AN ORDINANCE of the City of Kent, Washington, adopting the CITY OF KENT 201 WASTE WATER FACILITY PLAN, and directing the filing of three copies thereof with the Kent City Clerk.

THE CITY COUNCIL OF THE CITY OF KENT, WASHINGTON, DO HEREBY ORDAIN AS FOLLOWS:

Section 1. There is hereby adopted by reference as if fully set forth herein that certain plan known as the "CITY OF KENT 201 WASTE WATER FACILITIES PLAN."

Section 2. Three copies of the plan shall be filed with the Kent City Clerk and shall be available for public inspection.

Section 3. This Ordinance shall take effect five (5) days after its passage, approval and publication as provided by law.

ATTEST:

ISABEL HOGAN, MAYOR

MARIE JENSEN, CITY CLERK

APPROVED AS TO FORM:

DONALD E. MIRK, CITY ATTORNEY

PASSED the 2 day of November, 1979
APPROVED the 3 day of November, 1979
PUBLISHED the 5 day of November, 1979

I hereby certify that this is a true copy of Ordinance No. 2138, passed by the City Council of the City of Kent, Washington, and approved by the Mayor of the City of Kent as hereon indicated.

(SEAL)

MARIE JENSEN, CITY CLERK
city of KENT
201 Wastewater Facilities Plan

prepared by URS Company
FACILITIES PLAN

FOR

THE CITY OF KENT

WASHINGTON

BY

URS COMPANY

SEATTLE, WASHINGTON

MARCH 21, 1977
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CHAPTER 1
INTRODUCTION

This draft facilities plan presents the evaluation of alternative methods of meeting the wastewater disposal needs of the City of Kent, Washington. Preparation of a facilities plan is required if federal funding will be involved in the construction of wastewater interception or treatment facilities.

This facilities plan will be concerned primarily with the collection aspect of wastewater since all wastewater generated within the City of Kent is treated by the Municipality of Metropolitan Seattle (METRO). The wastewater is transported via Metro's Valley Interceptor to the Renton Wastewater Treatment Plant where it is treated and discharged into the Duwamish River which flows into Puget Sound.

AUTHORIZATION

The development of this facilities plan is pursuant to a contractual agreement dated February 2, 1976 and amended November 29, 1976 between the City of Kent and URS Company. The agreement between the City of Kent and URS Company was finalized after the City received grant approval from the Environmental Protection Agency.

PURPOSE

This facilities plan presents a number of alternatives, together with the most appropriate plan for accommodating the wastewater needs of the City of Kent. A major purpose of this plan is to guide the
City of Kent in its decision making regarding providing wastewater collection and interception facilities in the future. The City of Kent like many other communities in south King County is a growing community. This growth, however, cannot be accommodated unless wastewater collection and treatment are provided for. Since Metro is the agency responsible for treating wastewater generated in the City of Kent, this plan will aid Metro in its planning efforts to meet the treatment needs of Kent as well as the other participating jurisdictions.

Aside from the reasons mentioned, there are regulatory reasons for developing this plan. The following table summarizes those reasons.

<table>
<thead>
<tr>
<th>Agency/Document</th>
<th>Summary of Requirements</th>
</tr>
</thead>
</table>
| Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500); Section 201 | 1. Insure that the facility integrates as much as possible facilities for treatment, disposal or utilization of all wastes;  
2. Insure that alternative waste management techniques have been studies and evaluated;  
3. Insure that best practical treatment will be provided over project life; |
TABLE 1 (Continued)

<table>
<thead>
<tr>
<th>Agency/Document</th>
<th>Summary of Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Environmenal Policy Act of 1969 (Public Law 91-190)</td>
<td>Overall - insure that environmental quality objectives are adequately considered. Specific - &quot;...to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may:</td>
</tr>
<tr>
<td>NEPA</td>
<td></td>
</tr>
</tbody>
</table>

4. Take into account and allow for application of later technology to eliminate discharge of pollutants;

5. Insure that adequate infiltration/inflow analysis is performed.

1. fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

2. assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;

3. attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;
<table>
<thead>
<tr>
<th>Agency/Document</th>
<th>Summary of Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Protection Agency</td>
<td>1. Insure that the environmental impact, both adverse and beneficial, of any alternative is adequately examined in accordance with the objectives of NEPA Guidelines established for the development of environmental impact statements for facilities plans.</td>
</tr>
<tr>
<td></td>
<td>4. preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice;</td>
</tr>
<tr>
<td></td>
<td>5. achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and</td>
</tr>
<tr>
<td></td>
<td>6. enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.&quot;</td>
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<thead>
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<th>Summary of Requirements</th>
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<td>Washington Water Pollution Control Planning Regulations</td>
<td>1. Regulations outline minimum plan requirements and plan adoption procedures.</td>
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<td>2. Impact on wetlands must be avoided, rare species of fish and wildlife protected.</td>
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SCOPE

The scope of this study is as follows:

1. Identification of the wastewater collection and treatment needs of the planning area. This includes an assessment of existing practices and anticipated future wastewater flows and characteristics. Water quality and public health related requirements are evaluated and also those concerning treatment needs and effluent limitations.

2. The development of alternative plans for meeting identified needs.

3. An assessment of alternative plans based on cost effectiveness, water quality effects, environmental and community impacts and implementation requirements.

4. The identification of a recommended plan for implementation.
PLANNING AREA

The planning area which includes the City of Kent is located in south King County, Washington. To the north the area is bounded by S. 180th Street which is the boundary with the City of Renton; to the south the area is bounded by S. 277th Street which is the boundary with the City of Auburn; to the west the area is bounded by Interstate 5, and to the east by 124th Avenue S.E. Figure 1 shows the location of the planning area with respect to the major population centers in Puget Sound, while Figure 2 shows the boundaries of the planning area and the City of Kent. Both figures appear in Chapter 4.

The boundaries of the planning area have been determined by physical as well as jurisdictional considerations. The City of Kent including the commercial and industrial areas is situated in the lowlands of the Green River. Two large residential areas are located northeast of the City and west-southwest on the slopes of the hills forming the natural walls of the Green River Valley. The planning area contains large tracts of undeveloped as well as undevelopable land. The potential for all type of development will continue in the future as it has in the past several years.

NEED FOR PLANNING

The need for developing this facilities plan stems from regulatory as well as planning consideration.

Pursuant to the former, Title II of the Federal Water Pollution Control Act Amendments (PL 92-500) of 1972 authorizes the award of construction grants for wastewater interceptor and treatment works.
The award of these grants creates a contractual obligation of the United States for payment of the federal share of the construction costs of such projects.

Pursuant to the requirements of the above Act, the Environmental Protection Agency has promulgated a three-step grant process for the award of such federal assistance. Step I constitutes a "Facilities Plan"; Step II constitutes the plans and specifications for whatever project(s) are decided upon in Step I; Step III consists of the actual construction of the project(s) or any segment(s) thereof.

Facilities planning (Step I), therefore constitutes an essential element of the construction of publicly owned wastewater treatment works. Facilities planning consists of the development of those necessary plans which are directly related to the construction of treatment works, in compliance with Section 201 of the Act. Facilities planning will determine what is the need for the sewage facilities and by a systematic evaluation of feasible alternatives will also determine the most cost-effective means of meeting those needs.

Participation by the EPA to the extent of 75% of the cost of construction of interceptor and treatment facilities, and by the State of Washington to the extent of 15% in those same costs is not possible without a facilities plan developed pursuant to the appropriate federal and state regulations.

The rate of growth over the past several years has been fairly stable in the City of Kent as well as the service area within the boundaries of the planning area. Between 1960 and 1970 the City's
population increased from 9,017 to about 16,300 or an increase of about 80% in ten years. Proper planning of wastewater facilities under such conditions is needed in order to accommodate growth in an orderly and manageable fashion. The 1977 population for the City of Kent is estimated at 18,000.

HISTORY OF SEWERAGE SERVICE IN THE STUDY AREA

The sewerage system of the City of Kent has been designed and constructed in accordance with the growing needs of the City as development occurred. As early as 1963 URS, (at that time known as Hill & Ingman) completed an engineering report on sewage collection, treatment, and disposal for the City of Kent. The report resulted in recommendations which enabled the City to continue to meet its growing sewerage needs.

In July, 1967 the City turned over the treatment responsibility to Metro and thereby became a part of the Metro system. In 1966 the first utility local improvement district (ULID) was established. Throughout the late sixties and early seventies the City as well as Metro constructed a number of large interceptors including the 212th Street Interceptor, Mill Creek Interceptor and the Garrison Creek Interceptor.

The collection system of the City has been constructed largely by developers in accordance with the specifications of the City. It is expected that future extensions to the existing system in areas which are presently unsewered will be constructed under the same procedures.
REFERENCES


CHAPTER 2
SUMMARY AND RECOMMENDATIONS

This chapter presents a brief statement consisting of a summary and recommendations for the Kent Facilities Plan. Following a public hearing scheduled for June 6, 1977, at 8:00 P.M. in the Council Chambers of the City of Kent and review of the comments of agencies and interested parties, a final facilities plan will be prepared. Barring unforeseen circumstances the final facilities plan will be issued July 8, 1977.

In accordance with guidelines promulgated by EPA this Facilities Plan has addressed a number of issues which are summarized in the following paragraphs:

1. It has provided City officials with information on the regulatory requirements for planning and construction of sewerage facilities. This information will assist the City officials in their decision making regarding extending sewerage facilities to where they may be needed. Facilities Plans constitute a prerequisite for the construction of any sewerage facilities where state or federal assistance is involved.

2. It has provided City officials for decision making information on environmental, historical and socio-economic conditions in the planning area. Generally, environmental conditions in the planning area show a quality environment and further extending sewerage service will have no discernible adverse impacts on those conditions.
3. It has provided the City officials with information on the general conditions of the existing sewerage system and its performance. This information will assist City officials in their decision making regarding the utilization of the system and its extension. Generally speaking the system throughout the planning area is in good condition with some exceptions in the older section of the Kent downtown area.

4. In compliance with the regulatory requirements this plan has evaluated the extent of infiltration inflow into the existing sewerage system. It has been determined that it is not cost effective to replace any of the existing sewerage system.

5. To aid the City officials in meeting the sewerage needs of the planning area this plan has provided an estimate, based on future growth and annexation, of future wastewater loads. The estimates for the years 1980, 1990, and 2000 are 3.25, 4.75 and 6.51 mgd respectively.

6. The alternatives presented in this plan will provide a framework for servicing presently unsewered areas within the planning area and aid the City officials in land use planning decisions. It is possible to provide sewerage service to practically everywhere within the planning area at varying costs, although it may be desirable that some areas for one reason or another should never be intensively developed.
6. (continued)

Specifically, the sizing of lines to serve the portion of Area I situated west of the Auburn Interceptor and south of the Green River, and Area M situated north of S. 212th Street and west of the Green River should be carefully reviewed prior to design and construction to determine if their size is actually necessary in relation to anticipated land use, and will not be built until the absolute need occurs.

7. The environmental impacts associated with extending sewerage service have been presented together with adverse impacts and mitigating measures. Further developments necessitating sewerage service, although will fulfill social and economic needs, may result in adverse effects on air quality, increased levels of noise, potential for flood damage and soil erosion. With proper planning and control these impacts may be substantially ameliorated.

8. This document will serve as a tool for coordinating sewerage service with adjoining municipalities such as Cascade Sewer District, City of Auburn, City of Renton, City of Tukwila, Metro and others.

9. It is recommended that the Kent's City Council adopt this facilities plan (after finalization) as a prerequisite for federal and state assistance in meeting the City's future sewerage needs.
CHAPTER 3
PLANNING CONSTRAINTS

The purpose of this chapter is to discuss several considerations relevant to the formulation and evaluation of alternatives, to point out those agencies who have jurisdictional authority over the plan and its implementation and to point out some of the rules, regulations and permits relevant to the formulation of this plan.

PLANNING PARTICIPATION AND COORDINATION

A variety of governmental agencies are involved with different aspects of planning, selecting, financing, and operating wastewater facilities. Presented below is a list and short description of the major decision making entities associated with sewerage facilities for the planning area.

- Environmental Protection Agency (EPA) - the lead federal agency responsible for financing the planning and construction of wastewater collection and treatment systems; reviews plans and evaluates environmental impacts of each project.

- U.S. Army Corps of Engineers - responsible for navigable waters; issues permits for construction in tidelands.

