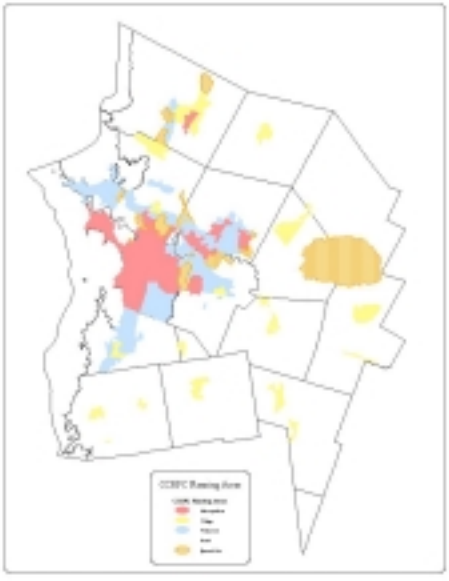
# Regional Public Sewage Treatment Capacity Study

Based Upon Data from 2000

Prepared August 2002

Chittenden County
Regional Planning Commission



## Acknowledgements

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CCRPC thanks all who helped in developing this Study. This includes each municipal planner, municipal public works director, town manager, and other municipal officials who dedicated time to reviewing this work. As well, the CCRPC Transportation and Utilities Committee is to be thanked for its review of this work.

Throughout this work, the members of the CCRPC Regional Public Sewer Service Capacity Study Steering Committee skillfully guided this project. The members of this committee include:

- Neil Boyden, Direct of Public Works, Town of Williston
- Jim Fay, General Manager, Champlain Water District
- Steve Goodkind, Director of Public Works, City of Burlington
- James Jutras, Chief Operator, Essex Junction Wastewater Treatment Facility
- Dennis Lutz, Director of Public Works, Essex Town
- Jeff McDonald, Dufresne-Henry, CCMPO Board
- Michael Munson, Planner, Town of Williston
- Bryan Osborne, Director of Public Works, Town of Colchester
- Steve Roy, Public Works Engineer, City of Burlington

## Executive Summary

The goals of Regional Public Sewage Treatment Capacity Study are 1) to develop an understanding of the current capacity of the public sewer infrastructure for supporting these services, 2) to provide this information to local and regional entities, and 3) to use this knowledge to examine the infrastructure's capacity for absorbing future growth. All findings presented in this Study reflect data for the calendar year 2000 and consider only public facilities[1].

Results presented in this report outline the status of the sewer infrastructure capacity in the region as of the year 2000 and assess this capacity for its potential in accommodating anticipated housing and employment growth. Many of the regional goals stated in the *2001 Regional Plan* (such as the conservation of land and wildlife habitat, reduction of automobile travel, lower housing costs, and greater community spirit and cohesion) are supported by dense, centralized patterns of development.

- Overall, the findings show that there is sufficient sewage treatment capacity to absorb the anticipated regional growth in housing and employment within all currently formally adopted sewer service areas.
- However, at a finer scale, there are several municipal sewer service areas that are anticipated to have sewer demand that will exceed the area's sewer capacity in 10 to 20 years.
- The Airport Parkway facility, which serves the majority of South Burlington and Colchester, has sufficient capacity to absorb growth within its entire service area.
    - However, the allocation for Colchester is not sufficient for its expected growth by 2010, and the allocation for South Burlington is not sufficient for its expected growth by 2020.
- By 2020, the Burlington Main Facility is expected to have growth that will create a demand exceeding its current reserve capacity.
- The Essex Junction facility has sufficient capacity to absorb the growth within its total service area until 2020.
    - However, by 2010, the allocation for Williston will not be sufficient to accommodate its expected growth.
- By 2010, it is expected that housing and employment growth in Milton will create a sewer demand exceeding the Milton facility's capacity.

The findings produced from this Study are not an official policy statement of the Chittenden County Regional Planning Commission. Rather, this Study is intended solely as a planning tool for the member municipalities and partner organizations to develop plans and policies that are impacted by sewer allocations and capacity. As such, some of the work that this information may be used for includes local and regional land use planning, open space planning, stormwater planning, and economic development planning.

