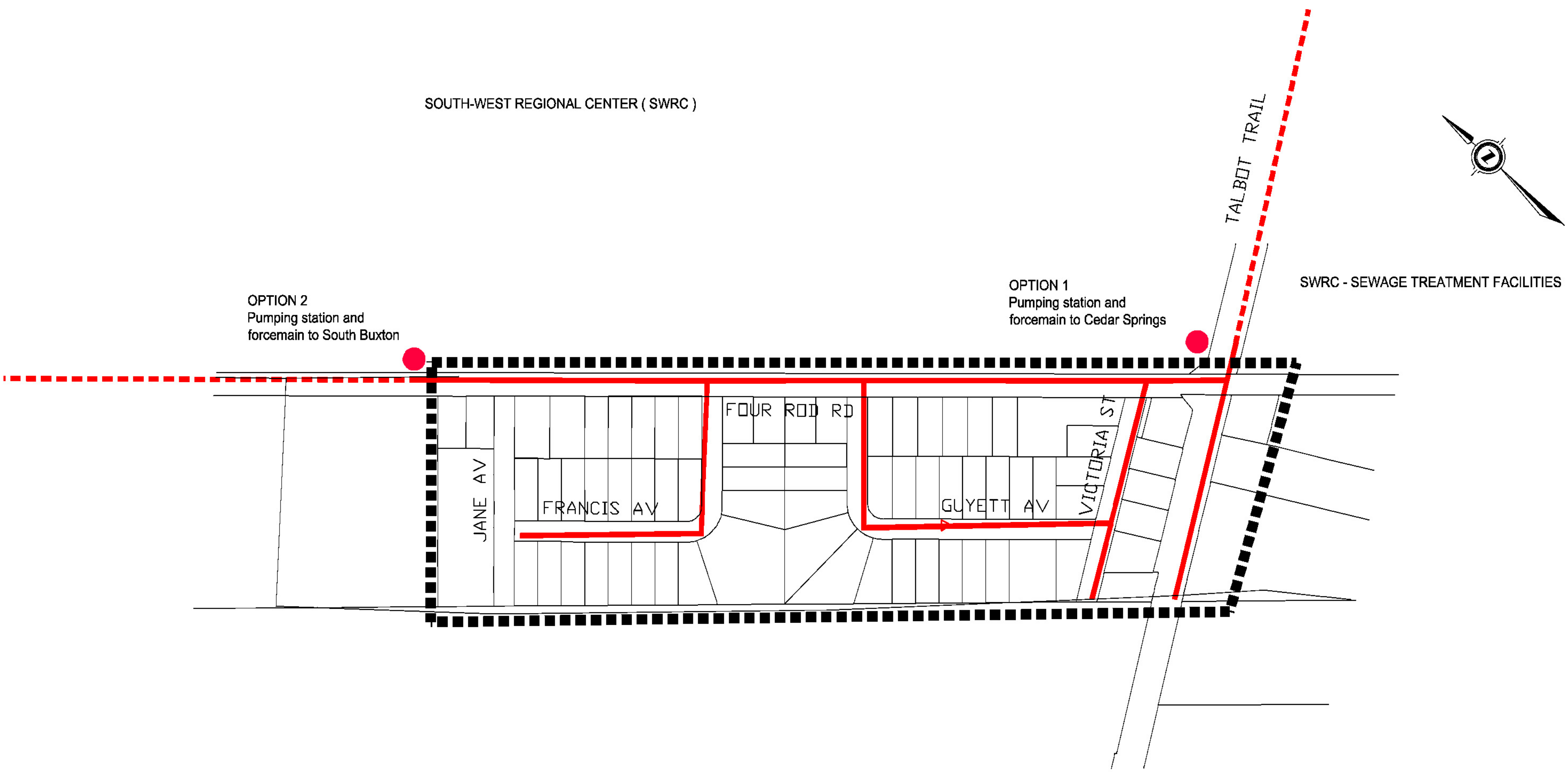
SOUTH BUXTON

PROJECT NO. 65600747

1:4000 0 40 120 200m

DRAWING NO. FIGURE 17

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-17-22.dwg
2005-09-14 11:26AM By: kfox



LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- ⊗10 SAMPLE LOCATION

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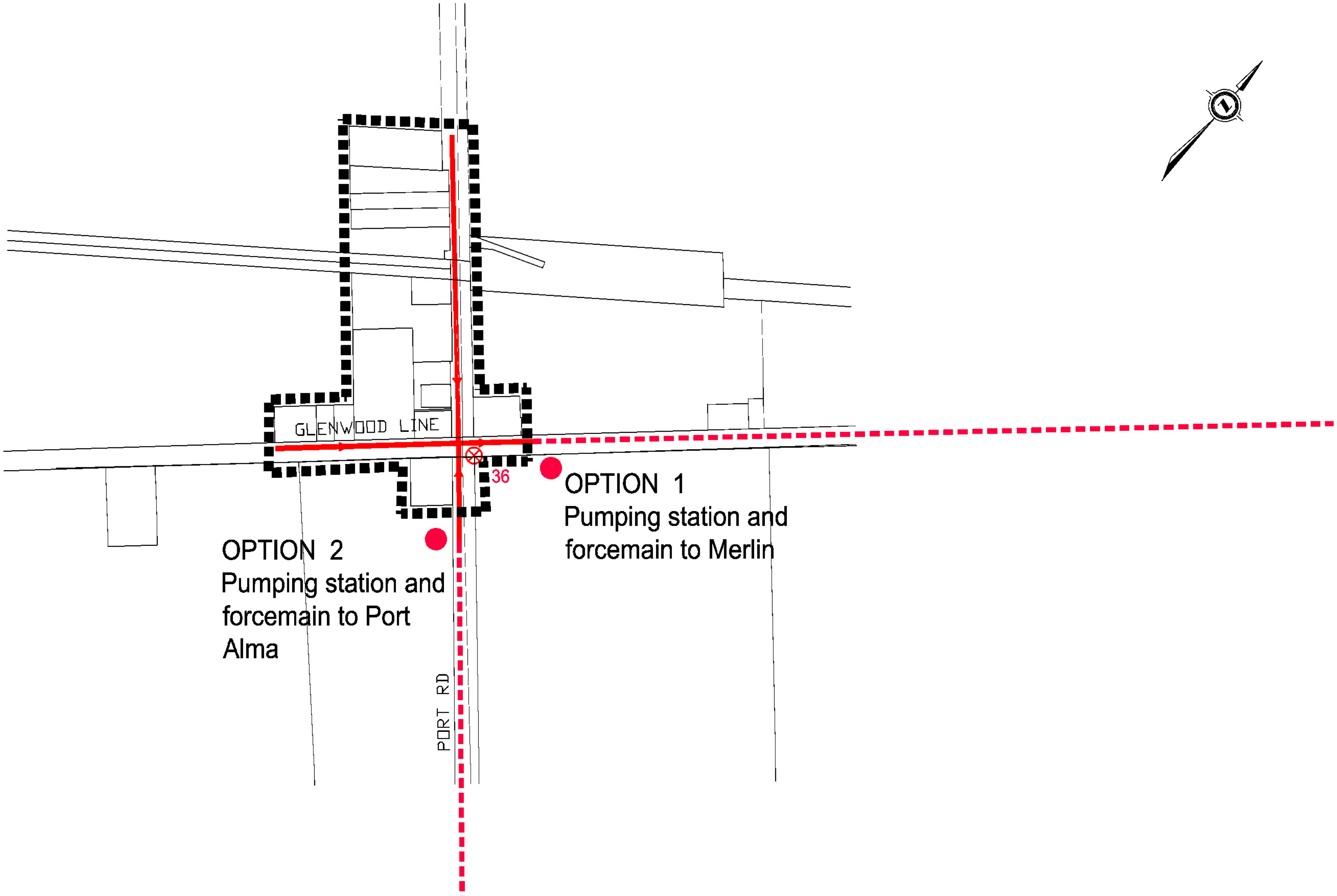
MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

DEALTOWN

PROJECT NO.		DRAWING NO.
65600747	1:4000 0 40 120 200m	FIGURE 18

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-17-22.dwg
2005-09-14 11:26AM By: kfox



LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- ⊗ 10 SAMPLE LOCATION

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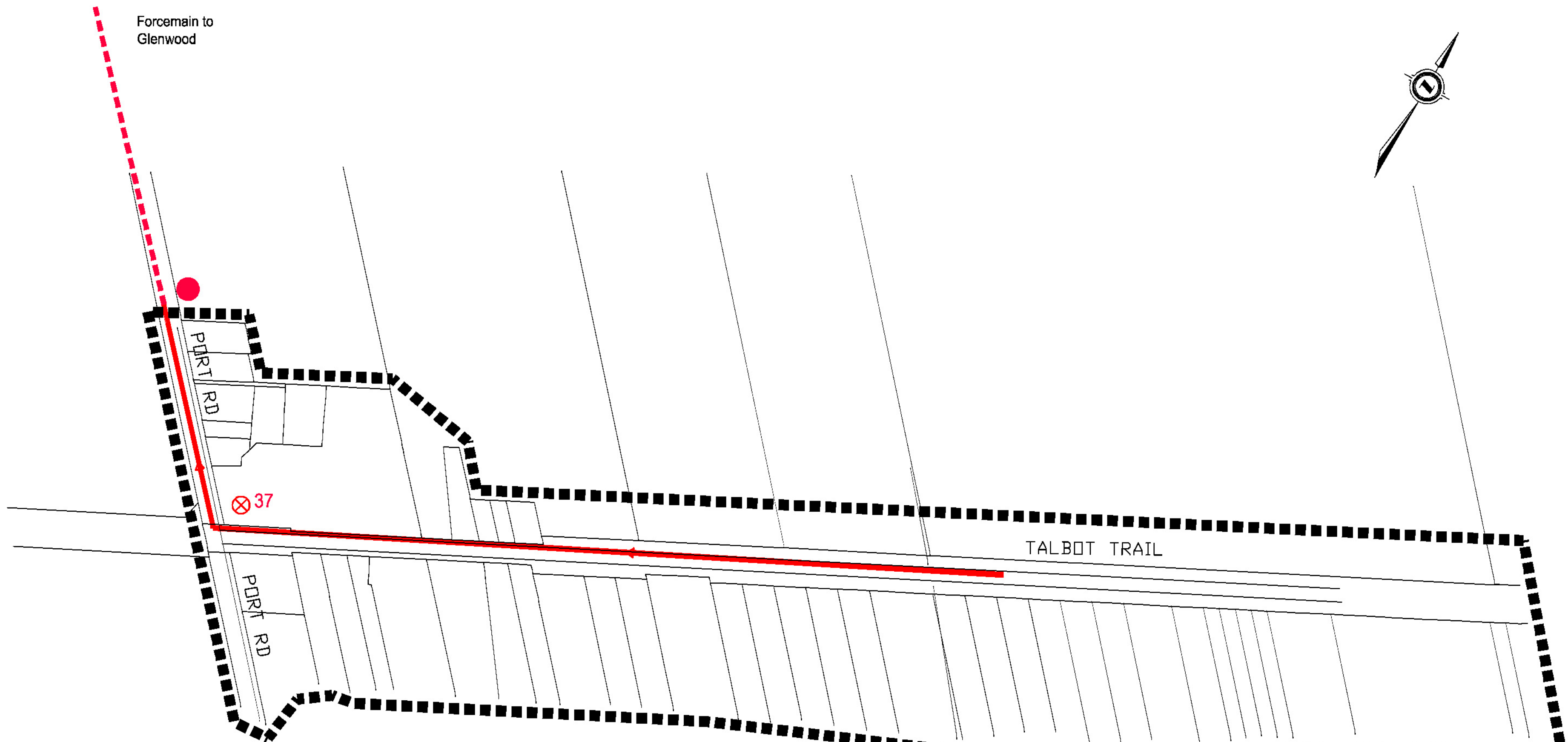
MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

GLENWOOD

PROJECT NO.		DRAWING NO.
65600747	1:4000 (0, 40, 120, 200m)	FIGURE 19

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-17-22.dwg
2005-09-14 11:26AM By: kfox



LEGEND

SERVICE AREA
PROPOSED PUMPING STATION
PROPOSED SANITARY SEWER
PROPOSED FORCEMAIN
10 SAMPLE LOCATION

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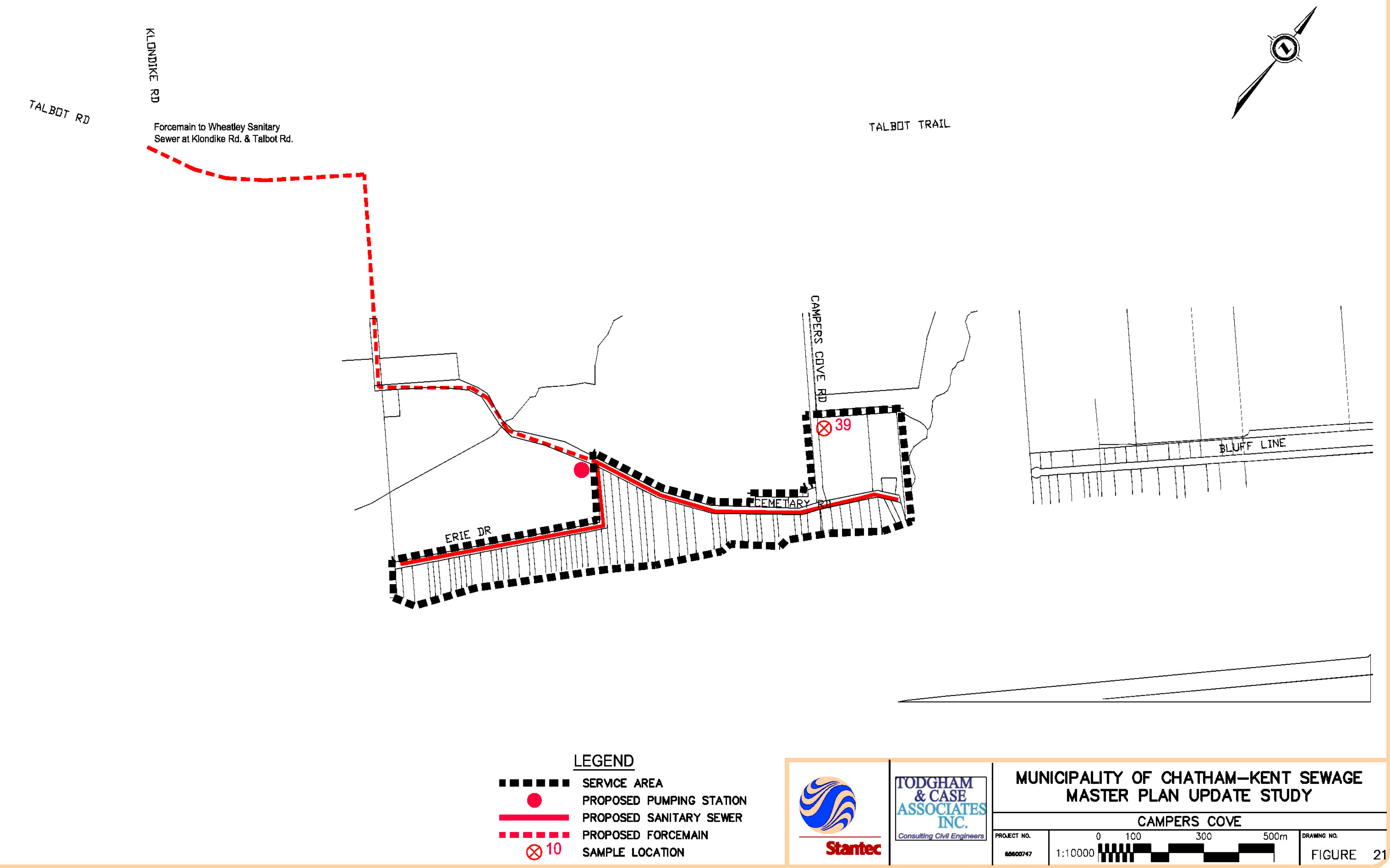
MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

PORT ALMA

PROJECT NO.		DRAWING NO.
65600747	1:4000 (0 40 120 200m)	FIGURE 20

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-17-22.dwg
2005-09-14 11:26AM By: kfox



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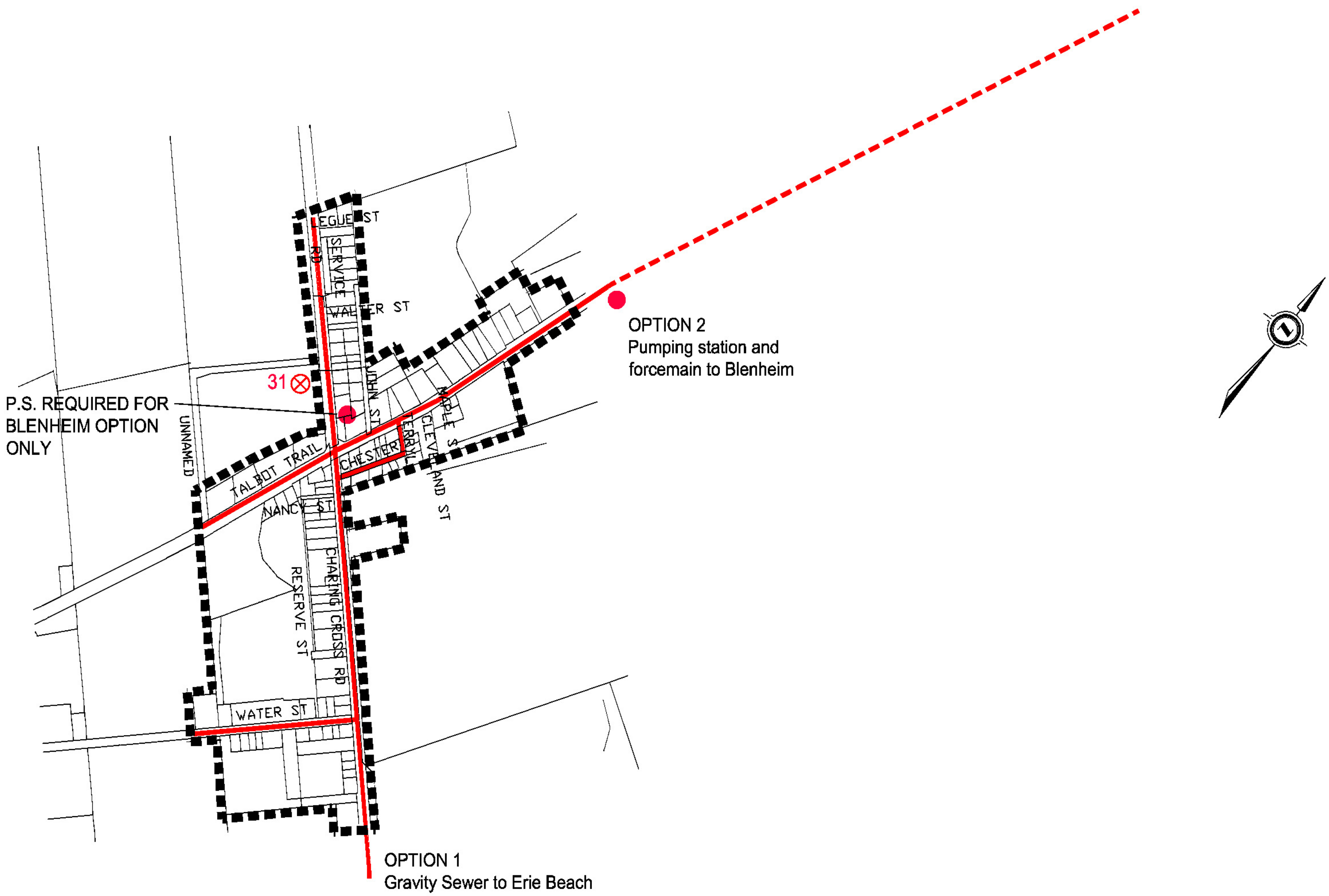
MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