- Washington State Department of Ecology (DOE) - the lead state agency responsible for environmental matters; determines water quality criteria and effluent limitations; administers the National Pollutant Discharge Elimination System (NPDES); assists in funding of publicly owned waste treatment systems.
Washington State Department of Fisheries - responsible for the food-fish resources of the State; in conjunction with the Department of Game issues a hydraulics permit for construction either in or affecting fish habitats in fresh or saltwater areas.

Washington State Department of Game - responsible for wildlife throughout the State; jointly responsible with the Department of Fisheries for issuance of hydraulic permits.

Washington State Department of Social and Health Services (DSHS) - reviews and regulates engineering designs, reports and plans for construction of new waste treatment plants or expansions to existing plants.

Municipality of Metropolitan Seattle (METRO) - The agency responsible for treatment of all wastewater from the study area as well as other municipalities in Puget Sound.

City of Renton shares the northern boundary of the study area and is a participant in the Metro system.

City of Tukwila shares the same Metro interception and treatment facilities with the City of Kent.

City of Auburn is also part of the Metro system. The City forms the southern boundary of the study area and shares with the City of Kent Metro's valley interceptor and treatment facilities.

City of Des Moines is also a Metro participant.
o Cascade Sewer District shares with the City of Kent interceptor facilities which lead to Metro's Valley Interceptor and Treatment Plant.

o Des Moines Sewer District borders the study area to the west where drainage basins cross over the study area boundary.

o Lakehaven Sewer District borders the study area to the southwest where the District shares the responsibility for studying the feasibility of providing sewerage service to the Star Lake sub-basin, which is also a part of this facilities plan study area.

o King County is the local government, other than the City of Kent, in whose jurisdiction a substantial part of the study area is located.

REGULATORY CONSTRAINTS AND PERMIT REQUIREMENTS

The recommended plan must conform to many rules and regulations, some of which were summarized in Chapter 1. Each of the many agencies which gives its approval has its own requirements and criteria against which the plan is judged. In particular, the EPA's Facilities Plan Guidelines, (Reference 1), Construction Grants Regulations, (Reference 2), and Environmental Impact Statement Regulations, (Reference 3) affect the content of the Facilities Plan, since the federal government shares in the funding of wastewater facilities. The federal participation is presently 75% of the grant eligible costs (such as treatment plants, interceptors and outfalls) and the state
participates in 15% of the same eligible costs. It is the responsi-

bility of the local residents to pay the remaining 10%, in addition
to the costs of land acquisition, building collector sewers, and
operation and maintenance of wastewater treatment facilities. In
the case of collector sewer laterals, the governments will only
participate in the funding of rehabilitation or replacement that is
shown to be economically preferable to accommodating infiltration/
inflow in the existing sewers. The governments normally do not
participate in collector sewers in areas being sewered for the first
time under the present situation.

The Construction Grant process involves three steps as follows:

1. Step I - Facilities Planning

2. Step II - Preparation of Engineering Design and
Specifications.

3. Step III - Construction

Funding is allocated for each step following approval of the
results of the previous work.

Many permits are required prior to construction of the proposed
facilities, among them:

- State of Washington Department of Fisheries and Department
  of Game permits for work in streams used by anadromous
  fish for spawning or migration.

- U.S. Army Corps of Engineers permit for work near navigable
  waters.
- Easements, building and conditional use permits, and all other standard permits.

- Appropriate Municipal and State Shoreline Management Substantial Development permit.

In addition, the present National Pollutant Discharge Elimination System (NPDES) permit for each existing municipal discharge will be revised to reflect the progress toward compliance with secondary treatment requirements.

WATER QUALITY OBJECTIVES AND EFFLUENT LIMITATIONS

It should be pointed at the outset that this facilities plan is indirectly concerned with the treatment aspect of the wastewater generated in the planning area since wastewater is disposed of, untreated, to the Metro Valley Interceptor where it is treated at Metro's wastewater treatment facilities in Renton prior to release into the Duwamish River. This plan therefore will not concentrate on, neither ignore the treatment aspect of wastewater since the planning area contributes incrementally to the wastewater load treated by Metro's facilities.

A variety of laws, regulations, and policies at all levels of government define the quality objectives for receiving waters and the general environment. These objectives as well as natural conditions and public concerns provide the goals, parameters, and constraints for the planning and construction of wastewater interceptor and treatment facilities. The following discussion will describe briefly some of the more important objectives affecting
water quality in the Duwamish River and the Green River within the study area. The water quality objectives will be discussed under the federal, state and local/regional levels.

Federal Level

Goals for publicly owned wastewater treatment facilities have been delineated by the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) and they include the following schedule:

1. For plants in existence on July 1, 1977, the provision of secondary treatment is required;

2. Best Practicable Waste Treatment Technology (BPWTT) is required by July 1, 1983;

3. The goal of elimination of pollutant discharge into navigable waters by 1985 has been established.

Further, by July 1, 1977, compliance with other or more stringent limitations or requirements to achieve state or federal standards, objectives, or schedules is required.

To assist communities in meeting these goals and requirements, the Federal Water Pollution Control Act Amendments of 1972 authorized grants for sewage treatment works. The grants are awarded at each step of a three-stage process referred to earlier.

Since the grants involve distribution of federal funds, the provisions of the National Environmental Policy Act of 1969 (NEPA) requiring the Environmental Protection Agency (EPA) to conduct an
environmental analysis must be met. The analysis includes and evaluation of the potential environmental impacts associated with the project.

The EPA further controls discharge of treated wastes from treatment plants by requiring plants to obtain a permit according to the procedures of the National Pollutant Discharge Elimination System (NPDES). The system is administered in Washington by the Department of Ecology (DOE).

State Level

The Department of Ecology has established water quality criteria for the waters of Washington State. The Department also determines effluent limitations for permit issuance. Puget Sound in which the treated effluent from the study area is finally disposed of is rated Class AA (Extraordinary). The Duwamish River from mouth to the confluence with the Black River is rated "Class B". From the confluence with the Black River upstream to the limit of tidal influence it is rated "Class A" with the following exceptions: total coliform organisms shall not exceed median values of 1000 with less than 20% of samples exceeding 2400 when associated with an fecal source. The Green River is rated "Class AA".

The following tables show the water quality standards for the above classes.
Table 2
State of Washington Water Quality Standards
For Class AA "Extraordinary" Water

<table>
<thead>
<tr>
<th>Water Quality Parameter</th>
<th>Standard</th>
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</thead>
<tbody>
<tr>
<td>Total Coliform Organisms (MPN/100 ml)</td>
<td>Median values not to exceed 50 (Freshwater) or 70 (Marine water) with less than 10% of samples exceeding 230 when associated with any fecal source.</td>
</tr>
<tr>
<td>Dissolved Oxygen</td>
<td>Not more than 9.2 mg/l (Freshwater) or 7.0 mg/l (Marine water).</td>
</tr>
<tr>
<td>Total Dissolved Gas</td>
<td>Not to exceed 110% of saturation at any point of sample collection.</td>
</tr>
<tr>
<td>Temperature</td>
<td>Not to exceed 60°F (Freshwater) or 55°F (Marine water) due in part to measurable (0.5°F) increases resulting from human activities.</td>
</tr>
<tr>
<td>pH</td>
<td>To be within the range of 6.5 to 8.5 (Freshwater) or 7.0 to 8.5 (Marine water) with an induced variation of less than 0.1 units.</td>
</tr>
<tr>
<td>Turgidity (Jackson Turbidity Units)</td>
<td>Not to exceed 5 JTU over natural conditions.</td>
</tr>
<tr>
<td>Water Quality Parameter</td>
<td>Standard</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Toxic Radio-active or Deleterious</td>
<td>To be less than those which may not affect public health, the natural</td>
</tr>
<tr>
<td>Materials Concentration</td>
<td>aquatic environment or the desirability of the water for any usage.</td>
</tr>
<tr>
<td>Aesthetic Values</td>
<td>Not to be impaired by the presence of materials of their effects,</td>
</tr>
<tr>
<td></td>
<td>excluding those of natural origin, which offend the senses of sight,</td>
</tr>
<tr>
<td></td>
<td>small, touch or taste.</td>
</tr>
<tr>
<td>Water Quality Parameter</td>
<td>Standard</td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Total Coliform Organisms (MPN/100 ml)</td>
<td>Median value not to exceed 240 (Freshwater) or 70 (Marine water) with less than 20% of samples over 1000 (230 for Marine water).</td>
</tr>
<tr>
<td>Dissolved Oxygen</td>
<td>Greater than 8.0 (6.0, Marine waters).</td>
</tr>
<tr>
<td>Total Dissolved Gas</td>
<td>Not more than 110% of saturation due to non-natural causes.</td>
</tr>
<tr>
<td>Temperature</td>
<td>Not to exceed 65°F (Freshwater) or 61°F (Marine waters) due to human activities.</td>
</tr>
<tr>
<td>Increase due to one source less than 0.5°F; increase due to all sources less than 2.0°F.</td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>6.5 to 8.5 (Freshwater) or 7.0 to 8.5 (Marine waters) with an induced variation less than 0.25.</td>
</tr>
<tr>
<td>Turgidity (Jackson Turbidity Units)</td>
<td>Not to exceed 5 JTU over natural conditions.</td>
</tr>
</tbody>
</table>
TABLE 3 (Continued)

<table>
<thead>
<tr>
<th>Water Quality Parameter</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toxic, Radio-active or Deleterious Materials</td>
<td>Less than the concentration affecting public health, the natural aquatic environment or the desirability of the water for any usage.</td>
</tr>
<tr>
<td>Concentration</td>
<td></td>
</tr>
<tr>
<td>Aesthetic Values</td>
<td>Not impaired by materials or effects, excluding natural causes, which offend the senses of sight, small, touch or taste.</td>
</tr>
</tbody>
</table>
# TABLE 4

## STATE OF WASHINGTON WATER QUALITY STANDARDS

FOR CLASS B (GOOD) WATERS

<table>
<thead>
<tr>
<th>Water Quality Parameter</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Coliform Organisms (MPN/100 ml)</td>
<td>Median value not to exceed 1000 less than 10% of samples over 2400.</td>
</tr>
<tr>
<td>Dissolved Oxygen</td>
<td>Greater than 6.5 (5.0, Marine waters), or 70% saturation, whichever is greater.</td>
</tr>
<tr>
<td>Total Dissolved Gas</td>
<td>Same as A.</td>
</tr>
<tr>
<td>Temperature</td>
<td>Not to exceed 70°F (Freshwater) or 66°F (Marine waters) due to human activities.</td>
</tr>
<tr>
<td>pH</td>
<td>6.5 to 8.5 (Freshwater) or 7.0 to 8.5 (Marine waters) with an induced variation less than 0.5.</td>
</tr>
<tr>
<td>Turgidity (Jackson Turbidity Units)</td>
<td>Not to exceed 10 JTU over natural conditions.</td>
</tr>
<tr>
<td>Toxic Radio-active or Deleterious Materials Concentration</td>
<td>Less than the concentration affecting public health, the natural aquatic environment or the desirability of the water for any characteristic water use.</td>
</tr>
<tr>
<td>Water Quality Parameter</td>
<td>Standard</td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Aesthetic Values</td>
<td>Not reduced by dissolved, suspended, floating, or submerged matter excluding natural causes, so as to affect water use or taint flesh of edible species.</td>
</tr>
</tbody>
</table>
The Department of Ecology who administers the National Pollutant Discharge Elimination System (NPDES) has issued a permit under this system to the City of Kent (Permit No. WA-002939-4). The permit, under certain conditions, recognizes the possibility of certain overflows and bypasses from the two pump stations in the City of Kent's system. These are Linda Heights P.S., and Aero-Kent (Springwood) P.S. The permit also lists the industrial users who discharge their untreated effluent into the system. The overall purpose of the permit is to effectuate compliance with the effluent limitations specified in PL 92-500 in accordance with a specified schedule.

Local/Regional Level

At the local and regional levels, policies, goals, and objectives are found virtually in all the existing and proposed plans such as wastewater comprehensive plans, areawide management plans, basin plans, solid waste management plans, land use plans, shoreline master programs, and subdivision regulations.

In considering the impact and relevancy of local and regional plans four factors appear pertinent. These are: health conditions, recreational uses of the Green and Duwamish Rivers as well as Puget Sound, sports and commercial fish populations, and land use in the Green River Valley.

Health considerations constitute a primary issue in facilities planning especially in new and unsewered areas. The study area is substantially seweried and the health hazards associated with sewage are at an absolute minimum under normal operating conditions. The
The Metro plant at Renton where the wastewater from the study area is treated is capable of achieving secondary treatment.