[1] The findings presented here are based upon data for the calendar year 2000. It should be noted that, in some instances, there have been significant changes to the demand on particular wastewater treatment facilities and, thus, the available reserves for sewage treatment capacity.

## 1.0 Introduction

The goals of Regional Public Sewage Treatment Capacity Study are 1) to develop an understanding of the current capacity of the public sewer infrastructure for supporting these services, 2) to provide this information to local and regional entities, and 3) to use this knowledge to examine the infrastructure's capacity for absorbing future growth. All findings presented in this Study reflect data for the calendar year 2000[1].

The Chittenden County Regional Planning Commission (CCRPC) has worked to develop this information in collaboration with its member municipalities and with the guidance of a steering committee comprised of relevant professionals. In turn, CCRPC will provide this Study to each town so that it can be used as a tool to inform both local and regional planning processes. Having an understanding of those areas that are equipped for accommodating greater development will enable local and regional land planners, school districts, transportation planners, town managers, economic development entities, and others to make improved decisions regarding the provision of public facilities and services.

The findings produced from this Study are not an official policy statement of the Chittenden County Regional Planning Commission. Rather, this Study is intended solely as a planning tool for the member municipalities and partner organizations to develop plans and policies that are impacted by sewer allocations and capacity.

Results presented in this report outline the status of the sewer infrastructure capacity in the region as of the year 2000 and assess this capacity for its potential in accommodating anticipated housing and employment growth. Many of the regional goals stated in the *2001 Regional Plan* (such as the conservation of land and wildlife habitat, reduction of automobile travel, lower housing costs, and greater community spirit and cohesion) are supported by dense, centralized patterns of development. These compact development patterns require sufficient sewer infrastructure. In addition to assisting the region in meeting these goals, compact development patterns offer reduced costs in providing sewer service, which can translate into reduced housing and business costs[2].

A complete discussion of the assumptions inherent to this Study is presented in Section 4.0. This Study has five parts[3]:

1) Inventory of each public sewer facility for its permitted capacity, average daily influent, committed allocations, and reserve capacity in 2000,
2) Estimated population and estimated demand for 2010 and 2020 within the existing and approved sewer service areas,
3) Assumptions and a discussion of results and findings,
4) Conclusion and Recommendations, and
5) A map of the public sewer service areas.

## 2.0 Public Sewer Service Area

Table 2-1 shows that approximately twelve percent of the 347,820 acres comprising the Chittenden County land area lies within the currently served sewer service areas. Of the 12 wastewater treatment facilities in the County, these service areas are located in Burlington, Colchester Town, Colchester Fire District #1, Essex Town, Village of Essex Junction, Hinesburg, Milton, Richmond, Shelburne, South Burlington, Williston, and Winooski. The region's public sewer service areas are illustrated on Map 1 (page 16).

**Table 2-1: Acres served by existing and approved public sewer service areas**

| Wastewater Treatment Facility | Acres within Existing Service Area | Acres within Approved Service Area | Acres within Proposed Service Area | Total Acres[1] |
|---|---|---|---|---|
| Airport Parkway | 5,788 | 4,859 | 0 | 10,647 |
| Bartlett's Bay | 1,566 | 0 | 0 | 1,566 |
| Burlington Main | 3,024 | 0 | 0 | 3,024 |
| Burlington North | 1,973 | 0 | 0 | 1,973 |
| Burlington River | 662 | 0 | 0 | 662 |
| Essex Junction | 6,830 | 5,544 | 0 | 12,374 |
| Hinesburg | 765 | 0 | 0 | 765 |
| Milton | 1,612 | 733 | 948 | 3,293 |
| Richmond | 471 | 0 | 266 | 737 |
| Shelburne #1 | 1,255 | 0 | 0 | 1,255 |
| Shelburne #2 | 2,894 | 0 | 0 | 2,894 |
| Winooski | 759 | 0 | 0 | 759 |
| Regional Total | 27,599 | 11,136 | 1,214 | 39,231 |