CAMPERS COVE

PROJECT NO.		DRAWING NO.
65600747	1:10000 0 100 300 500m	FIGURE 21

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-17-22.dwg
2005-09-14 11:26AM By: kfox



LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- 10 SAMPLE LOCATION

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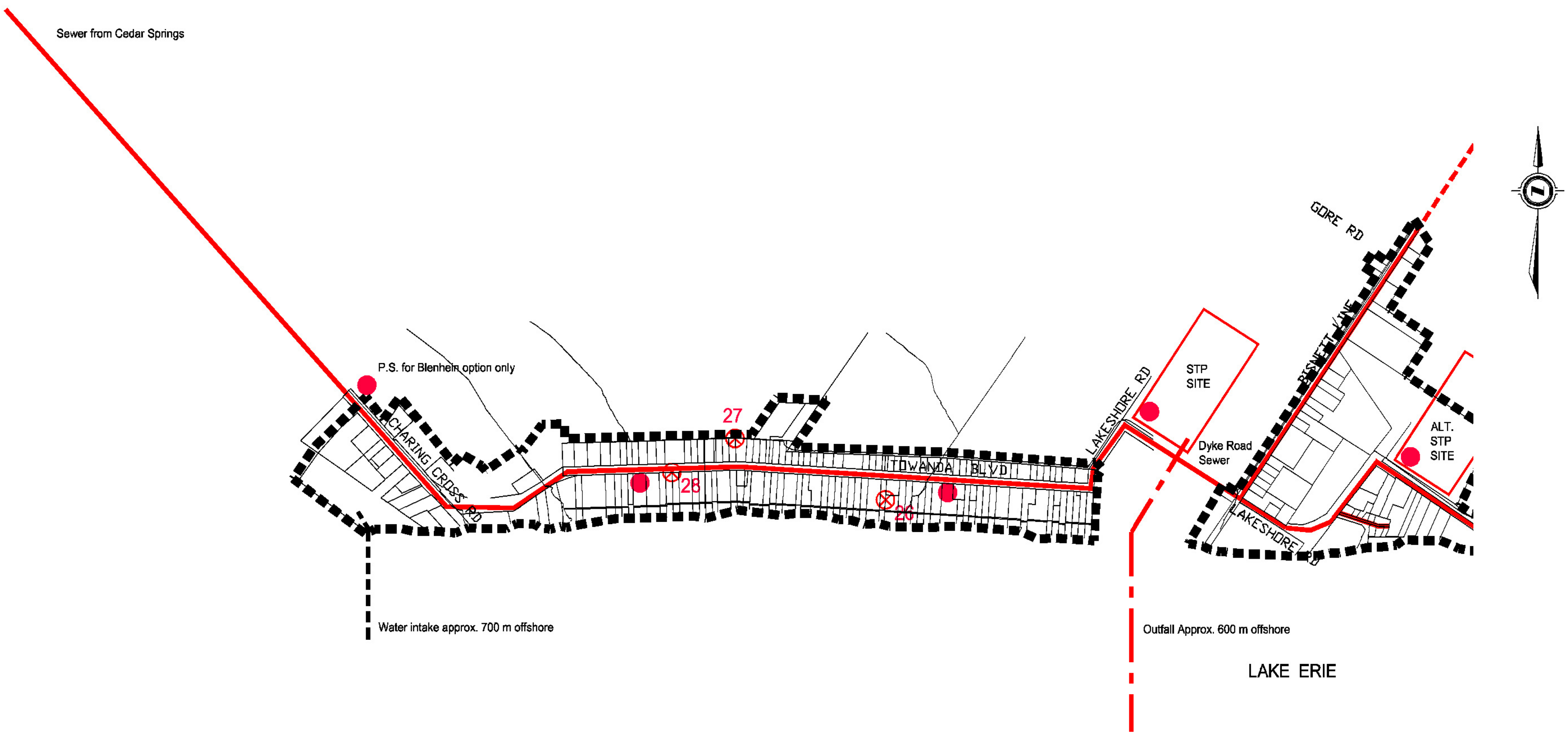
MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

CEDAR SPRINGS

PROJECT NO.		DRAWING NO.
65600747	1=7500 0 75 225 375m	FIGURE 22



LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- 10 SAMPLE LOCATION

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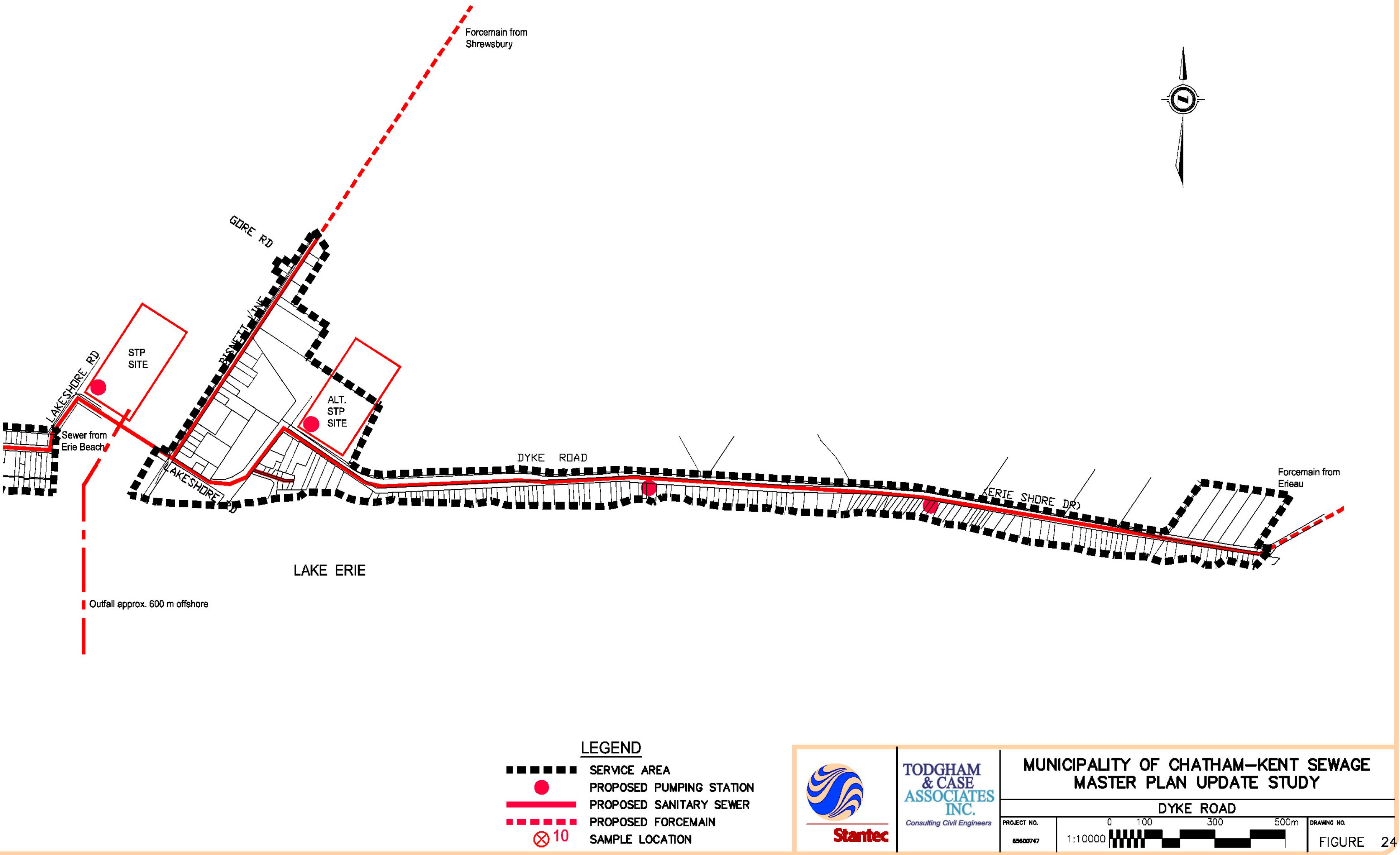
MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

ERIE BEACH

PROJECT NO.	SCALE	DRAWING NO.
65600747	1:10000 (0, 100, 300, 500m)	FIGURE 23

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-23-31.dwg
2005-09-14 11:24AM By: kfox