In accordance with the conditions of the NPDES permit issued to the City of Kent overflows and bypasses are allowed only under emergency conditions such as equipment failure.

The recreational uses of the Green River within the study area are not adversely affected by the existing system nor are they likely to be affected in the future. The recreational uses of the Duwamish River as the receiving water especially below the point of discharge is not suitable to contact sports such as swimming. This, however, is due largely to the other industrial and commercial uses of the river. Likewise no ill effects on sports fish population in the Green River within the study area have occurred.

The cause effect relationship between sewerage facilities and land use has been well documented and is often self fulfilling. The land use plan, including the zoning map of the City of Kent is an important factor in the formulation of this plan, not only within the boundaries of the City of Kent but rather throughout the area considered to be the area of interest (influence) by the City of Kent. In this regard the Planning Department of the City of Kent plays an important role.

The final contribution to quality objectives is the various concerns and opinions of the resident populations and elected officials.
REFERENCES

1. "Guidance for Facilities Planning", EPA, January, 1974; and
   "Guidance for Preparing a Facility Plan Municipal Wastewater
   Treatment Works Construction Grants Program", EPA, Revised
   May, 1975.


   Federal Regulations, Title 40, Chapter 1, Part 6, April 14, 1975
   and Council on Environmental Quality, Chapter V, Part 1500,
   August 1, 1975.

4. "Washington Water Quality Standards", WAC Chapter 173-201,

5. "Secondary Treatment Information", EPA, CFR Title 40, Sub-
   chapter D, Part 133, August 17, 1972.

6. "National Environmental Policy Act of 1969", Public Law 91-190,
   enacted by Congress, January 1, 1970.

   Wastewater Treatment Works, Facilities Plans, and 208 Areawide

8. "Environmental Protection Agency Administrator's Decision
   Statement Number 4 on Policy to Protect the Nation's Wetlands",

CHAPTER 4
ENVIRONMENTAL INVENTORY

GENERAL DESCRIPTION

The Kent Planning Area encompasses the incorporated city of Kent plus some additional unincorporated areas within the jurisdiction of King County. Figure 1 shows the location of the Planning Area; Figure 2 shows its boundaries. The area covers approximately 32 square miles. Land use in the Planning Area includes a mix of residential, commercial, and light industrial uses. The area's proximity to the employment centers throughout the Seattle-Tacoma area makes it well suited to commuter-oriented residential development. Industrial growth is expanding along the Kent Valley floor transforming the use from agriculture to light industrial use. Kent is close to Seattle and Tacoma, Sea-Tac International Airport, two major transcontinental rail lines, two major inter-state freeways, and lots of flat industrially zoned land which contribute to attracting new industry to the Kent area. The area will continue to experience economic and population growth for the next several decades.

At present about 20 square miles within the planning area are served by the City of Kent.

NATURAL CONDITIONS

The principal topographic features are the upland plateaus rising from both sides of the Green River Valley. The valley itself connects the adjoining cities of Auburn to the south and
Tukwila and Renton to the north. The valley is about 2-1/2 miles wide with an elevation ranging from 20 to 30 feet above sea level before it ascends to two bordering hills. The West Hill rises quickly to about 300-400 feet with a steep slope while the East Hill rises to about 400 feet with a much more gentle slope. Because of the East Hill's gentle slope, more development has occurred there. A topographic map has been included and appears as Figure 3.

The Planning Area itself has been defined by topography. The area contains all drainage basins which flow toward Kent. The basic drainage pattern after water leaves the hills and moves to the valley is for it to move northward, as does the Green River toward Tukwila and Renton.

**Soils and Geology**

The geology of the Puget Sound area is primarily the result of processes which occurred during the Vashon period of the great Fraser glaciation about 15,000 years ago. The major portion of the region was covered by ice several thousand feet thick. As the ice moved, it compressed the underlying earth and carved it into the valleys and ridges present today. In addition, the glacier scraped away the pre-existing soil of the area. As the ice retreated, it left behind the geologic and soil types characteristic of glaciated areas. The geology of the planning area is predominantly very dense and consolidated material called glacial till over varying thicknesses of clay, sand, or bedrock. The till is overlain by erosional material. (See Reference 2 for an interesting discussion of local geology.)
Figure 3
Planning Area Topography
The surficial geology of the Green River Valley is composed entirely of alluvium-sedimentary material deposited by streams and lakes. This alluvium deposit is of recent origin, accumulating over the past 4,500 years, and it contains numerous and various layers of clay, silt, sand, gravel, and peat. The Green-Duwamish Valley alluvium deposit offers some of the most fertile soils in the Pacific Northwest.

Several fault lines exist on the slopes of the East and West Hills, northeast, northwest, and Southwest of the Kent city limits. These fault lines lend evidence to the instability of the region's slopes.

Soil composition and characteristics are very important when planning optimum land uses for a region. Developing improper uses for certain soil types will require expensive man-made alterations of the natural environment in order to sustain the desired incompatible land use. The nature of the soil determines drainage bearing capacity, and wastewater "accommodability".

The Kent lowland soils are generally homogeneous consisting of primarily three nearly identically textured, alluvial soils: the Puyallup, Puget, and Sultan soils. There are several different types of soil within each individual soil series. The East and West Hills, like the lowland, are basically homogeneous, but they consist primarily of one soil series, the Alderwood series.

Generally, the soil types of the Kent lowland are unsuitable for urban and industrial uses. Because of the drainage problems and low bearing capacity of valley soils, home sites, septic tank
filter fields, sewage lagoons, sanitary landfills and heavy building sites are unsuitable land uses unless expensive, man-made compensations are constructed. The Alderwood soil of the East and West Hills are generally unsatisfactory for septic tank filter fields, but do offer a high bearing capacity suitable for home and heavy building sites.

Figure 4 shows that most of the Planning Area, in the valley and on the hillsides, has soils that are moderately or severely limited for septic tank/drainfield use. Development in such areas requires sewers.

**Climate**

The planning area is influenced by the West Coast Marine climate which is characterized by mild, wet winters and cool, relatively dry summers. Nearly all precipitation occurs as rainfall, although snow does occur each year. Approximately 75% of the rainfall occurs between October 1 and April 1, with a mean annual precipitation of 34.1 inches in Kent.

Temperatures are moderated by the proximity of Puget Sound. The mean annual temperature in Kent is 51.7 degrees F. while the maximum and minimum recorded readings are 100 degrees and -5 degrees respectively.

The prevailing winds in the region are from the south in the fall and winter, gradually shifting to the north in late spring and summer.
Air Quality

The Puget Sound Air Pollution Control Agency routinely monitors the air quality at a station in Kent. Table 5 summarizes the recently collected data for the site. Comparison of these data with standards established to protect public health reveals that the air quality at these locations is well within the primary standards with the exception of photochemical oxidants. Kent recorded violations of the photochemical oxidant standard for five hours during 1975.

The low wind speeds in the area, high frequency of low level inversions, and the constraining effects of the valley walls tend to trap locally-generated emissions. This results in poorer air quality than in areas adjacent to Puget Sound having the same emission density. Examination of the Puget Sound area confirms that the lower emission density in the Kent area results in air quality comparable to that in many other areas in Seattle and Tacoma with higher emission source densities. Air quality is threatened only during "inversions" when air pollutants are trapped and concentrate within the "walls" of the valley and below the "ceiling" of the "inversion". Methods to minimize concentrations of suspended particulates include eliminating slash burning, improving mass transit thus reducing automobile traffic, and converting from fossil fuel to electricity for heating and technological improvements.

Noise

No known noise studies have been conducted in the Kent Planning Area. However, the area has evolved from a very quiet rural farming community to an urbanized and suburban community. Increased
### Table 5

#### Ambient Air Quality Standards

<table>
<thead>
<tr>
<th>PRIMARY</th>
<th>NATIONAL</th>
<th>SECONADY</th>
<th>PUGET SOUND</th>
<th>KENT SITE</th>
<th>1973</th>
<th>1974</th>
<th>1975</th>
</tr>
</thead>
<tbody>
<tr>
<td>SULFUR OXIDES</td>
<td></td>
<td></td>
<td>REGION</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ug/m$^3$ ppm</td>
<td>ug/m$^3$ ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Average</td>
<td>80 .03</td>
<td>a</td>
<td>a</td>
<td>.02 ppm</td>
<td>.008</td>
<td>.005</td>
<td>.002</td>
</tr>
<tr>
<td>30-day Average</td>
<td>365 .14</td>
<td>b</td>
<td>1,300 .50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24-hour Average</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Geometric Mean</td>
<td>75 ---</td>
<td>a</td>
<td>60</td>
<td>60 ug/m$^3$</td>
<td>35</td>
<td>35</td>
<td>32</td>
</tr>
<tr>
<td>24-hour Average</td>
<td>260 ---</td>
<td>b</td>
<td>150</td>
<td>150 ug/m$^3$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CARBON MONOXIDE</td>
<td>mg/m$^3$ ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-hour Average</td>
<td>10</td>
<td>9</td>
<td>b</td>
<td>same</td>
<td>same</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>24-hour Average</td>
<td>40</td>
<td>35</td>
<td>b</td>
<td>same</td>
<td>same</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>PHOTOCHEMICAL OXIDANTS</td>
<td>ug/m$^3$ ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-hour Average</td>
<td>160</td>
<td>.08</td>
<td>b</td>
<td>same</td>
<td>same</td>
<td>.08</td>
<td>.1</td>
</tr>
<tr>
<td>24-hour Average</td>
<td>No Standards</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NITROGEN DIOXIDE</td>
<td>ug/m$^3$ ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. 24-hour Avg.</td>
<td>100</td>
<td>.05</td>
<td>a</td>
<td>same</td>
<td>same</td>
<td>.035</td>
<td>.025</td>
</tr>
<tr>
<td>Max. 1-hour Avg.</td>
<td>No Standards</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STATE AND REGION PARTICLE FALLOUT STANDARDS (No National Standard)</td>
<td>gm/m$^2$/mo.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Areas (a)</td>
<td>10 grams/meter$^2$/month</td>
<td>(28.6 tons/mile$^2$/month)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial-Residential Areas (a)</td>
<td>5 grams/meter$^2$/month</td>
<td>(14.3 tons/mile$^2$/month)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ppm = parts per million</td>
<td>ug/m$^3$ = micrograms per cubic meter</td>
<td>mg/m$^3$ =</td>
<td>a Never to be exceeded</td>
<td>b Not to be exceeded more than once per year</td>
<td>c Not to be exceeded more than twice in seven days</td>
<td>d Not to be exceeded more than once in eight hours</td>
</tr>
</tbody>
</table>
noise in an urbanizing area can usually be attributed to increased traffic, especially truck traffic, and increased highway speeds. With the construction of major freeways in the area and the addition of truck traffic associated with industrial development, the once quiet town is quickly becoming a bustling urban center.

**Water Quality**

Protection and improvement of water quality are primary concerns of this plan. This section covers water quality of both surface waters and groundwater. Water quality is discussed from the perspective of how improper sewage disposal or treatment may be degrading water quality. The status of each significant body of water within the planning area will be discussed.

Lake Fenwick lies in a small valley in the southwestern area of Kent. (See Figure 1.) The lake is approximately 20 acres in size and is the focal point for a 642 acre drainage basin located in the Cambridge residential area. It is 31 feet deep and contains an estimated 285 acre feet of water. The lake drains southeasterly into the Green River Valley. Severe sediment damage has occurred in Lake Fenwick in recent years caused by residential development to the west. Suspended sediment in the lake has lowered water quality in the past and is a concern. (Reference 3)

Star Lake lies southwest of Lake Fenwick, just outside the Kent City limits. (See Figure 1.) The 34 acre lake is fed by a 370 acre drainage basin in which there is considerable residential land use dependent on septic tanks for sewage disposal; runoff from two
major roads in the area also flows toward the lake. Metro studies of nutrient levels indicate significant enrichment; nuisance algal blooms are becoming more likely. Monitoring by the Seattle-King County Health Department has revealed bacterial contamination during the summer. (Reference 10)

The Green River flows from the Cascade Mountains to Puget Sound. The river meanders basically from south to north with a peak discharge of 11,400 cfs. The river averages about 150 feet in width through Kent. The river flooded annually before the Howard Hanson Dam and man-made levees and dikes were built in 1962. Much of the low-lying area along the Green River has been identified as having severe drainage problems, including local flooding during high flood stages, (Reference 11) In the vicinity of Kent, State water quality standards for dissolved oxygen, temperature, nutrients, and bacteria have been violated at least once every two years. Low stream flows during warm summer months appear to be the cause. Bio-chemical oxygen demand from point discharges of wastewater does not appear to be significant. Other pollutants encountered include coliforms, nitrate-nitrogen, and algae. Total coliform standards are violated frequently each year; sources of contamination appear to originate upstream in the Green River system. Nutrient levels are high enough to support algal growths. Nuisance aquatic growths have been observed downstream from the Kent-Highlands landfill site and are thought to be associated with this source. (Reference 7)

Mill Creek flows northwesterly through the southeast area of Kent, draining a basin of approximately 1,000 acres. The creek drains an area that has undergone major land use changes from that
of rural forested farmland to that of rather intensively developed commercial and residential development. Velocities in the Creek vary from 20 cfs to 150 cfs during the year. As urbanization of the Mill Creek Basin continues, the summer flows will lessen as ground water sources dry up. The City of Kent is presently developing a detention pond to detain excess storm runoff and maintain summer flows.