1 = Acreages presented here include rights-of-way land area and open lands without services within the served areas

These facilities have the collective capacity to treat 17.857 million gallons per day (MGD) of discharge (see Table 2-2). Using data for the calendar year 2000, the average daily effluent for each wastewater treatment facility was compared with the facility's permitted capacity. The uncommitted reserve capacity was determined by subtracting both the committed allocations for sewer connections and the average daily effluent from the permitted capacity.

| | | |
|---|---|---|
| | **Facility Permitted Capacity** | **(GPD)** |
| **--** | **Committed Allocations** | **(GPD)** |
| **--** | **Average Daily Effluent** | **(GPD)** |
| **=** | **Uncommitted Reserve Capacity** | **(GPD)** |

Permitted capacity, rather than facility design capacity, is used as a means for incorporating consideration of peak flows, which is accomplished through the permitting process. For each wastewater treatment facility in the region, Table 2-2 shows the permitted capacity, the average daily effluent in 2000, the committed allocations as of 2000, and the uncommitted reserve capacity in 2000. These data were initially obtained from the Vermont Agency of Natural Resources, Wastewater Management Division, then verified with the municipal public works offices.

**Table 2-2: 2000 Wastewater Treatment Facility Parameters**

| | | Facility Permitted Capacity | Average Daily Discharge | | Unconnected Committed Allocation | Uncommitted Reserve Capacity | |
|---|---|---|---|---|---|---|---|
| Wastewater Treatment Facility | Municipality Served | GPD | GPD | Percent of design | GPD | GPD[10] | Percent of design[10] |
| Airport Parkway[1] | | 2,300,000.00 | 1,462,417.00 | 63.58 | 403,867.00 | 433,716.00 | 18.86 |
| | South Burlington[1] | 1,650,000.00 | 1,151,215.00 | 69.77 | 298,022.00 | 200,763.00 | 12.17 |
| | Colchester Town[2] | 340,000.00 | 178,120.50 | 52.39 | 105,845.00 | 56,034.50 | 16.48 |
| | Colchester Fire District #1[11] | 310,000.00 | 133,081.50 | 42.93 | 176,918.50 | 0.00 | 0.00 |
| Bartlett's Bay[1] | South Burlington[1] | 1,250,000.00 | 619,000.00 | 49.52 | 138,335.00 | 492,665.00 | 39.41 |
| Burlington Main[3] | | 5,300,000.00 | 4,672,700.00 | 88.16 | 269,129.00 | 358,171.00 | 6.76 |
| | Burlington[3] | 5,228,274.00 | 4,622,425.00 | 88.41 | 269,129.00 | 336,720.00 | 6.44 |
| | South Burlington[3] | 71,726.00 | 50,275.00 | 70.09 | ND | 21,451.00 | 29.91 |
| Burlington North[3] | Burlington[3] | 2,000,000.00 | 1,170,333.00 | 58.52 | 117,743.00 | 711,924.00 | 35.60 |
| Burlington River[3] | Burlington[3] | 1,000,000.00 | 813,383.00 | 81.34 | 68,452.00 | 118,165.00 | 11.82 |
| Essex Junction[4] | | 3,100,000.00 | 1,724,000.00 | 55.61 | 319,272.00 | 1,056,728.00 | 34.09 |
| | Williston[10 and 4] | 780,000.00 | 450,000.00 | 57.69 | 179,183.00 | 150,817.00 | 19.34 |
| | Essex[12 and 4] | 1,100,000.00 | 539,000.00 | 49.00 | 74,204.00 | 486,796.00 | 44.25 |
| | Essex Junction[4] | 1,220,000.00 | 735,000.00 | 60.25 | 65,885.00 | 419,115.00 | 34.35 |
| Hinesburg[5] | Hinesburg[5] | 250,000.00 | 179,225.00 | 71.69 | 43,694.00 | 27,081.00 | 10.83 |
| Milton[6] | Milton[6] | 275,000.00 | 154,043.00 | 56.02 | 109,405.00 | 11,552.00 | 4.20 |
| Richmond[7] | Richmond[7] | 222,000.00 | 113,500.00 | 51.13 | 360.00 | 108,140.00 | 48.71 |
| Shelburne FD#1[8] | Shelburne[8] | 310,000.00 | 330,417.00 | 106.59 | 19,428.00 | -39,845.00 | -12.85 |
| Shelburne FD#2[8] | Shelburne[8] | 450,000.00 | 295,500.00 | 65.67 | 49,752.00 | 104,748.00 | 23.28 |
| Winooski[9] | Winooski[9] | 1,400,000.00 | 791,583.00 | 56.54 | 273,981.00 | 334,436.00 | 23.89 |
| Regional Total | | 17,857,000.00 | 12,326,101.00 | 69.03 | 1,813,418.00 | 3,717,481.00 | 20.82 |