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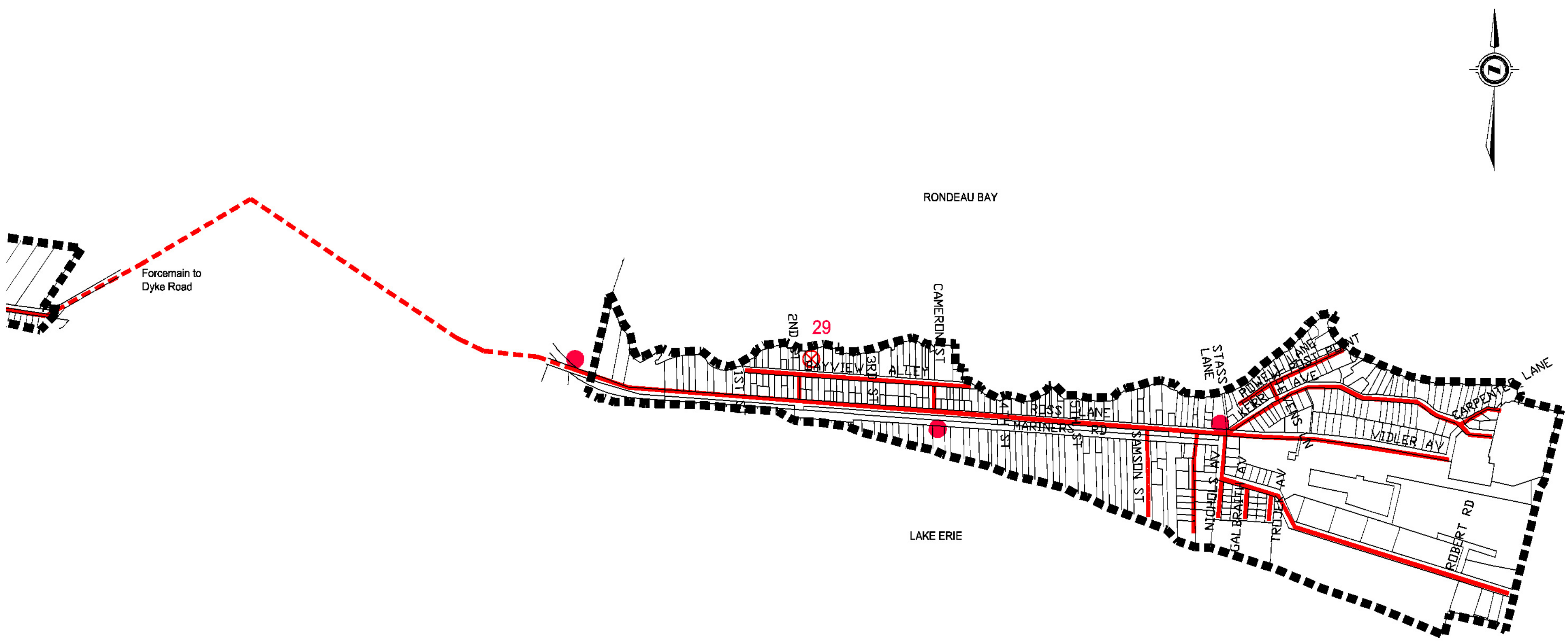
MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

DYKE ROAD

PROJECT NO.		DRAWING NO.
65600747	1:10000 (0, 100, 300, 500m)	FIGURE 24

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-23-31.dwg
2005-09-14 11:24AM By: kfox



LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- 10 SAMPLE LOCATION

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MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

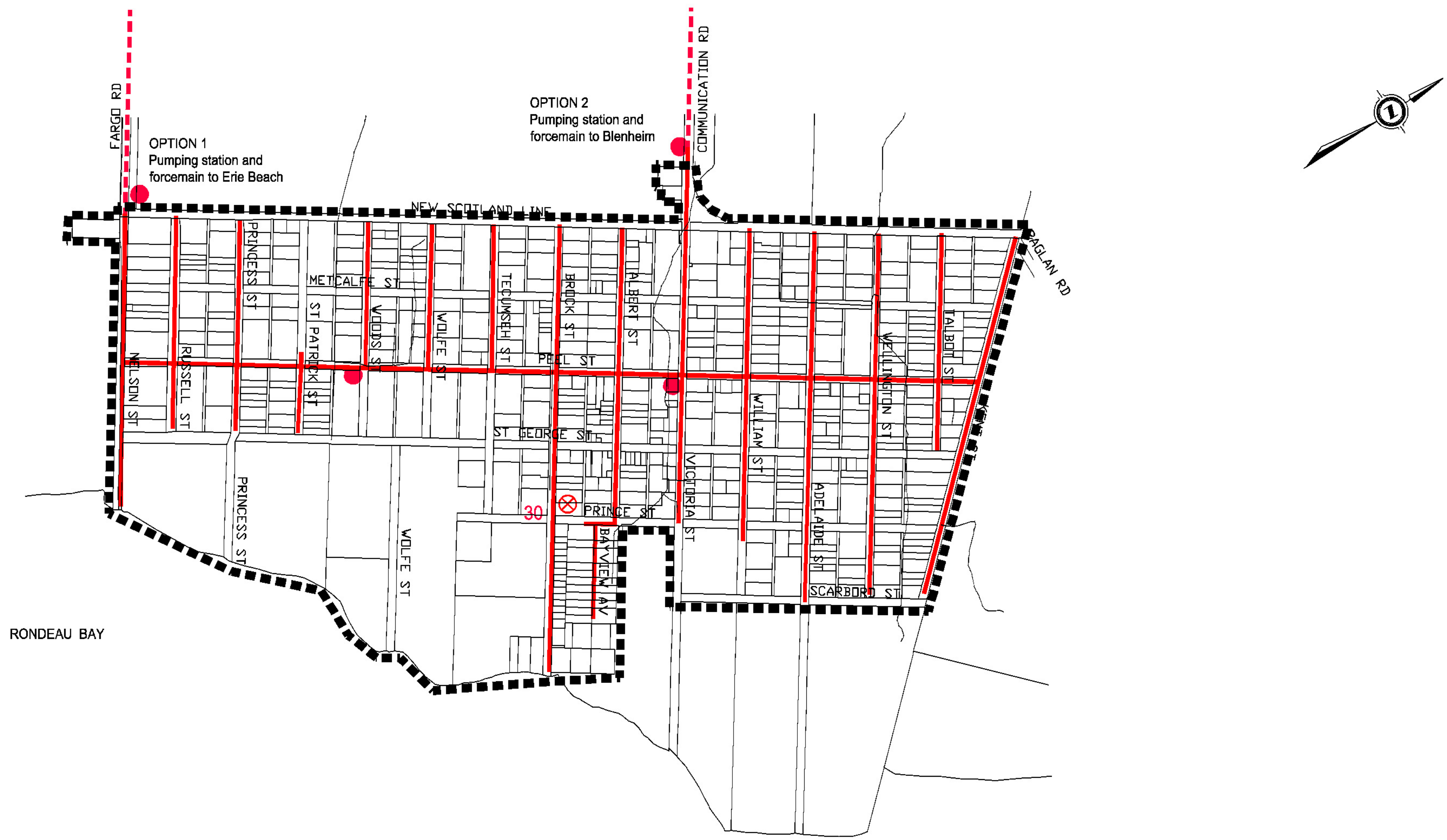
ERIEAU

PROJECT NO. 65600747

1:10000 0 100 300 500m

DRAWING NO. FIGURE 25

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-23-31.dwg
2005-09-14 11:24AM By: kfox



LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- 10 SAMPLE LOCATION

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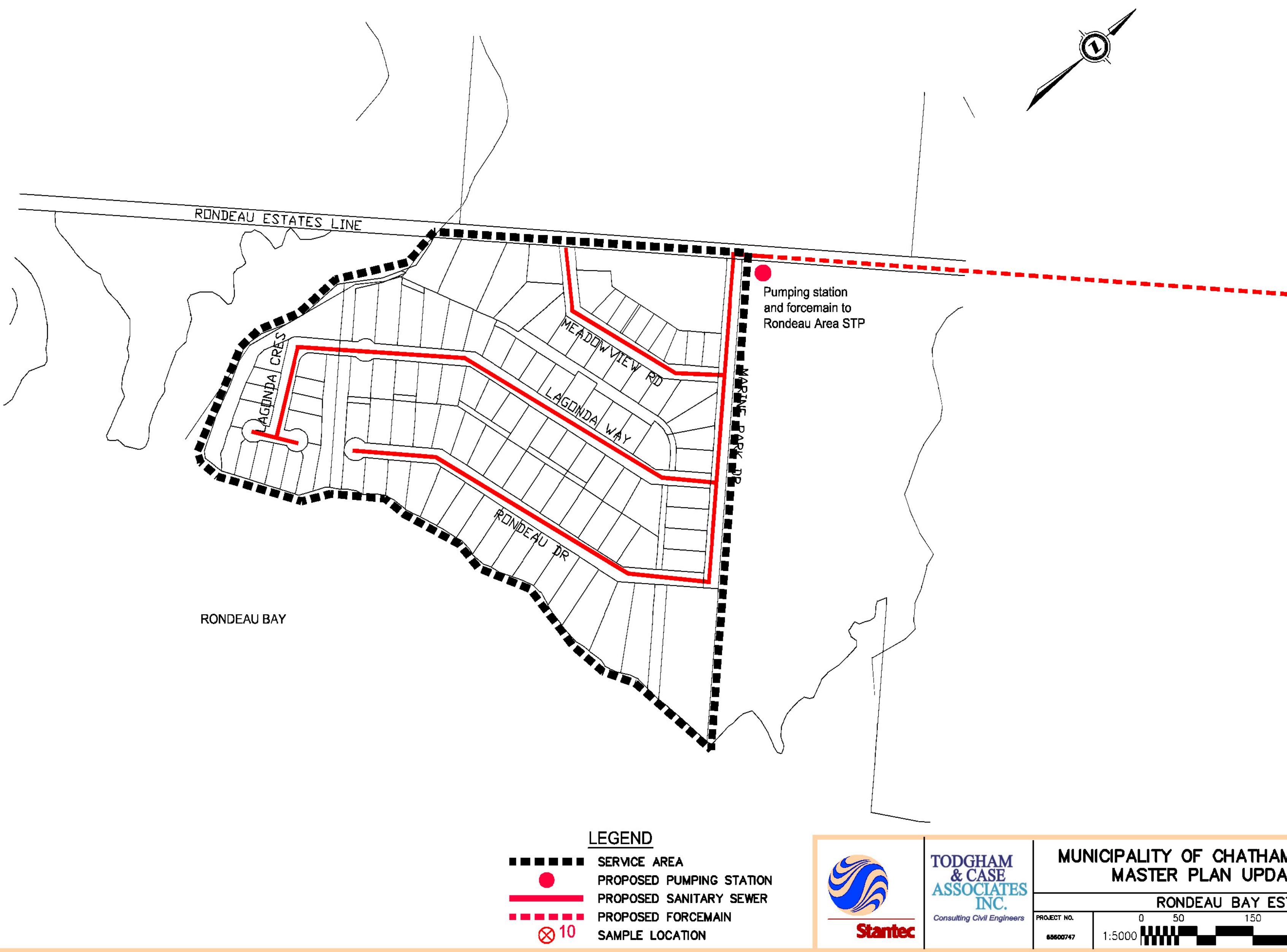
MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

SHREWSBURY

PROJECT NO.		DRAWING NO.
65600747	1:10000 0 100 300 500m	FIGURE 26

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-23-31.dwg
2005-09-14 11:24AM By: kfox



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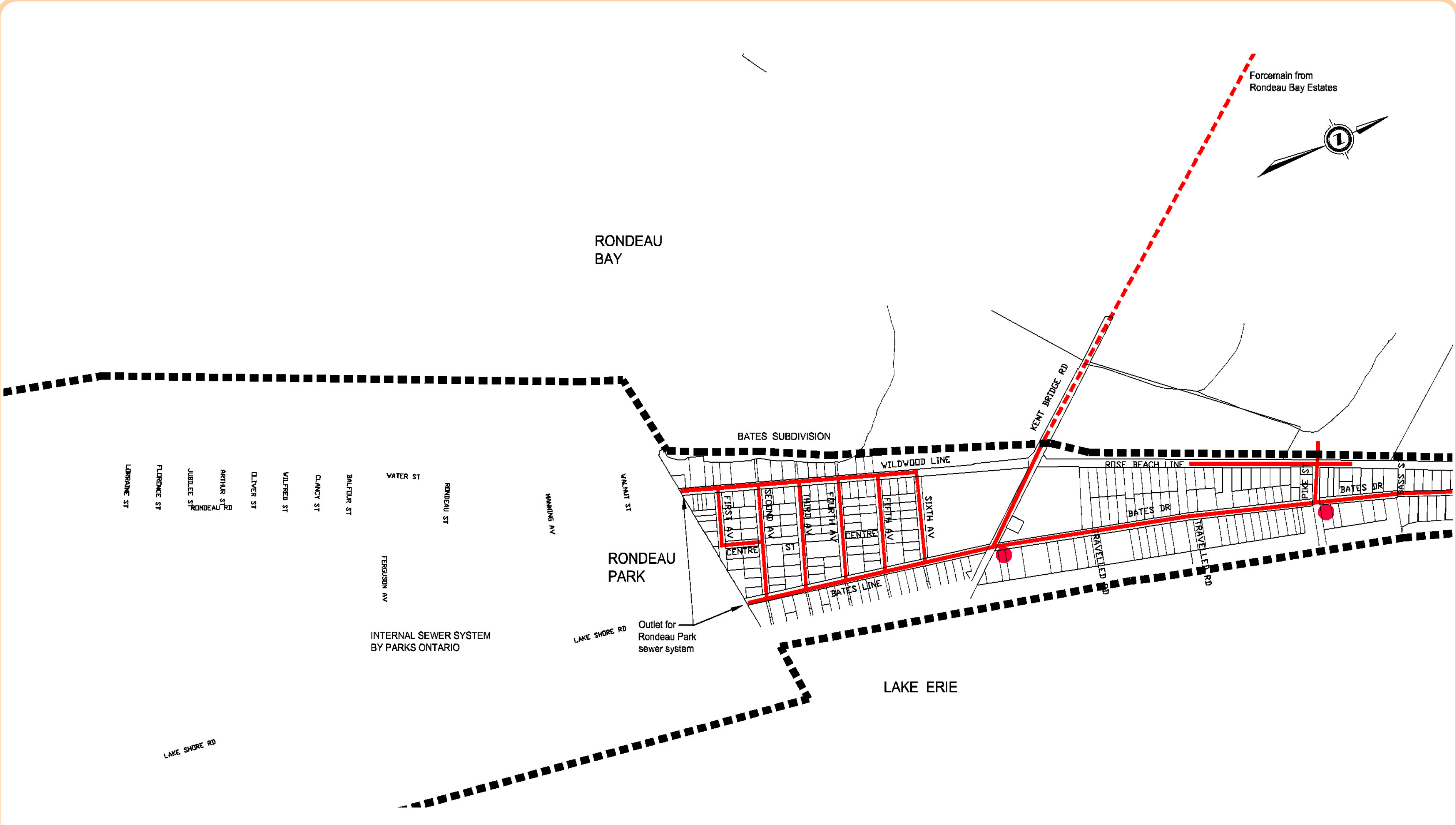
MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

RONDEAU BAY ESTATES

PROJECT NO.	SCALE	DRAWING NO.
65600747	1:5000 (0, 50, 150, 250m)	FIGURE 27

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-23-31.dwg
2005-09-14 11:24AM By: kfox



LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- ⊗ 10 SAMPLE LOCATION

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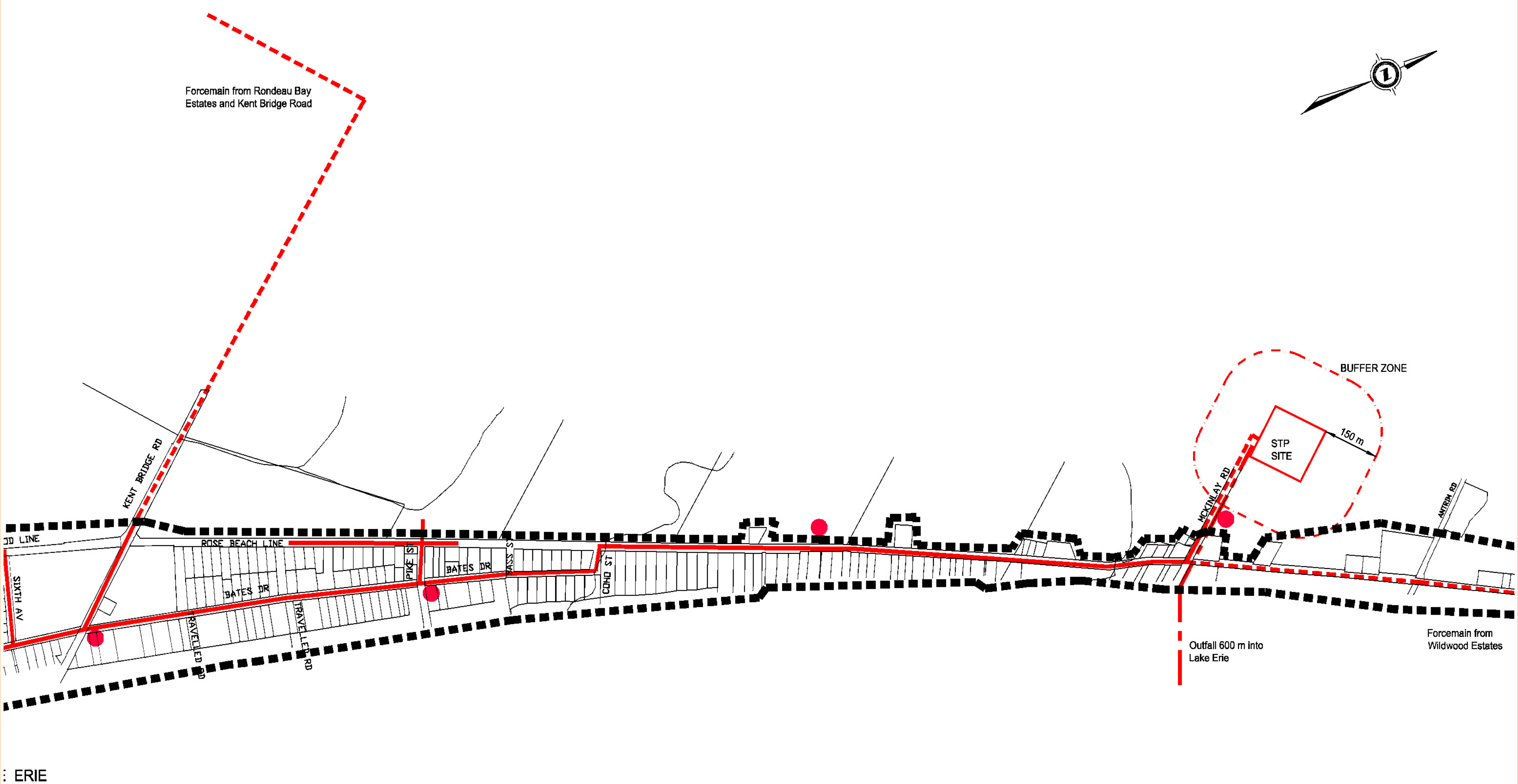
MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