Groundwater in the valley and on the upland hills is replenished by precipitation during the wet winter months and ultimately discharges to the Green River. The City of Kent relies on ground water reached through wells and springs which are located east of the town on the plateau. Groundwater quality in the Kent area is very good.

**Vegetation and Animal Life**

Much of the land within the area is semi-urban in character, and as such represents an alteration of the naturally occurring ecosystem. Some limited sections of second growth forest do exist, and the plant and animal life typically associated with this ecosystem occur in these locations. Much of the indigenous vegetation has been replaced by floral species valued for landscaping. In these areas the fauna was also affected. Most large animals have been displaced or destroyed due to urbanization. Thus, the remaining species are limited to those that were able to adapt to the changed condition and are able to exist in close proximity to man.

The study area falls within the Humid Transitional Life Zone which extends from sea level to about 3,000 feet in elevation.
In the Green River Valley permanent and seasonal wetlands are the most important habitats. On the surrounding plateaus the dominant habitat is a mixed (coniferous-deciduous) forest. Deciduous forests, brushlands and wetlands are also found on the plateaus. Some rare and endangered species are found within the study area and are listed on Table 6.

The project area includes several lakes, rivers, and streams that, together with their characteristic shoreline vegetation, provide necessary habitat for such waterfowl as herons and osprey, mammals favoring aquatic or semi-aquatic habitats (e.g. marsh shrew, Townsend's mole, beaver), amphibians and fish.

Although the Green River Basin contains both warm and cold water fishes, data and information sufficient for critical evaluation is available only on the cold water group. Anadromous salmonids making up this group are chinook, coho, and chum salmon, steelhead, searun cutthroat, rainbow, and Dolly Varden trout, all of which spawn in the river.

The state maintains and operates the Green River Salmon Hatchery on Big Soos Creek near Auburn. Fall chinook and coho salmon and some chum are propagated at the Green River facility. Most of the fish produced here are released into the Green River.

Total fish production data of the hatchery and the natural habitat are presented in Table 7.
### TABLE 6

**RARE, THREATENED OR ENDANGERED ANIMALS**
**WHOSE RANGE INCLUDES THE GREEN RIVER SEWERAGE AREA**

#### AMPHIBIANS

<table>
<thead>
<tr>
<th>Animal</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northwest Pond Turtle</td>
<td>Clemmys marmorata marmorata</td>
</tr>
</tbody>
</table>

#### BIRDS

<table>
<thead>
<tr>
<th>Animal</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Grebe</td>
<td>Aechmophorus occidentalis</td>
</tr>
<tr>
<td>Double-crested Cormorant</td>
<td>Phalacrocorax auritus</td>
</tr>
<tr>
<td>Great Blue Heron</td>
<td>Ardea herodias</td>
</tr>
<tr>
<td>*Green Heron</td>
<td>Butorides virescens</td>
</tr>
<tr>
<td>Whistling Swan</td>
<td>Olor columbianus</td>
</tr>
<tr>
<td>*Aleutian Canada Goose</td>
<td>Branta canadensis leucopareia</td>
</tr>
<tr>
<td>Sharp-Shinned Hawk</td>
<td>Accipiter striatus</td>
</tr>
<tr>
<td>Cooper's Hawk</td>
<td>Accipiter cooperii</td>
</tr>
<tr>
<td>Bald Eagle</td>
<td>Haliaeetus leucocephalus</td>
</tr>
<tr>
<td>Marsh Hawk</td>
<td>Circus cyaneus</td>
</tr>
<tr>
<td>*Osprey</td>
<td>Pandion haliaetus</td>
</tr>
<tr>
<td>Gyrfalcon</td>
<td>Falco rusticolus</td>
</tr>
<tr>
<td>*Peregrine Falcon</td>
<td>Falco peregrinus</td>
</tr>
<tr>
<td>*Pigeon Hawk</td>
<td>Falco columbarius</td>
</tr>
<tr>
<td>Sparrow Hawk</td>
<td>Falco sparverius</td>
</tr>
<tr>
<td>Barn Owl</td>
<td>Tyto alba</td>
</tr>
<tr>
<td>*Spotted Owl</td>
<td>Strix Occidentalis</td>
</tr>
<tr>
<td>*Black Swift</td>
<td>Cypseloides niger</td>
</tr>
<tr>
<td>*Anna's Hummingbird</td>
<td>Calypte anna</td>
</tr>
<tr>
<td>*Bank Swallow</td>
<td>Riparia riparia</td>
</tr>
<tr>
<td>Purple Martin</td>
<td>Progne subis</td>
</tr>
<tr>
<td>*Winter Wren</td>
<td>Troglodytes troglodytes</td>
</tr>
<tr>
<td>Bewick's Wren</td>
<td>Thryomanes bewickii</td>
</tr>
<tr>
<td>*Western Bluebird</td>
<td>Sialia mexicana</td>
</tr>
<tr>
<td>*Hermit Warbler</td>
<td>Dendroica occidentalis</td>
</tr>
<tr>
<td>Western Meadowlark</td>
<td>Sturnella neglecta</td>
</tr>
<tr>
<td>*Purple Finch</td>
<td>Carpodacus purpureus</td>
</tr>
<tr>
<td>*Pine Grosbeak</td>
<td>Pinicola enucleator</td>
</tr>
<tr>
<td>*White-winged Crossbill</td>
<td>Loxia leucoptera</td>
</tr>
<tr>
<td>*Golden-crowned Sparrow</td>
<td>Zonotrichia atricapilla</td>
</tr>
</tbody>
</table>

#### MAMMALS

<table>
<thead>
<tr>
<th>Animal</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Keen's Brown Bat</td>
<td>Myotis keeni keeni</td>
</tr>
<tr>
<td>*Red Bat</td>
<td>Lasiurus borealis teliotis</td>
</tr>
<tr>
<td>*Townsend's Meadow Mouse</td>
<td>Microtus townsendi</td>
</tr>
<tr>
<td>*Red Fox</td>
<td>Vulpes vulpes fulva</td>
</tr>
</tbody>
</table>

* Species on preliminary list of rare and endangered animals in Washington State, prepared by the U.S. Bureau of Sport Fisheries and Wildlife (Olympia).
TABLE 7
ANADROMOUS FISH NATURAL PRODUCTION
(HARVEST PLUS ESCAPEMENT),
CEDAR-GREEN BASINS
(Reference 7)

<table>
<thead>
<tr>
<th>Species</th>
<th>Range</th>
<th>Average (Annual)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinook</td>
<td>4,200-31,240</td>
<td>13,960</td>
</tr>
<tr>
<td>Coho</td>
<td>56,900-296,000</td>
<td>162,400</td>
</tr>
<tr>
<td>Chum</td>
<td>7,440-86,410</td>
<td>33,360</td>
</tr>
<tr>
<td>Sockeye</td>
<td>48,000-190,000</td>
<td>90,000</td>
</tr>
<tr>
<td>Summer Steelhead</td>
<td>40-280</td>
<td>130</td>
</tr>
<tr>
<td>Winter Steelhead</td>
<td>42,600-79,100</td>
<td>59,100</td>
</tr>
<tr>
<td>Searun cutthroat</td>
<td>43,800-80,500</td>
<td>61,000</td>
</tr>
<tr>
<td>Searun Dolly Varden²</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

² Production limited and therefore not determined.

SOCIAL CONDITIONS

Population

Population projections for the planning area have been taken from the Kent Comprehensive Plan. (Reference 2) The Kent Comprehensive Plan in turn utilized projections from the Interim Regional Development Plan which were updated in 1973 by the Puget Sound Council of Governments' Activity Allocation Model. The Activity Model projects population for each census tract. The boundaries of the Planning Area and the census tracts do not coincide. Therefore, assumptions as to the number of people and land area within the planning area today had to be made before any projections could be made. For the facilities plan planning area, the past and future population estimates are given in Table 8.
TABLE 8
ESTIMATED POPULATION OF PLANNING AREA

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>17,500</td>
</tr>
<tr>
<td>1980</td>
<td>22,000</td>
</tr>
<tr>
<td>1990</td>
<td>30,000</td>
</tr>
<tr>
<td>2000</td>
<td>41,000</td>
</tr>
</tbody>
</table>

In 1976 the City of Kent estimated that there were 3.2 people per single family dwelling unit and 2.0 people per multiple dwelling family unit (apartment) within the City of Kent. The trend for the number of people per dwelling unit to decrease is expected to continue.

The following table indicates how the population of Kent differs from that of Washington State as a whole. As can be seen from the table, the median family income of a Kent family is higher; the median amount of education received is insignificantly smaller; and Kent residents are more mobile.

TABLE 9
POPULATION CHARACTERISTICS

<table>
<thead>
<tr>
<th></th>
<th>Kent</th>
<th>Washington State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median Family Income</td>
<td>$11,473</td>
<td>$10,407</td>
</tr>
<tr>
<td>Median years of School</td>
<td>12.3</td>
<td>12.4</td>
</tr>
<tr>
<td>Different House - Same County between 1965 and 1970</td>
<td>59%</td>
<td>24%</td>
</tr>
<tr>
<td>Class of Worker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private or Salaried</td>
<td>82%</td>
<td>70%</td>
</tr>
<tr>
<td>Government</td>
<td>12%</td>
<td>18%</td>
</tr>
<tr>
<td>Self-Employed</td>
<td>5%</td>
<td>8%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>1%</td>
<td>4%</td>
</tr>
</tbody>
</table>
Housing

Kent is typical of the region in that almost 75% of Kent's housing units are single-family residences; the percentage of multi-family dwellings is increasing; the overall vacancy rate is currently low; and housing costs are rising rapidly. Kent's housing differs from that of the region in that it generally is in better condition, since most of it (40.6%) was built from 1960 to 1970; the ratio of owner-occupants to renter-occupants is 2:1.

The Kent area will experience considerable population and household growth in the future. The exact timing of this growth is dependent upon many factors - construction of utilities, the effects of the gasoline shortage, the local and regional economy, etc., according to the Kent Comprehensive Plan - Resource Data document. (Reference 3).