1 = Data obtained from City of South Burlington WPCD
2 = Data obtained from Town of Colchester Office of Public Works
3 = Data obtained from City of Burlington Public Works
4 = Data obtained from Village of Essex Junction Public Works
5 = Data obtained from Town of Hinesburg Public Works Department
6 = Data obtained from Town of Milton Public Works
7 = Data obtained from Town of Richmond Water Resources Department
8 = Data obtained from Town of Shelburne Town Manager's Office; plant upgrades have been performed since 2000
9 = Data obtained from City of Winooski Wastewater Treatment Facility Superintendent
10= Data obtained from Town of Williston Public Works
11= Data obtained from FD#1 engineering consultant
12 = Data obtained from Essex Town Junction Public Works
ND = No Data

For facilities receiving wastewater from more than one town, efforts were made to work with each town's public works department in assessing their town's contribution to the overall facility load. The average daily effluent from each town, as well as information regarding future committed allocations, was used in developing measures of town-level capacity.

# 3.0 Current and Future Demand

### 3.1 – Residential

Table 3.1-1 inventories the 42,782 dwelling units located within adopted public sewer service areas in Chittenden County in 2000 (not all dwelling units are necessarily connected to the sewer system). For this section of the Study, the study area includes all adopted sewer service areas, inclusive of all formally approved service areas, either currently served or not currently served. Table 3.1-1 also details the housing growth rates used in estimating future residential demand upon the public sewer systems in 2010 and 2020[4].

**Table 3.1-1: Dwelling units (2000) within existing and approved service areas and expected housing growth rates by municipality**

| Wastewater Treatment Facility | Municipality Served | Dwelling Units Served[1] | 10-Year Housing Growth Rate[2] | 20-Year Housing Growth Rate[3] |
|---|---|---|---|---|
| Airport Parkway | | 5,142 | NA | NA |
| | South Burlington[4] | 4,497 | 85 units/yr | 85 units/yr |
| | Colchester Town[5] | 452 | 1.14 | NA |
| | Colchester FD#1[6] | 193 | NA | NA |
| Bartlett's Bay | South Burlington[4] | 1,491 | 85 units/yr | 85 units/yr |
| Burlington Main | | 13,252 | NA | NA |
| | Burlington[7] | 13,093 | 1.06 | NA |
| | South Burlington[4] | 159 | 85 units/yr | 85 units/yr |
| Burlington North | Burlington[7] | 4,072 | 1.06 | NA |
| Burlington River | Burlington[7] | 3,354 | 1.06 | NA |
| Essex Junction | | 8,941 | NA | NA |
| | Williston[8] | 2,114 | 68 units/yr (2000-2002 & 2007-2010); 53 units/yr (2003-2006) | 68 units/yr |
| | Essex Town[9] | 3,199 | 58 units/yr | 58 units/yr |
| | Essex Junction[10] | 3,628 | 1.03 | NA |
| Hinesburg | Hinesburg[7] | 304 | 1.14 | NA |
| Milton | Milton[11] | 1,168 | 1.163 | 1.34 |
| Richmond | Richmond[12] | 281 | See footnote | See footnote |
| Shelburne FD#1 | Shelburne[13] | 824 | 1.11 | 1.20 |
| Shelburne FD#2 | Shelburne[13] | 1,240 | 1.11 | 1.20 |
| Winooski | Winooski[7] | 2,713 | 1.03 | NA |
| Regional Total | | 42,782 | NA | NA |