RONDEAU PARK AND BATES SUBDIVISION

PROJECT NO.	SCALE	DRAWING NO.
65600747	1:10000 (0 100 300 500m)	FIGURE 28

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-23-31.dwg
2005-09-14 11:23AM By: kfox



LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- 10 SAMPLE LOCATION

Stantec

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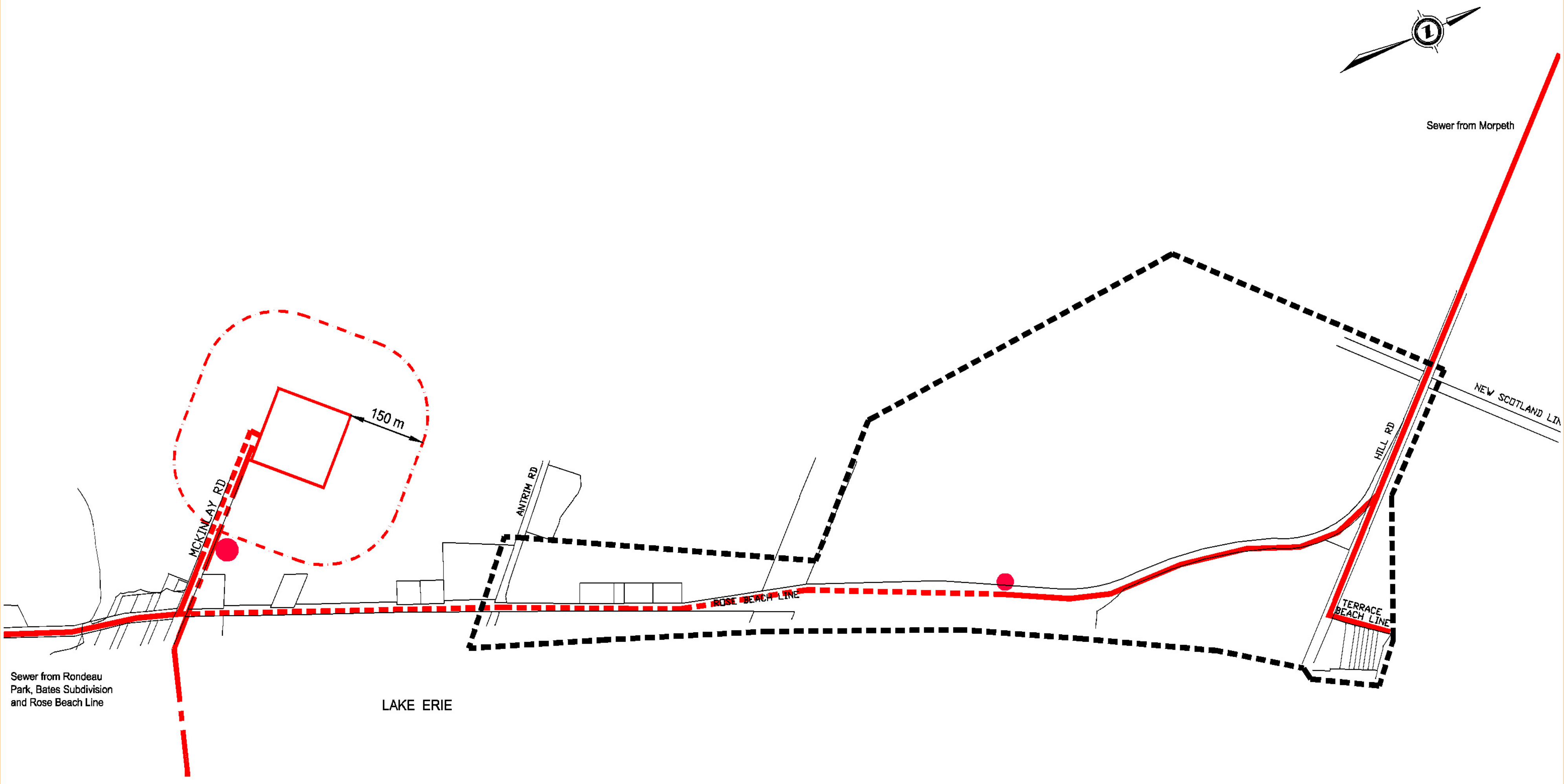
MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

ROSE BEACH LINE

PROJECT NO.		DRAWING NO.
65600747	1:10000 (0, 100, 300, 500m)	FIGURE 29

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-23-31.dwg
2005-09-14 11:23AM By: kfox



LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- ⊗ 10 SAMPLE LOCATION

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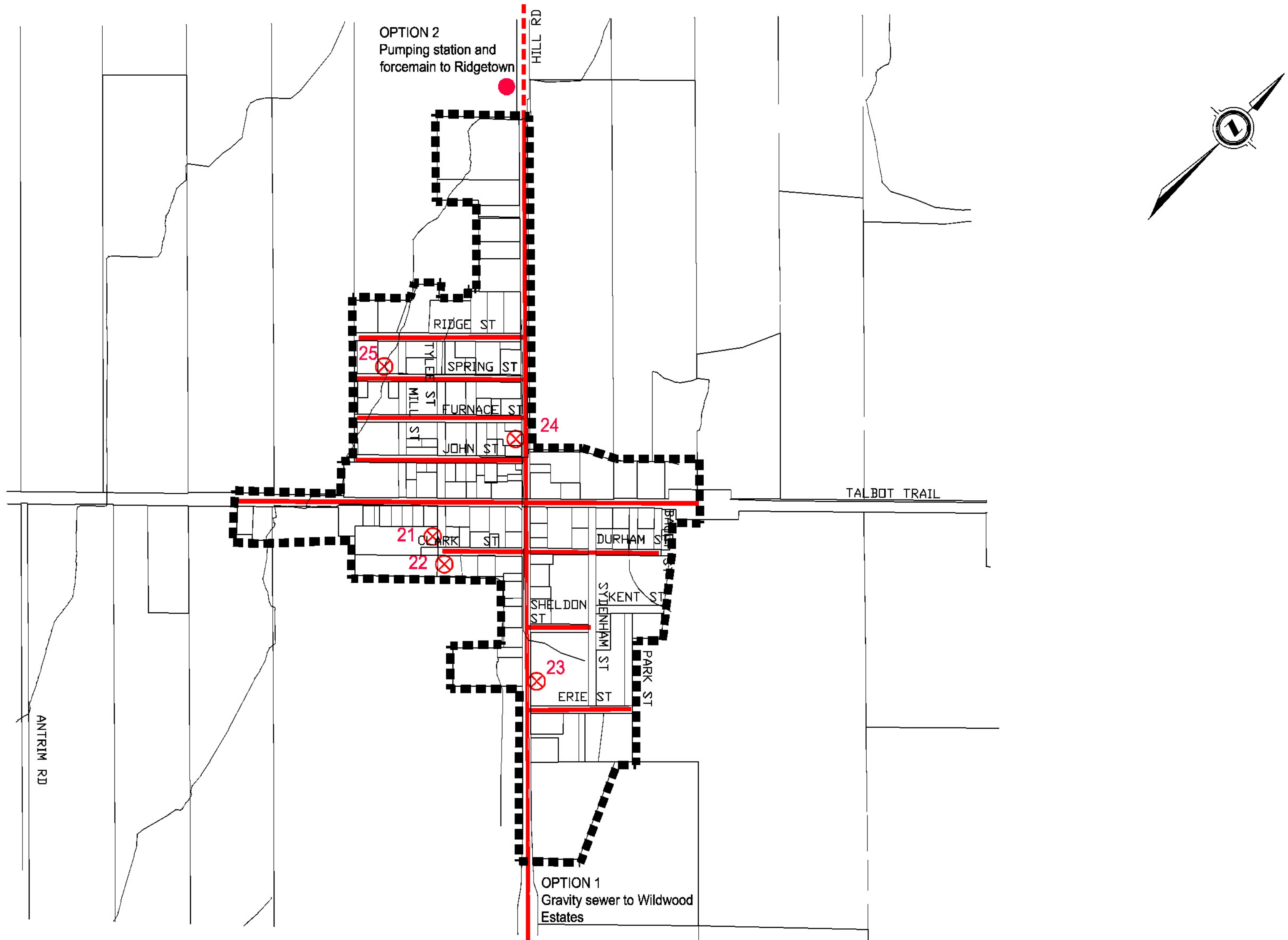
MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

WILDWOOD ESTATES

PROJECT NO.		DRAWING NO.
65600747	1:7500 (0, 75, 225, 375m)	FIGURE 30

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-23-31.dwg
2005-09-14 11:23AM By: kfox



LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- 10 SAMPLE LOCATION

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MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