Land Use

Historically, the Green River Valley has been used for agricultural purposes because of its excellent soil. However, because of its location near Seattle-Tacoma, the Sea-Tac Airport, and two railway lines, recent decisions to locate new freeways to improve accessibility, new utilities, and flood control devices constructed in the Valley, it has been transformed into an industrial area with residential areas lining the hillsides. Increasing property taxes forced many farmers to sell their lands to speculators when farming was no longer profitable. Much of the undeveloped land is owned by speculators who lease land to farmers until they want to develop it to a more intensive land use. Most of the valley floor is zoned for industrial use now. The trend for the valley to become more
urbanized will continue. A study completed in 1974 by Corff and Shapiro, Inc. showed how the 33,320 acres of the Green River Valley had changed since 1965. The following table was taken from their report:

TABLE 10

LAND USE AREAS, 1965 AND 1973
(Reference 7)

<table>
<thead>
<tr>
<th>USE</th>
<th>1965</th>
<th>1973</th>
<th>% CHANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial</td>
<td>1,150</td>
<td>3,130</td>
<td>+ 172%</td>
</tr>
<tr>
<td>Power Lines</td>
<td>230</td>
<td>230</td>
<td>0%</td>
</tr>
<tr>
<td>Commercial</td>
<td>250</td>
<td>700</td>
<td>+ 180%</td>
</tr>
<tr>
<td>Residential</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Tract</td>
<td>2,420</td>
<td>4,220</td>
<td>+ 74%</td>
</tr>
<tr>
<td>- Non-Tract</td>
<td>3,690</td>
<td>3,990</td>
<td>+ 8%</td>
</tr>
<tr>
<td>- Multi-Family</td>
<td>80</td>
<td>160</td>
<td>+ 100%</td>
</tr>
<tr>
<td>- Mobile Homes</td>
<td>20</td>
<td>210</td>
<td>+ 950%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>14,370</td>
<td>9,020</td>
<td>- 37%</td>
</tr>
<tr>
<td>Open Space</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Wooded</td>
<td>5,560</td>
<td>4,160</td>
<td>- 25%</td>
</tr>
<tr>
<td>- Non-Wooded</td>
<td>3,290</td>
<td>2,700</td>
<td>- 18%</td>
</tr>
<tr>
<td>Site Preparation</td>
<td>840</td>
<td>1,540</td>
<td>+ 83%</td>
</tr>
<tr>
<td>Institutional</td>
<td>340</td>
<td>530</td>
<td>+ 55%</td>
</tr>
<tr>
<td>Parks - Recreation</td>
<td>150</td>
<td>430</td>
<td>+ 186%</td>
</tr>
<tr>
<td>Transportation - Freeways</td>
<td>80</td>
<td>920</td>
<td>+1,050%</td>
</tr>
<tr>
<td>Gravel Quarries</td>
<td>250</td>
<td>700</td>
<td>+ 180%</td>
</tr>
<tr>
<td>Water</td>
<td>600</td>
<td>630</td>
<td>+ 13%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>33,320</td>
<td>33,320</td>
<td>---</td>
</tr>
</tbody>
</table>

King County has recently proposed an agricultural lands policy which designates land throughout the county to be preserved for agriculture. Three areas adjacent to Kent (see Figure 5) are so designated by this policy statement. The City of Kent can affect the agriculture designation of an area by what it permits adjacent to it. Adjacent to Area "B", Kent has zoned the property mainly "residential agriculture" and "industrial agriculture" with a small portion zoned "garden density multi-family" and "medium density multi-family" which are compatible. Adjacent to Area "A", Kent has zoned
Legend

Agricultural Areas Designated by King County

Figure 5

King County Agricultural Lands
property "Residential Agriculture" to the south and "Industrial Park District" to the east across the river. "Residential Agriculture" is compatible. An "Industrial Park District" would typically not be compatible and would tend to influence the adjacent lands to be industrially used; however, in this instance the river separates the two uses. Area "C" is adjacent to land zoned "multi-family" and "limited industrial", which are incompatible uses; however, the river again separates the uses, thus making them more compatible than anticipated. Some of the existing adopted King County agricultural policies state that:

- "Sewer and water local improvement district assessments on agricultural land are frequently detrimental to the operation of farms in King County."

- In order to preserve agricultural lands, sprawled development should be avoided and the urban center development concept should be adopted.

- "King County shall approve those connections to sewer interceptors reviewed by the County only when such action shall not adversely affect the agricultural potential of the District".

- "King County shall not approve rezone applications for more intensive use classifications for any of the Agricultural Lands of County Significance" as designated.

- Boundaries surrounding designated "Agricultural Land of County Significance" can be revised when the County
Council finds that the continued economic viability of farm operations conducted in these subareas changes.

- Agriculture lands designated shall not be divided into parcels of less than 10 acres.

Generally, the City of Kent’s zoning is compatible with adjacent agricultural lands designated by the proposed King County Agricultural Ordinance.

The Kent Comprehensive Plan (Reference 2) notes the following land use policies:

- The West and East Hills should be used for residential development.
- The city should concentrate facilities and services in new areas to minimize sprawled development.
- Adequate sewerage facilities should be provided adjacent to waterways.

SERVICES AND FACILITIES

Police

The bulk of the planning area lies within the jurisdiction of the City of Kent. There are 25 officers, 5 detectives, and 5 patrol units assigned to the Kent Police Department.

Fire

Fire protection in the planning area is provided by the City of Kent. The department employs 31 paid firemen and 35 volunteers,
and operates 6 engines, 5 utility vehicles, 1 aid car and 1 heavy duty rescue vehicle.

**Water**

Service is provided by the City of Kent. The source of the water supply is from springs. There is a reserve capacity in the system to meet future additional demand. The average water demand is 5 million gpd with a peak demand of 8 million gpd. The storage capacity is 18 million gallons with a pumping capacity of 11 million gpd.

**Sewage**

Service is provided by the City of Kent. Treatment is provided by METRO, a county wide sewer agency. The Kent Comprehensive Plan (Reference 2) identifies as its second goal the provision "for a planned, coordinated and efficient sanitary sewer system." The objectives it lists to support this goal are as follows:

**Objective 1**

Complete and implement a comprehensive sanitary sewer plan encompassing both facilities and services.

**Objective 2**

Coordinate closely with METRO and local sewer districts to insure that adequate and efficient sewer service is available to all the Kent area.
Objective 3

Finance and develop the sanitary sewer system based on planned development patterns and land decisions.

Objective 4

Develop an equitable rate structure which encourages an adequate sewer system.

**Highways**

Interstate Highways 5 and 405 and State Route 167 presently provide excellent access to Kent and its surrounding area. These freeways were all constructed between 1965 and 1970 and have contributed most to Kent's recent growth and transformation.

**Schools**

The planning area is served by the Kent School District which has 15 elementary schools, 4 junior high schools, and two senior high schools. The 1976 enrollment of the Kent public schools numbered 15,500. Higher education can be provided to the area's residents from Green River Community College in Auburn or Highline Community College in Midway. Six universities are also within easy commuting distance of the area.

**Parks and Recreation**

Recreational facilities include three community parks, one private and one public golf course, and a thoroughbred horse race track.
ARCHAEOLOGICAL AND HISTORICAL SITES

A search of archaeological and/or historical site records by the Washington State Department of Recreation revealed that archaeological and historical resources are present in the Kent Planning Area (Reference 9).

SUMMARY OF ENVIRONMENTAL CONCERNS

The most important environmental concerns for planning in the area are as follows:

- The soil types present in much of the planning area impose moderate to severe limitations on the ability of septic tank systems to provide adequate wastewater treatment and disposal.

- Conversion of prime agricultural land to residential use should be avoided.

- Protection and improvement of water quality of both ground water and surface waters, particularly Lake Fenwick and Star Lake.
REFERENCES


4. King County Ordinance 76-1073, King County Agricultural Districts, 1976.


CHAPTER 5
EXISTING WASTEWATER SYSTEM CONDITION,
FLOWS AND POLLUTANT LOADS

INTRODUCTION

For the most part, the City of Kent is served by an adequate sewerage system. The main interceptor system is basically complete in the areas presently occupied. A substantial portion of the sewers in the older downtown areas are in need of repair and/or replacement to reduce infiltration/inflow but are functioning without presenting a health problem. The main areas of concern are the portions of the entire service area where growth is expected to occur.

GENERAL SYSTEM CONDITIONS AND PERFORMANCE

The sewage collection and interceptor system serving the City of Kent is in general adequately sized and in good condition with the exception of the older portion of the City where an infiltration/inflow problem exists. These older lines are being replaced through an on-going program by the City.

The main portion of the newer collection system and virtually all of the interceptors have been planned and constructed within the past 15 years, and were designed based on projected ultimate densities. The system is functioning with a minimum amount of maintenance and is not subject to overloading.
One potential future problem concerns Metro's Mill Creek Interceptor and the interceptor upstream from S264th Street and 104th Avenue S. to S. 256th Street and 116th Avenue S. This interceptor receives sewage pumped from the Cascade Sewer District's Soos Creek drainage basin, and from the housing development of Timberlane to the east. Also, there is planning being undertaken by King County to determine the feasibility of delivering sewage from the Black Diamond - Lake Sawyer area. This will be discussed under a subsequent portion of this chapter.

In general, the performance of the system is good with no significant problems that are not being dealt with the City in an orderly and continuing manner. The existing system is shown on the system layout appended to this report.

EXISTING CONDITION

Collection System

As previously stated, the collection system, with exception of the older downtown area, is in good to excellent condition, is adequately sized, and is functioning with very little maintenance. Where infiltration and/or inflow exists, some lines are surcharged during wet weather, but are not subject to overflow problems. These lines require an inordinately large amount of maintenance, but the problem is gradually being overcome by replacement of the deteriorated sewers.

Downstream from these areas the interceptor system is large enough to accommodate these high flows with little impact.
Unsewered Areas

Within the study area of this report, there are several unsewered areas; however, in most cases the drainage patterns have been established and the basic interceptor network has been constructed to receive the flows from these areas when development occurs. These areas, for the most part, are located along the outer fringes of the natural drainage basins tributary to the Green River Valley, and can be served by extending the existing gravity system.

The southerly portion of the study area, encompassing the valley floor and portions of the West Hill area will require some pumping to provide service. In particular, the area around Lake Fenwick will require pumping and the area around Star Lake if it is to be served through the Kent system. The Auburn Interceptor, now nearing completion, will provide the trunk line necessary for the extension of laterals and interceptors required to serve the valley floor and tributary uplands.

The southeast portion of the study area extends into the drainage basin naturally tributary to the Soos Creek drainage basin. The City presently serves the housing development known as Springwood and now being managed by the King County Housing Authority. This development is within the Soos Creek drainage basin, but is pumped westerly into the Kent system. Also, there is substantial development existing principally in the Derbyshire area east of 116th Avenue S. and south of S. 272nd Street. While the natural drainage pattern is easterly to the Soos Creek area which is not presently served by a gravity interceptor line, the need for sewer service may cause the development of a pumping system westerly over the drainage divide into the Kent system.
At this point it should be noted that a substantial area around Lake Meridian and northerly is being served by Cascade Sewer District, and the sewage is being pumped from the Soos Creek drainage basin westerly along S.E. 256th Street into the Kent system. Also, the possibility of sewer service for the Black Diamond-Lake Sawyer area is being explored with discharge into the Cascade Sewer District and then into the Kent system. Until such time as an interceptor is constructed from the Soos Creek area to the Auburn Interceptor, any additions to the Cascade Sewer District tributary to the S.E. 256th Street pumping station will hasten the time when the City of Kent and Metro's Mill Creek Interceptor system will reach capacity.

While the Soos Creek area is not a natural part of the Kent system, future development will affect the City's ability to serve the East Hill Service area south of S. 248th Street.

**Sewage Treatment Facility**

All sewage generated in the Kent service area is treated at Metro's Renton Treatment Plant. The City's collection system is discharged into Metro's Interceptor network in the Valley and ultimately into an existing 72 inch trunk line extending north from S. 216th Street and 76th Avenue S. to the Renton plant. No change in the agreement is anticipated.

At the present time, the City serves approximately 12,335 customers and customer equivalents. Based on 225 gpd per customer or equivalent, the sewage flow generated within the system would be approximately 2.8 mgd, exclusive of any extraneous flows entering the system through infiltration and inflow.
The City of Kent collection system as it now exists is adequately sized and in good condition with the exception of the older portions previously noted. The main area of need is the development of a plan which will provide the guidance for the extension of the system to all areas considered to be a logical part of drainage basin. This could include service to limited areas not tributary to the natural basin, but which through physical impediments or timing should become a part of the Kent system.
PREVIOUS STUDIES

In conjunction with sewer system projects constructed by the City of Kent, and other agencies, the City has conducted four infiltration/inflow analyses for substantial portions of the City's sewage collection and interceptor system. These studies were undertaken at various times as a part of the process of establishing eligibility for Environmental Protection Agency and Department of Ecology construction grants.

Three of the infiltration/inflow analyses were completed in 1973, and were prepared for the following projects:

1. Garrison Creek Interceptor
2. Linda Heights Pump Station Modifications
3. 100th Avenue Interceptor

The fourth study was completed in 1974 and was prepared in conjunction with the Metro-Auburn Interceptor project. This study covered the older portion of the City's collection system, and a substantial amount of relatively new system. For the most part, the systems studies are located in the Valley floor and are subject to high groundwater tables.

The results of these studies have been summarized and are being presented in a condensed form for the purpose of unifying the findings of the studies previously completed.
SUMMARY OF COMPLETED I/I ANALYSIS

As mentioned, four independent I/I analyses have been completed on portions of the City of Kent sewerage system. The areas studied, which collectively comprise approximately 40% of the total system are shown on Figure 7. A summary of each study is as follows:

**Garrison Creek Interceptor**

This study cover the Plats of Stockton and Kenton Firs located southeasterly of 124th Avenue on S.E. 100th Street, and was done in conjunction with the Garrison Creek Interceptor project constructed by the City. The study covered approximately 6,360 feet of 8" pipe and 700 feet of 12" and 18" interceptor, all installed in the period from 1969 to 1972. This system is in the East Hill area of the City at an elevation of approximately 400'.