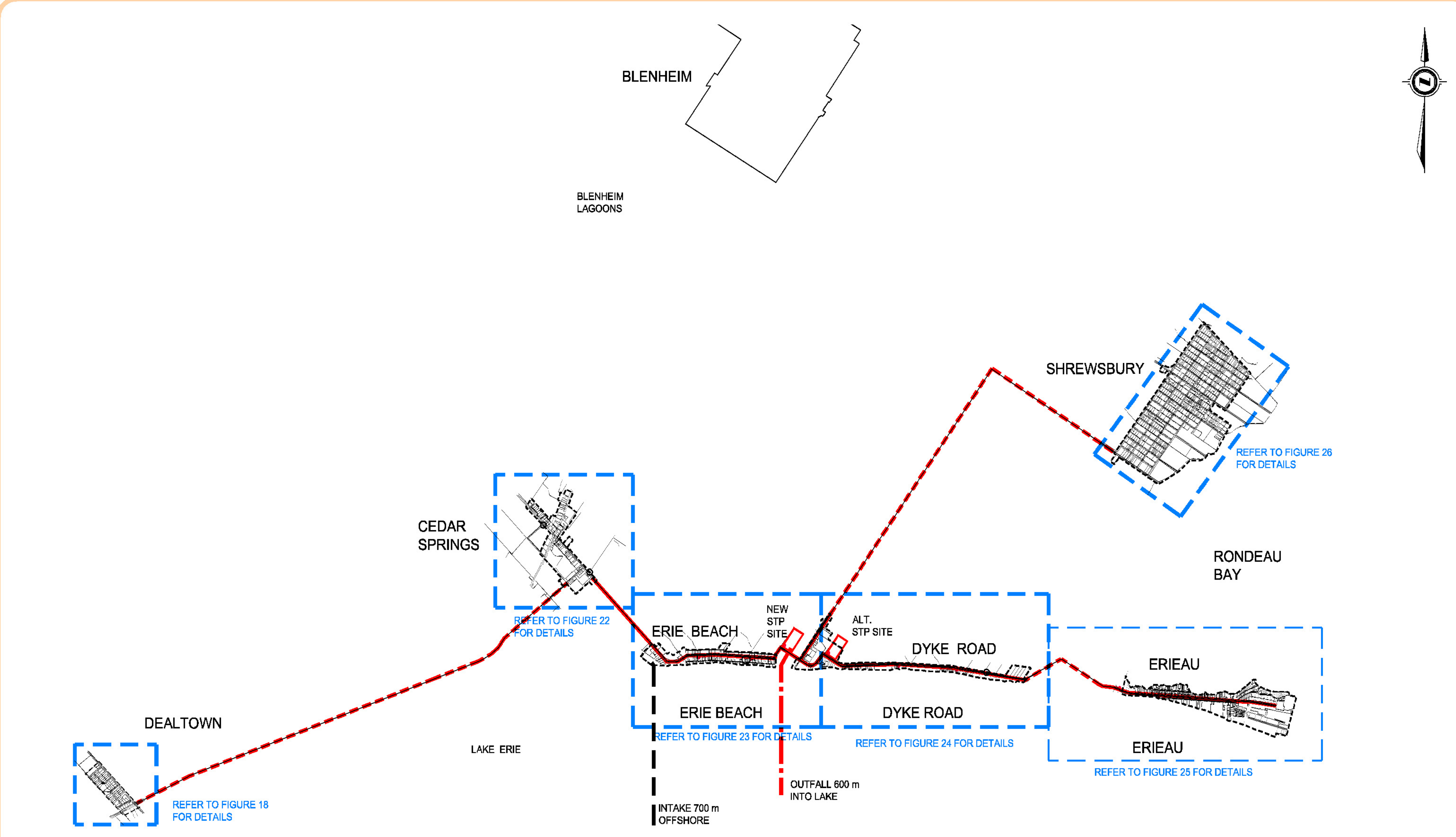
MORPETH

PROJECT NO. 65600747

1:10000 — 0 100 300 500m

DRAWING NO. FIGURE 31

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-23-31.dwg
2005-09-14 11:23AM By: kfox



LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- ⊗ 10 SAMPLE LOCATION

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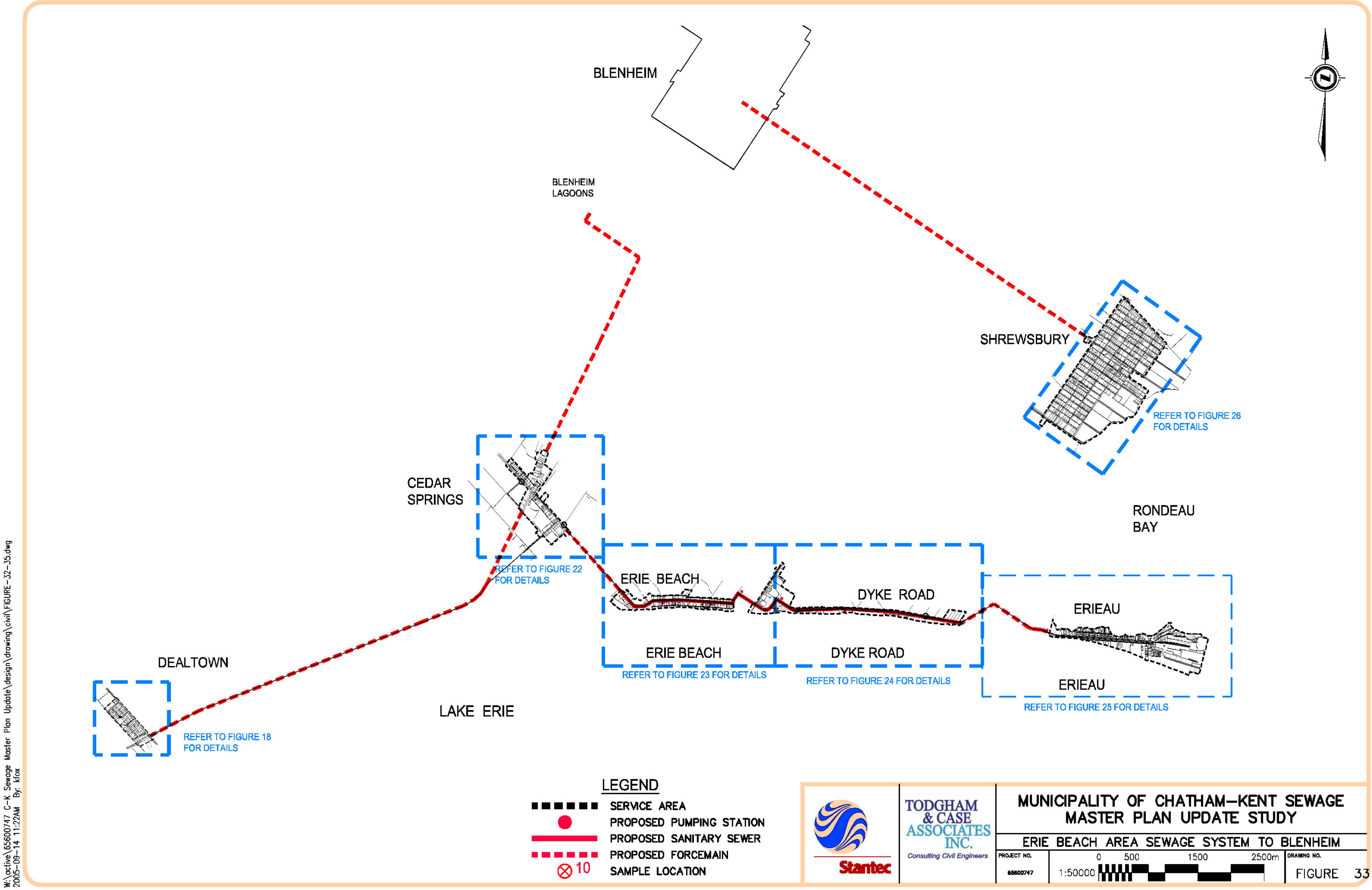
MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

ERIE BEACH AREA SEWAGE SYSTEM TO NEW STP

PROJECT NO.		DRAWING NO.
65600747	1:50000 0 500 1500 2500m	FIGURE 32

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-32-35.dwg
2005-09-14 11:20AM By: kfox