An analysis of the flows showed that this system is entirely free of infiltration and inflow.

**100th Avenue Interceptor**

This study consisted of an analysis of the system tributary to the Hines pumping station then in existence. The 100th Avenue Interceptor constructed by the City has subsequently intercepted the flow to the pump station and now flows by gravity to the Garrison Creek Interceptor at the intersection of 100th Avenue S.E. and S.E. 124th Street.

The study covered approximately 30,000 feet of 8" concrete pipe and 1,400 feet of 12" concrete pipe. The area is located generally
east of 104th Avenue S.E. and south of S.E. 224th Street in the East
Hill area of the City. Elevations in the area range from approxi­
mately 380' to 450' above mean sea level.

The results of the flow analyses from this area showed a minor
and insignificant amount of infiltration and inflow occurring only
in February of the year under study. This month had a period of excep­
tionally high rainfall, and excessive flow was attributed to a plugged
storm drain line which caused a ponding of water over manholes.

**Linda Heights Pump Station**

This study was undertaken in conjunction with a project upgrad­
ing the Linda Heights Pump Station serving an area on the West Hill
of Kent. The area served is located generally between S. 240th and
S. 252nd Streets and between Interstate 5 and 36th Avenue S.

The system studied consist of approximately 17,000 feet of 8"
pipe constructed in 1959 and 1960. The elevations in the study area
range from 400' to 500' above mean sea level.

An analysis of the flows in the study area showed virtually no
correlation between rainfall and flows generated. Since the flows
closely approximated the anticipated theoretical flow for the
system, it was concluded that infiltration and inflow are not a
problem in this area.

**Metro-Auburn Interceptor**

The I/I Analysis performed for this project was by far the most
extensive study of the four completed to-date, both from the stand­
point of amount of pipe, and from flows generated.
The area studied consisted of three independent sub-systems; the James Street system, the Smith Street system, and the South system. The sub-systems serve all of the old area of the City and a substantial amount of more recent developments. The age of the pipe ranges from more than sixty years old, to virtually new construction. The older pipe is vitrified clay and some concrete, while the new pipe is concrete with some cast iron.

The size and approximately combined length of the pipe in the three systems is as follows:

<table>
<thead>
<tr>
<th>Size (inches)</th>
<th>Approximate Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>8,540'</td>
</tr>
<tr>
<td>8&quot;</td>
<td>76,650'</td>
</tr>
<tr>
<td>10&quot;</td>
<td>7,250'</td>
</tr>
<tr>
<td>12&quot;</td>
<td>14,550'</td>
</tr>
<tr>
<td>14&quot;</td>
<td>3,500'</td>
</tr>
<tr>
<td>18&quot;</td>
<td>190'</td>
</tr>
<tr>
<td>24&quot;</td>
<td>3,000'</td>
</tr>
</tbody>
</table>

The footage of pipe in each sub-system is as follows:

- James Street System: 12,820' = 2.43 mi.
- Smith Street System: 66,900' = 12.67 mi.
- South System: 35,660' = 6.75 mi.

Total: 21.85 miles

The James Street System is located primarily in the valley floor, and while some of the pipe is relatively new, much of the system is of older construction. Variations from theoretical anticipated flows range from 700% during dry periods to 1150% during wet periods.

Approximately 50% of the Smith Street System is located on Scenic Hill at elevations of from 50' to 350' above mean sea level. The Scenic Hill system is geographically part of the East Hill System.
While a substantial amount of the pipe in this area is old, infiltration and inflow were found to be insignificant. The remaining portion of the system is old pipe located in the valley floor. Variations from theoretical flows range from 550% to 700%; the decrease in variation from the James Street System being attributed to the influence of the lack of I/I from the Scenic Hill area.

Virtually all of the South system is located in the valley floor, but has been constructed within the past 15 years. A substantial portion of the South System, tributary to the Horseshoe Acres pump station, was constructed in 1971 and 1972. The flow analysis of the South System showed an insignificant amount of infiltration and inflow.

While the study of the three sub-systems showed a large amount of infiltration and inflow, it also disclosed that the problem is basically confined to the older portions of the system. Pipe installed within the past 15 to 20 years is generally in good condition with little or no infiltration/inflow problems. This is particularly true in the higher elevations.

Despite the presence of a large amount of extraneous flows in the older parts of the system, a cost-effective analysis disclosed that these flows were not excessive by definition. A significant factor in this analysis was the low cost of treatment by Metro.

RELATIONSHIP TO TOTAL SYSTEM

The City of Kent System consists of approximately 445,000 feet of pipe, or some 84 miles. Of this amount, 171,500 feet, or 32.5
miles have been studied under the previously summarized I/I Analyses. This constitutes slightly under 40% of the total system. Also, of this 32.5 miles, 12.5 miles have been constructed since 1970, or 22%.

The City of Kent is located in two characteristically different areas with relationship to topography and groundwater conditions; the Green River Valley floor, and the uplands on each side which fall fairly abruptly to the valley. The East Hill System and the West Hill System already referred to are in the higher elevation areas above the valley. These areas are well-drained and not subject to any significant high groundwater conditions. Of the total 84 miles of system, approximately 53 miles are located on the East and West Hills. Of this 53 miles, approximately 16.5 miles have been investigated under previous studies, or approximately one-third. The remaining 31 miles of the total system are located on the valley floor. Of this 31 miles, approximately 16 miles have been investigated under the previous studies, or approximately 50%.

CONCLUSIONS

From the information developed in the studies summarized, it was evident that the portions of the systems investigated on the East and West Hill are free from excessive infiltration/inflow. As noted, approximately one-third of East and West Hill systems were investigated. These areas were studied in conjunction with construction projects and as such, could be considered randomly selected since location, pipe condition or groundwater conditions were not factors involved in their selection. Since virtually all of the systems located on the East and West Hills are above 150 feet
elevation, were installed within the past 20 years for the most part, and are subject to similar groundwater conditions, it is concluded that the portions studied are representative of the entire higher level systems and not subject to excessive infiltration or inflow.

This conclusion is further substantiated by interviews with Sewer Department personnel. A large amount of the East and West Hill Systems have been televised with no indication of infiltration conditions. Also, the Department conducts a thorough and continuous inspection program which has revealed that the only areas where infiltration/inflow conditions exist are in the old portion of the downtown system already investigated under previous studies. Also, for the past ten years, the City has televised all new construction prior to acceptance. As a part of their construction practices, all pipe installed is fill tested for leakage prior to installation, and the completed sewer is air tested prior to television and acceptance. Since a substantial amount of the Hill systems were installed in accordance with these procedures, the likelihood of leakage is further minimized.

In the valley system, approximately 50% of the same 31 miles of sewer pipe comprising the system have been investigated. The pipe subject to infiltration and inflow has been noted under previous studies. The portion of the system not covered under the previous studies, approximately 15 miles, is located primarily in the valley northerly of S. 240th Street. Virtually all of this system has been installed subsequent to 1967, and was installed utilizing construction methods previously noted. For the most part, this portion of
the system consists of larger diameter pipe (12" through 27"). Routine maintenance and inspection of the system by the Sewer Department has not disclosed any evidence of infiltration or inflow. Although the area is subject to high groundwater conditions, the City Sewer Department Superintendent has stated that this system is in very good condition and he has found nothing that would indicate any significant amount of infiltration or inflow.

In summary, an assessment of the studies completed to date indicates that the only areas subject to infiltration and inflow in the entire Kent Sewage Collection System have been identified. Although the quantities of infiltration and inflow in the deteriorated portions of the old system were found to be substantial, it was determined that it was not cost effective to correct the problem due to the low cost of treatment by Metro. These findings were concurred with by the agencies reviewing the studies.

Although rehabilitation and/or replacement was not found to be cost effective, the City is proceeding with a program of replacement in the problem area, and has replaced several thousand feet of old pipe within the past few years. This is a continuing program, and it is anticipated by the City that within the next few years, all of the older pipe will be replaced under the improvement program.
Under the present agreement between the City of Kent and Metro, charges for sewage treatment and related costs are based on the number of single family residences served together with commercial and industrial usage converted to residential equivalents on the basis of 900 cu. ft. of water per month consumed equaling one equivalent.

At the present time the City has 3,600 single family customers and 8,733 residential equivalents for a total of 12,333 customers and equivalents. Included in this number are multiple family residences.

Forecasts of flows and wasteloads result directly from population estimates and forecasts. Sewage flows on a per capita basis are assumed to remain fairly constant at 900 cu. ft. per month per single family residence.

Using 12,333 single family equivalents at an average flow rate of 900 cu. ft. per month, the total flow would amount to 2.8 million gallons per day (mgd).

The population of the study area as detailed in Chapter 6 in this report is as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>17,500</td>
</tr>
<tr>
<td>1980</td>
<td>22,000</td>
</tr>
<tr>
<td>1990</td>
<td>30,000</td>
</tr>
<tr>
<td>2000</td>
<td>41,000</td>
</tr>
</tbody>
</table>
The above population data in themselves are not sufficient to calculate the total sewerage flow from within the study area since the population gives no indication of the flow resulting from commercial, industrial, institutional and multi-family sources expressed as equivalents. It may, however, be assumed that the growth in the above sectors or sources will keep pace with the normal population growth. For projecting future flows, the same ratio between the single family residences as a source of wastewater and the other sources, namely industrial, commercial, institutional and multi-family as another source of wastewater will be maintained constant throughout the planning period.

Another source of difficulty in projecting future flows is that the area presently served by the City of Kent does not include all the study area. The City will no doubt continue to grow by annexing areas adjacent to the City from within the study area. It is doubtful that by the year 2000 the city limits will grow far enough to include all the study area. An assumption, however, can be made that half the area outside the city limits but within the planning area will be within the City of Kent by the year 2000. The growth is assumed to occur uniformly over the planning period.

The following calculations can be made for sewerage flows for the years 1980, 1990 and 2000.

The rate of population growth which yields the figures shown in the above table is 3.2% compounded annually.

The flow from 3,600 residences at 900 cu. ft. per month is equal to 0.8 mgd. The industrial/commercial, etc., sources therefore comprise 2.0 mgd of the 2.8 mgd total flow.
Projection of the 3,600 residences assumed to exist in December 1976 to 1980 at a rate of 3.2% yields 3,957 residences. Assuming a single family residence contains 3.6 persons, the total number of people would be 14,250. The population of the study area in 1980 will be 22,000. The population growth due to annexation is assumed to be 8% of the difference, or 620 for a total of 14,870 which is equivalent to 4,130 residences which will yield a flow of 0.93 mgd. The industrial/commercial sector, keeping the same ratio as 1976 will be 2.32 mgd for a total 3.25 mgd.

In 1990 the number of single family residences at a 3.2% growth rate will be 5,420, representing a population of 19,500. The total population will, however, be 30,000. The increase in population due to annexation will be 21%. (8% for the first 3 years and 21% for the 10 years between 1980 and 1990, thus leaving 21% for the period between 1990 and 2000 for a total of 50% growth by annexation). The increase due to this element will be 2200 for a total population by 1990 of 21,700. This figure is equivalent to 6028 residences, yielding a flow of 1.36 mgd. The industrial/commercial sector, using the same ratio as 1976, will be 3.39 mgd for a total flow of 4.75 mgd.

In the year 2000 the number of single family residences at 3.2% growth rate will be 7,430. The population this number represents is 26,750. Growth by annexation will be equivalent to 3,000 for a total population of 29,750. This figure represents 8,264 residences resulting in a flow of 1.86 mgd. The industrial/commercial section, keeping the same ratio as 1976 will be 4.65 mgd for a total flow of 6.51 mgd.
The following table summarizes expected waste flows for the years 1980, 1990 and 2000.

**TABLE 11**

PROJECTED WASTEWATER FLOWS

<table>
<thead>
<tr>
<th>Year</th>
<th>Residential Flow mgd</th>
<th>Ind./Comm. Flow mgd</th>
<th>Total Flow mgd</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>0.93</td>
<td>2.32</td>
<td>3.25</td>
</tr>
<tr>
<td>1990</td>
<td>1.36</td>
<td>3.39</td>
<td>4.75</td>
</tr>
<tr>
<td>2000</td>
<td>1.86</td>
<td>4.65</td>
<td>6.51</td>
</tr>
</tbody>
</table>

The flow for any of the intermediate years may be calculated by interpolation.
CHAPTER 8
DEVELOPMENT AND EVALUATION OF ALTERNATIVE PLAN ELEMENTS

INTRODUCTION

Since the pattern of the City of Kent's existing collection and interceptor system is basically established and implemented, the development of a number of fundamental alternative plans is not necessary. The various aspects of facilities planning will be discussed as they pertain to the operation of the Kent system.

REGIONALIZATION

Within the planning area covered in this report, virtually all of the area under study is naturally tributary to the Kent system. The Star Lake area in the southwestern part of the study area could be serviced by the Kent System or through the Lakehaven Sewer District; however the manner of service to this area is simply a matter of economy and timing and is not truly a regionalization consideration.

The City of Kent system is a part of a regionalization plan developed by Metro, and regionalization considerations have already been developed and the system constructed, or in the process of construction. While the full system for the region has not been fully completed, the basic planning has been done and the ultimate development of the City of Kent System will not affect the regionalization plan already established.
WASTE MANAGEMENT

Since the flows from the Kent system are treated at Metro's Renton Treatment Plant, waste management techniques are not a part of this study. Any analysis of the treatment facility will be made by Metro as the necessity arises.

FLOW REDUCTION

Observations of flows made during the infiltration/inflow analysis for the Kent system showed that the major areas subject to extraneous flows from storm and ground water were located in the older portions of the downtown area. As previously mentioned, the City is in the process of replacing these older lines, and anticipates that replacement will be basically complete within the next few years. Good maintenance and repair practices will keep infiltration and inflow to a minimum in existing lines. The City's construction requirements are such that new construction is well controlled and flow measurements from newer lines shows that infiltration/inflow is not a problem.

SYSTEM EXTENSION AND ALTERNATIVES

For the most part, the service area of the City can be served by gravity flow systems. Also the pattern of much of the interceptor and collection system has been established and the major lines constructed. In some of the unsewered areas, additional lift stations may be required.
From a study of the map showing the existing system of the City and the service area, it is readily apparent that the unsewered areas are located around the periphery of the existing system. These unsewered areas range in size from approximately 100 acres to several hundred acres and are tributary to different portions of the existing system. For the most part, these areas can be served by extending existing lines; one notable exception being the area lying south of the Green River to S. 277th Street, and extending from the Star Lake area east to the Green River. The construction of the Auburn Interceptor makes it possible to serve this area without pumping long distances into the existing City system north of the Green River.

In order to determine line sizing and possible routing, these areas were considered on a case by case basis, and a method of service developed. Some of the areas are relatively small and can be served by an 8", 10" or 12" line. The actual location of lines of this size can best be determined when plans for development are known and feasible locations can be identified. Also projecting 8" and 10" lines locations into an undeveloped area is of little value until development patterns become somewhat established. Location of larger trunk lines, where possible routes are limited by topography and geographical features, are more meaningful, and approximate locations have been established.

In order to facilitate identification of areas under discussion, they have been shaded on the proposed system map to show extent, and lettered for identification purposes. These areas commence at the northeast corner of the service area and progress clockwise, and are shown in the map appended to this report.
**Area A**

Area A covers approximately 160 acres. The natural slope of the ground, which is very slight is to the north. A single 15" pipe on minimum slope would be sufficient to serve the area. An existing 12" line extends northerly along the east margin of E. Valley Highway and easterly for about 1000 feet, about 400 feet south of S. 188th Street. Due to the length of the area, this line probably can serve only the southerly portion. An additional 12" line will be needed to serve the remainder of the area and should be routed across E. Valley Highway and extended northerly to the existing 36" Metro line on S. 180th Street.

Cascade District has shown a need for a line in this general vicinity to serve the area east of the Valley Freeway. This line is shown in two segments one of which is to be constructed by Cascade Sewer District while the other to be constructed as a joint facility.

**Area B**

Area B covers approximately 110 acres. The existing 15" crossing of E. Valley Highway at 192nd Street, and an 8" crossing approximately 1320 feet south have adequate capacity to serve the area. Until development is proposed, definite locations for interior lines cannot be established since there are no interior roads. The only natural obstacle will be the Springbrook Creek Crossing.

**Area C**

Area C covers approximate 110 acres. A 10" and a 12" line immediately east of and parallel with E. Valley Highway provide service to the south half. There is an existing 12" on S. 200th
which has been extended across E. Valley Highway to serve the northerly portion. Here again, any attempt to show interior collection or service lines across undeveloped property would be merely schematic and of little value in final planning.

Areas B-1 and C-1

The areas comprise approximately 80 acres total, extending in a narrow strip one mile long along the east margin of the Valley Freeway. Cascade Sewer District is proposing a trunk line in this area. If development occurs, the most feasible method of service would be into the proposed Cascade trunk line. This would eliminate at least two or more costly crossings of the Freeway.

Area D

Area D covers approximately 250 acres located between S. 218th Street and S. 208th Street, and from 92nd Avenue South to the East Valley Highway, together with an area located between 92nd Avenue S. and 100th Avenue S.E. and between 97th Place S. and S. 208th Street. The area west of the Valley Freeway is tributary to existing lines along E. Valley Highway, S. 208th Street and S. 218th Street. In order to serve the area east of the Valley Freeway, through which Garrison Creek flows, a crossing of the Valley Freeway will be required. A 10" pipe would adequately serve east of the Freeway for the balance of Area D.

Area E

Area E covers approximately 600 acres extending generally from 92nd Avenue S. to 108th Avenue S. and from S. 224th Street to S. 208th Street. This area, for the most part is tributary to the
Garrison Creek Interceptor at S. 218th Street and 93rd Avenue S., the most westerly and northwesterly portion would be tributary to the proposed crossing of the Valley Freeway in Area D.

A proposed collection system has been layed out for Area E which will provide service for the now existing development. If new streets are platted prior to actual installation, changes will undoubtedly occur. Under the proposed system, the area can be served for the most part by 8" lines, with some 10".

Area F

Area F consists of approximately 300 acres. This area is tributary to the 100 Avenue S. Interceptor and to the Garrison Creek Interceptor. Sufficient routes are available to allow this area to be served by 8" lines.

Area G

Area G consists of approximately 1000 acres tributary to the Mill Creek Interceptor and extends generally from S. 248th Street to S. 277th Street, and from 104th Avenue S. to 116th Avenue S. The collection system for this area consists primarily of 8" pipe, with some 10" to 15" in the area approaching the beginning of the Mill Creek Interceptor. One lift station is proposed to serve approximately 100 acres in the southwest corner of the service area. This lift station could be eliminated if a suitable route along easements or future streets could be obtained to Woodland Way along the southwesterly side at the Mill Creek drainage way.
Area H

Area H covers approximately 1200 acres extending from approximately S.E. 248th Street to S.E. 277th Street and from 116th Avenue S.E. to 132nd Avenue S.E. A small area lies east of 132nd Avenue S.E. in the vicinity of S.E. 272nd Street.

The total area is naturally tributary to the Soos Creek drainage basin; however, it appears at this time that it will be many years before the Soos Creek Interceptor will be constructed southwesterly into the Auburn Interceptor. In the meantime, any sewered development in the area can flow by gravity to an existing pump station located southwesterly of the intersection of 132nd Avenue S.E. and S.E. 272nd Street.

Area I

Area I consists of approximately 2000 acres in the Valley floor from the Green River south to S. 277th Street. Of this amount, approximately 700 acres are within the city limits of Kent. This total area has very poor drainage for the most part. The area within the County is zoned for agricultural purposes, and may remain in this classification. However, if development occurs, a system of serving the area has been developed which will not require pumping. The proposed system has been predicated on the assumption that if development occurs, substantial fill will be necessary in the very low areas to obtain surface drainage and thus would provide sufficient cover over the piping system. Because of the minimum slopes which must be maintained, slow development with low flows could result in the necessity for frequent cleaning until adequate flows are accumulated.
Area J (Lake Fenwick Area)

Area J covers approximately 225 acres including the surface area of Lake Fenwick. Much of the area surrounding the Lake is too steep to permit building. Approximately 100 acres could possibly be developed if sewer service were provided. The natural drainage pattern is southeasterly from the south end of the Lake. If the valley floor to the east and south develops, the valley system would provide a route to the Auburn Interceptor. If this does not occur, the most economical method of discharge would be through a tight line to the Auburn Interceptor. A six inch line would be adequate to serve the area. A careful analysis will be needed to determine if potential customers would provide adequate flow to maintain sufficient velocity.

Star Lake Area

While the Star Lake area is mostly within the Lakehaven Sewer District, gravity service could be provided by routing the trunk to serve the area into the Auburn Interceptor. The City of Kent was requested by the Department of Ecology to Study the Star Lake area as a part of this plan.

It can be assumed that the basic collection system required for the area would remain unchanged for the most part regardless of the disposition of the sewage after collection and that significant items for comparison would be in the cost of installing pumping facilities and force mains versus the cost of serving by a gravity system. This comparison must be made on the basis of providing ultimate service. The following comparison is made on the basis of the facilities that would be needed under service to the Lakehaven Sewer District as opposed to service to the Auburn Interceptor.
TABLE 12  
COST ESTIMATES FOR STAR LAKE AREA SERVICE ALTERNATIVES

<table>
<thead>
<tr>
<th>1. Collection System</th>
<th>Pumping Station (Lakehaven S. D.)</th>
<th>Gravity Line (Auburn Interceptor)</th>
<th>Tight Line (Auburn Interceptor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Cost difference of 2400' of 18&quot; pipe for pumping system versus 12&quot; for gravity system (see plan)</td>
<td>$17,000</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>b. Cost difference of 2000' of 15&quot; pipe for pumping systems versus 10&quot; for gravity system (see plan)</td>
<td>$26,000</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2. Pump Station</td>
<td>*273,000</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>3. Force main - 10&quot;</td>
<td>*87,000</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>4. 10,000' of 10&quot; gravity trunk line</td>
<td>450,000</td>
<td>180,000</td>
<td></td>
</tr>
<tr>
<td>4.a 10,000' of tight line</td>
<td>115,000</td>
<td>115,000</td>
<td></td>
</tr>
<tr>
<td>5. 5,000' of 12' tight line across valley to Auburn Interceptor</td>
<td>115,000</td>
<td>115,000</td>
<td></td>
</tr>
<tr>
<td>6. Boring under Valley Freeway</td>
<td>403,000</td>
<td>585,000</td>
<td>315,000</td>
</tr>
</tbody>
</table>

*From Star Lake Facilities Plan - Lakehaven Sewer District - Hart, Williams, and Roth

The above table shows that the least costly method of serving the Star Lake area is the construction of 10" and 12" tight lines to the Auburn interceptor. This is followed by pumping to Lake Haven Sewer District and finally a gravity line to the Auburn Interceptor being the most expensive. Also, a brief analysis shows that energy costs for the proposed pump station would be approximately $180,000 dollars over a fifty year period based on maximum density in twenty years, and assuming present day energy costs.
Expansion of the valley system from the Auburn Interceptor could change the initial construction costs; however, the greatest expense is in the 10,000 feet of 10" line over steep terrain down to the valley floor where significant development is not likely to occur.

**Area K**

This area consists of approximately 390 acres. The westerly side is quite steep and a substantial portion would not appear suitable for development. For the purpose of determining a design flow, 300 acres of usable area was assumed. Area K does not have a natural drainage outlet and during wet periods, water ponds in the southeasterly portion. In order to provide service to Area K, a pump station would be required, and a force main crossing of the Green River.

**Area L**

Area L covers approximately 840 acres. Again much of the area would appear to be unsuitable for development, particularly since the City of Seattle operates a sanitary landfill on the hillside in the west central portion, and much of the total area is steep. For design purposes 500 acres has been assumed as usable. This area can be made tributary to the existing line on S. 212th east of the Green River by installing an inverted syphon across the river.

**Area M**

This area covers approximately 470 acres, most of which could be developed. The natural flow is to the north and east. Assuming
that this area will develop to some extent an inverted syphon across
the Green River would be needed and a gravity line to the West Valley
Highway would be required. S. 196th St. would be the logical location
for the syphon and gravity line with sizing dependent on the extent
of development.

SUMMARY

Sewage flows from the City of Kent are treated at Metro's Renton
Treatment Plant. There is nothing at present that would indicate
any change in the foreseeable future. In view of this, no discussion
of treatment facilities is included in this plan.