BLENHEIM
BLENHEIM LAGOONS
SHREWSBURY
REFER TO FIGURE 26 FOR DETAILS
RONDEAU BAY
CEDAR SPRINGS
REFER TO FIGURE 22 FOR DETAILS
ERIE BEACH
DYKE ROAD
ERIEAU
ERIE BEACH
REFER TO FIGURE 23 FOR DETAILS
DYKE ROAD
REFER TO FIGURE 24 FOR DETAILS
ERIEAU
REFER TO FIGURE 25 FOR DETAILS
DEALTOWN
LAKE ERIE
REFER TO FIGURE 18 FOR DETAILS
LEGEND
SERVICE AREA
PROPOSED PUMPING STATION
PROPOSED SANITARY SEWER
PROPOSED FORCEMAIN
10
SAMPLE LOCATION
Stantec
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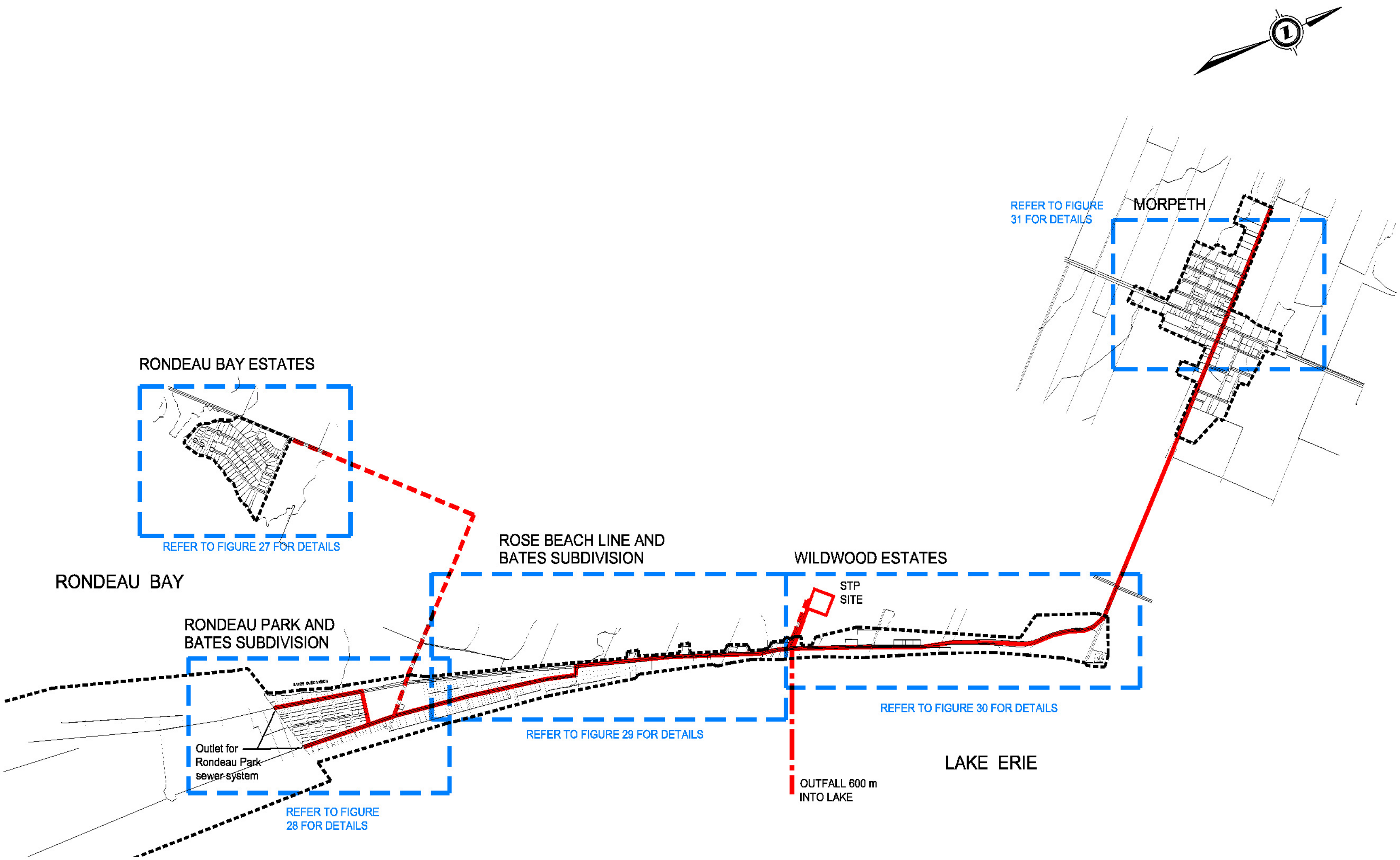
MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY
ERIE BEACH AREA SEWAGE SYSTEM TO BLENHEIM
PROJECT NO.
65600747
0
500
1500
2500m
1:50000
DRAWING NO.
FIGURE 33
W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-32-35.dwg
2005-09-14 11:22AM By: kfox



LEGEND

- SERVICE AREA
- PROPOSED PUMPING STATION
- PROPOSED SANITARY SEWER
- PROPOSED FORCEMAIN
- 10 SAMPLE LOCATION

Stantec

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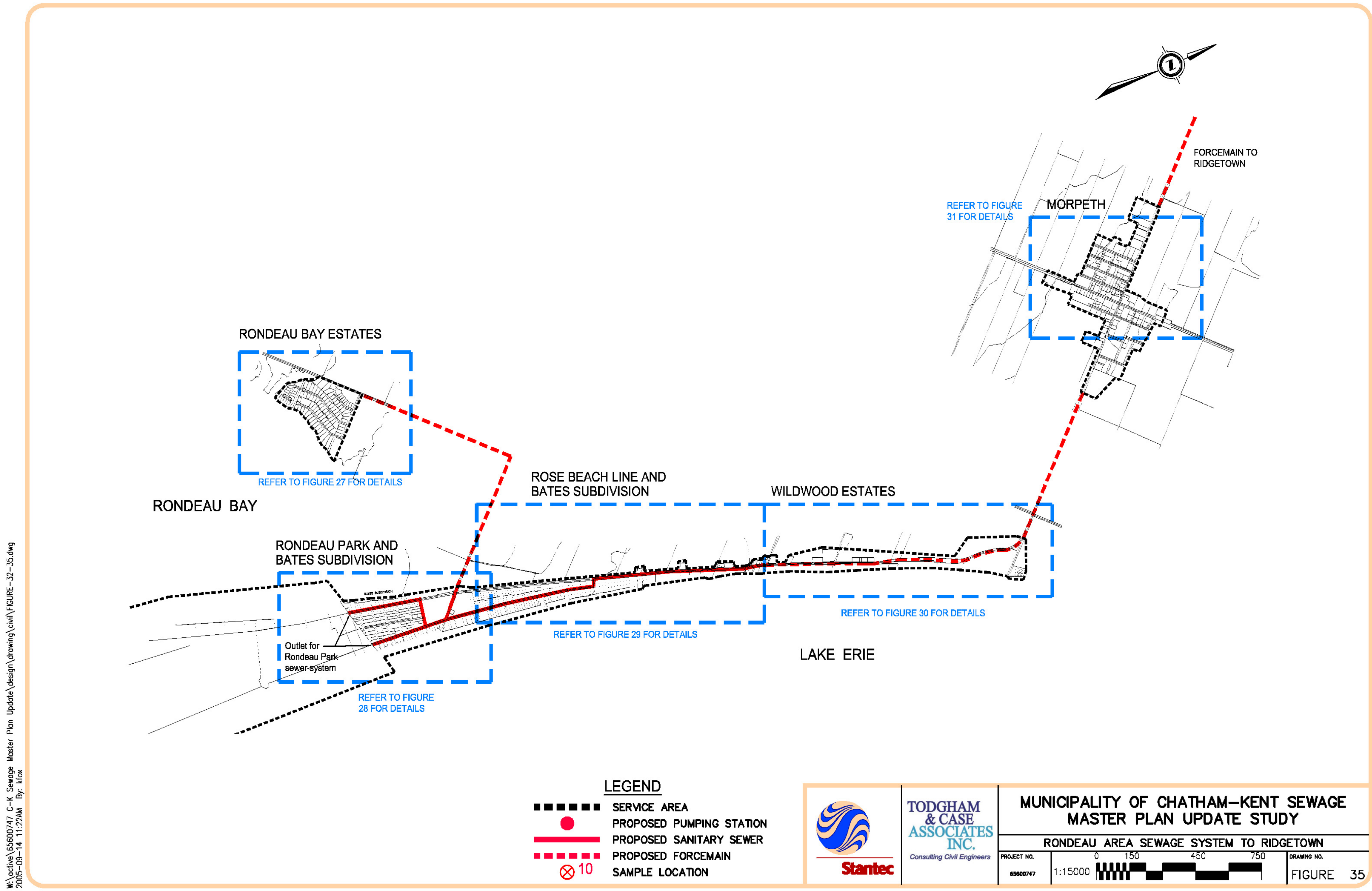
MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY

RONDEAU AREA SEWAGE SYSTEM TO NEW STP

PROJECT NO.		DRAWING NO.
65600747	1:15000 (0 150 450 750)	FIGURE 34

W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-32-35.dwg
2005-09-14 11:22AM By: kfox


FORCEMAIN TO RIDGETOWN
REFER TO FIGURE 31 FOR DETAILS
MORPETH
RONDEAU BAY ESTATES
REFER TO FIGURE 27 FOR DETAILS
ROSE BEACH LINE AND BATES SUBDIVISION
WILDWOOD ESTATES
RONDEAU BAY
RONDEAU PARK AND BATES SUBDIVISION
Outlet for Rondeau Park sewer system
REFER TO FIGURE 29 FOR DETAILS
REFER TO FIGURE 30 FOR DETAILS
LAKE ERIE
REFER TO FIGURE 28 FOR DETAILS
LEGEND
SERVICE AREA
PROPOSED PUMPING STATION
PROPOSED SANITARY SEWER
PROPOSED FORCEMAIN
10 SAMPLE LOCATION
Stantec
TODGHAM & CASE ASSOCIATES INC.
Consulting Civil Engineers
MUNICIPALITY OF CHATHAM–KENT SEWAGE MASTER PLAN UPDATE STUDY
RONDEAU AREA SEWAGE SYSTEM TO RIDGETOWN
PROJECT NO.
65600747
1:15000
0 150 450 750
DRAWING NO.
FIGURE 35
W:\active\65600747 C-K Sewage Master Plan Update\design\drawing\civil\FIGURE-32-35.dwg
2005-09-14 11:22AM By: kfox