The primary focus of this study is the system extensions that
will be required to provide service within the boundaries of the nat-
ural service areas of the City. The general nature of the unsewered
areas and the existing system available to serve these areas have
been discussed in the preceding portion of this chapter, on an area
by area basis. A system of new facilities has been developed and is
shown on the map appended to this report. The proposed system is
quite detailed in the areas where sufficient development has occurred
to establish street patterns. In the areas which are largely
undeveloped, only major lines are shown, and in some cases are
somewhat schematic in nature.

From the standpoint of alternatives to the system shown, there
is nothing significant which can be presented which would provide
the City with meaningful choices. Obviously, minor alternatives in
routing may be desirable as development occurs and street patterns
emerge. Also, there is no specific timetable for construction of
the proposed system. Installation of sewers will occur along with
development, or where failure of existing septic tank systems
becomes a significant problem and action is required.
CHAPTER 9
PUBLIC PARTICIPATION AND AGENCY COORDINATION

A public hearing is scheduled to be held on June 6, 1977 at 8:00 P.M. in the Council Chambers of the City of Kent. Testimony will be received from the public regarding any of the contents of this Facilities Plan. Furthermore, this plan is being forwarded to a number of local, state and federal agencies who may have interest or jurisdiction over the provisions of this plan. Their comments along with any of the citizens' comments will be addressed and included in the final facilities plan which is scheduled to be issued on July 8, 1977.

This draft facilities plan has been sent for review and comment to the following agencies.

Clifford V. Smith, Jr.
Regional Administrator
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington  98101

King County
Public Works Department
King County Administration Building
Seattle, Washington  98104

Des Moines City Manager
21630 - 11th South
Des Moines, Washington  98188

Director
Washington Department of Game
600 North Capitol Way
Olympia, Washington  98501

Governmental Services
Puget Sound Council of Governments
216 First Avenue South
Seattle, Washington  98104

Director
Washington Department of Fisheries
Room 115, Central Administration Building
Olympia, Washington  98501

U.S. Army Engr. District - Seattle
Col. Raymond J. Eineigi
4735 East Marginal Way South
Seattle, Washington  98134

King County
Division of Land Use Management
King County Courthouse
Seattle, Washington  98104

Washington Department of Ecology
4350 - 150th N.E.
Redmond, Washington  98052

Seattle-King County Health Service
Southwest District Office
10821 - 8th Southwest
Seattle, Washington  98146
Mr. Al Koch, P.E.
Washington Department of Social and Health Services
Sanitary Engineering Division
1312 Smith Tower
Seattle, Washington 98104

Office of Archaeology and Historic Preservation
Box 1128
Olympia, Washington 98504

METRO
600 1st Avenue
Seattle, Washington 98101

Director of Public Works
City of Auburn
20 "A" Street N.W.
Auburn, Washington 98002

Director of Public Works
City of Des Moines
216 - 11th Avenue South
Des Moines, Washington 98188

District Manager
Lakehaven Sewer District
P.O. Box 3046
30459 S. Military Road
Federal Way, Washington 98003

District Manager
Cascade Sewer District
10828 S.E. 176th
Renton, Washington 98055

District Manager
Des Moines Sewer District
P.O. Box 98704
Des Moines, Washington 98188
CHAPTER 10
ENVIRONMENTAL IMPACT ASSESSMENT - A SUMMARY

INTRODUCTION

The Environmental Impact Assessment is an integral part of a facilities plan. As a result, portions of it will be found throughout the document. In this particular plan, various segments of the Environmental Impact Assessment are presented in Chapters 4, 8 and 9. The purpose of this Chapter will be to evaluate the impact of the Proposed Action and to identify where in the document can be found key information for addressing the eight major question areas identified by the guidelines (References 1, 2). These question areas are as follows.

DESCRIPTION OF THE PROPOSED ACTION

The reader is referred to Chapter 8 for the description of the alternative plan elements and service areas. For ease of reference, approximate boundaries of the proposed service areas are shown in Figure 6.

ALTERNATIVES TO THE PROPOSED ACTION

The selected plan described in Chapter 8 divides the proposed service areas shown in Figure 6 into several sub-basins. Sewers may ultimately be constructed in any one of these areas, or in any combination of these areas. Within each drainage area, different configurations of lines could serve each area depending upon how they develop.
Legend

- Proposed Service Areas
- Other Possible Service Areas

Figure 6
Proposed Future Service Areas
ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION

The environmental impacts of the Proposed Action and the no action alternative are evaluated below. Where appropriate, impacts of servicing individual sub-drainage areas are specified. Within any given service area, the environmental impact varies insignificantly with the configuration of collection system. The impact assessment is based on information presented in Chapters 4 and 8, particularly the land use trends, policies aimed at preservation of agricultural lands in unincorporated King County, and population projections.

Table 13 lists all potential areas of impact that were evaluated for each alternative. Only those areas expected to experience significant impact are discussed. These potential impact areas may be divided into several general categories as follows:

- Physical
- Biological
- Social
- Economic
- Construction

Within each of these divisions, impacts may be termed "primary" and "secondary". These terms are defined by the EPA as follows (Reference 3):

Primary - "those (effects) directly related to construction and operation of the project."
TABLE 13

POTENTIAL AREAS OF ENVIRONMENTAL IMPACT

**PHYSICAL**
- Resource Utilization
- Energy Consumption
- Air Quality
- Noise
- Groundwater Quality
- Other Water Quality
- Solid Waste

**BIOLOGICAL**
- Terrestrial Biota:
  - Flora
  - Fauna, Mammals
  - Fauna, Other Forms
- Aquatic Biota: Fish
- Avian Biota: Terrestrial
- Unique and Endangered Species or habitats
- Total Ecosystem Stability

**SOCIAL**
- Aesthetics
- Health
- Safety
- Odor
- Insect Pests
- Archaeological/Historical/Cultural
- Recreational Opportunities
- Open Space
- Traffic
- Compatibility with Existing Land Use
- Compatibility with Planned Future Land Use
- Population Size/Density
- Potential for Population Growth

**ECONOMIC/FISCAL**
- Employment
- Tax Base
- Tax Rate/User Charges
- Property Values
- Housing
- Municipal Service Costs/Public Debt
- Demand for Public Services
- Economic Activity

**CONSTRUCTION FACTORS**
- General Interference
- Biota Distruption:
  - Terrestrial
  - Aquatic
- Water Quality
- Economic Activity
- Resource Use/Energy Use
Secondary - "indirect or induced changes in population, and economic and land use; and other environmental effects resulting from these changes in land use, population, and economic growth.

Physical Impacts

The proposed action would impact the physical environment by requiring use of material resources for pipes and pump stations, where required (see Chapter 8); operation of pumping stations would consume energy. The water quality of Star Lake and Lake Fenwick might improve if a sewerage system is constructed in their respective areas as described in Chapter 8. Bacterial contamination of Star Lake would probably decrease. Extensive development around these lakes would probably not be permitted without sewer collection systems; hence, the impact of taking no action on water quality would probably be minimal. Much of the area within Kent for which sewer service is proposed is zoned industrial; industrial development could not take place without sewer service. Such development might cause further degradation of air quality by increasing vehicular traffic and by direct emissions. Increased traffic might also raise noise levels.

Neither resource use nor energy consumption would increase if no action is taken, nor would air quality be affected.

Biological Impacts

The main impact of the proposed action on the biological environment would be loss of habitat due to development stimulated or made possible by provision of sewer service. (Such development
would be consistent with current zoning.) Further residential development would reduce habitats available for the terrestrial biota in the wooded areas around Star Lake, Lake Fenwick, and Garrison Creek; however, development of the latter two areas would probably be limited by the steep slopes. Low-lying areas containing ponded water and cattail marshes would be eliminated by planned industrial development, reducing habitat for waterfowl and other aquatic fauna. Such habitat is now found in proposed service areas along E. Valley Highway, and south and west of the Green River; much of this land is used for agriculture.

Social Impacts

Provision of sewer service would probably encourage population growth and industrial or residential development in at least some of the proposed service areas, since much of the area is unsuited to use of septic tanks because of soil type and seasonal high water table. Provision of sewer service to Star Lake and Lake Fenwick would probably encourage residential development in these areas. In contrast, industrial development in the City of Kent will probably be influenced to a far greater degree by economic factors than by availability of sewer service.

Development stimulated by the availability of a sewer service would have an impact on the social environment. Local population growth and industrial development would increase the traffic loads on existing roadways and demand for public services such as schools, fire and police protection, water supply, and power. Since much of the anticipated growth is industrial rather than residential, secondary impacts would include need for additional housing to the
extent that the industrial development creates more jobs than can be filled from the local labor market. Loss of agricultural land (in areas I, L, and M) would be inconsistent with King County Agricultural Policy. In addition, development will continue to reduce open space and accelerate the change in the aesthetic character of the impacted areas. No archaeological or historic resources would be affected (Reference 4).

The no action alternative would avoid the impacts discussed above.

Economic Impacts

Construction of sewers would place an economic burden on present residents in the areas to be served, requiring them to pay assessments and monthly service charges; increase property values in areas where residential or industrial development is thereby made more attractive; increase the property tax base; and increase demand for public services to the extent that development in presently undeveloped and unsewered areas is induced. Increases in revenue to local government would probably exceed costs of additional services, especially in Kent, where most of the new development would be industrial. Extension of service to any of the areas proposed above would require action by the local property owners to initiate a service request.

All of these impacts would be avoided under the no action alternative.
Construction Impacts

Implementation of the proposed plan would entail several short-term impacts during construction. These would include typical nuisances - noise, dust, traffic hindrance, vehicle emissions, consumption of fossil fuels. Additional impacts would occur during construction along the lake shores and across the Green River (areas K, L, and M). Impacts of laying sewers in the river bed and in the littoral zone of lakes include increased sedimentation and turbidity, disruption of littoral and benthic biota, possible disruption of anadromous fish; appropriate timing and methods should minimize these impacts, particularly those affecting the fish. Temporary disruption of agriculture is another probable impact dependent on timing of construction activity. Construction of lines to serve some areas (e.g. Garrison Creek, Lake Fenwick, Star Lake) would require removal of vegetation in heavily wooded areas with steep slopes, resulting in erosion unless appropriate measures are taken.

ADVERSE IMPACTS AND MITIGATING MEASURES

Adverse impacts of the proposed action include increased energy consumption, some loss of habitat for terrestrial flora and fauna, construction nuisances, increased costs for local residents, and disruption of aquatic habitats where the lines cross the Green River and where service to lakeside homes can only be provided by placing the sewer in the lake itself. Secondary adverse impacts include degradation of air quality, increases in loads on roads and public services, possible loss of agricultural land and open space.
Implementation of the following measures would mitigate some of those impacts.

1. All appropriate measures, such as timing of construction activities to create minimal disturbance, or special design, should be used to minimize construction interference. This is particularly important with respect to river crossing and construction in the littoral zone of the lakes.

2. Appropriate action by local governments may prevent loss of agricultural land to development. Sewer lines passing through agricultural land should be sized and constructed so that connection is not possible.

3. Adequate planning by local agencies and governments may minimize secondary impacts of increased growth.

UNAVOIDABLE ADVERSE IMPACTS

The following impacts cannot be entirely avoided:

1. Typical nuisances associated with construction will occur: noise, dust, traffic hindrance, vehicle emissions.

2. A financial burden will be placed upon local residents to construct, operate, and maintain the sewage collection systems.
LOCAL SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

The direct elimination of natural habitat will be limited to the small amount of land removed from its present use at those pump stations where flooding requires above ground construction; therefore, local short-term uses will be limited to those sites upon which surface facilities will be built, along with the natural resources and materials associated with operation and maintenance of the proposed facilities.

Removal of prime agricultural land in King County from agricultural use should also be considered here, even though it is a secondary effect.

Those agricultural lands within the City of Kent are zoned for residential or industrial use and will presumably be lost to residential or industrial use if the proposed action is implemented; larger areas of agricultural land within King County that the county wishes to preserve as agricultural land may be lost if sewer connections are permitted and zoning is altered.

Thus, implementation of the proposed action in areas including prime agricultural land would favor short-term use rather than long-term productivity. In the non-agricultural sections, the long-term productivity of the lands would be minimally affected by the proposed short-term uses.
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The following commitment of resources will be made.

1. The economic resources used to construct, operate, and maintain the facilities.

2. The material resources used to construct, operate, and maintain the facilities.

3. Loss of King County agricultural land to residential and industrial development, to the extent that those areas are sewered, if provision of sewer service is permitted.

4. The land upon which above-grade pump station facilities are placed.

PUBLIC INVOLVEMENT

The reader is referred to Chapter 9 for the summary of public involvement that has and will occur regarding the proposed facilities.
REFERENCES