1 - Dwelling Units data derived from CCRPC 2000 dwelling units point GIS database

2 - Unless expressed as units per year, value reflects a 10-year growth rate

3 - Unless expressed as units per year, value reflects a 20-year growth rate (data not available for all towns)

4 - 2001 City of South Burlington Comprehensive Plan (p. 32); assumed 85% of future housing will locate within an area with sewer service; divided future growth proportionately with 2000 data

5 - Colchester numbers reflect both the expected growth rate plus known permits within the sewer core

6 - Per FD#1, which is largely comprised of St. Michael's College, there is no expected housing growth within this sewer service area

7 – For towns not having formally adopted growth projections, future growth rates were derived from Census data and reflect a continuation of the observed growth during the most recent census years (this has been reviewed by these towns).

8 - 2000 Williston Comprehensive Plan (pp 48-49)

9 - 2001 Town of Essex Town Plan (p. 43)

10 - Per the Census, observed housing growth was 7% and observed population growth was 2.3%; Given that the Village anticipates a slowing in its housing growth, the observed rate was reduced to 3%

11 - Town of Milton Growth Management Study (2002), Table 5 (p.8)

12 - 2002 Richmond Town Plan (p. 12) provides projected total housing units; assumed proportion of housing stock within sewer service area in 2000 (approx. 20%) would continue

13 - 1999 Shelburne Town Plan, Volume I (p. 11) provides projected housing units showing a 10-year growth rate=11% and 20-year growth rate=20%; NOTE the 2000 projection does not agree with 2000 Census

NA - Not Applicable

To estimate the 2010 and 2020 residential demand upon each wastewater treatment facility, the anticipated number of dwelling units within the service area needs to be known. Approximating the future number of dwelling units was accomplished by factoring the number of dwelling units within the service areas in the year 2000 with the expected growth rate.

Table 3.1-1 shows the growth rate factors used in each town. Wherever available, municipal projections for housing growth were used in estimating future dwelling units. In the absence of this information, the 2000 count of dwelling units was factored by the percent growth in housing units observed in the U.S. Census. Towns for which future growth rates were derived from Census data reflect a continuation of the observed growth from 1990 to 2000. Given the high growth rates of the mid-1900s, this Study did not incorporate those data into the estimation of future growth rates.

The above derived an estimate for the number of dwelling units in 2010. For most towns, the same methods were used to estimate 2020 dwelling units, using the 2010 dwelling unit estimate as a baseline. In towns having an established 20-year housing growth rate, this rate was applied to the 2000 dwelling unit count.

To determine the additional domestic wastewater generation within the service area, the estimated number of additional housing units was then factored by 210 GPD[5]. When planning for future growth, this residential wastewater generation factor is intended to incorporate consideration of deterioration to the total system over time. Table 3.1-2 shows the estimated future residential demand in 2010 and 2020 for each treatment facility. Table 3.2-3 (page 12) then compares the estimated additional future demand (residential demand plus non-residential demand) in 2010 and 2020 with the reserve capacity in 2000.

**Table 3.1-2: Estimated future dwelling units and daily effluent for 2010 and 2020**

| | | 2000 | | | 2000-2010 | 2010 | | | | 2000-2020 | 2020 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wastewater Treatment Facility | Municipality Served | Average Daily Discharge (GPD) | Reserve Capacity (GPD) | Dwelling Units Served[1] | Housing Growth Rate[2] | Estimated Additional Dwelling Units[3] | Estimated Additional Residential Demand[4] (GPD) | Estimated Total Dwelling Units[5] | Estimated Total Residential Demand[6] (GPD) | Housing Growth Rate[2] | Estimated Additional Dwelling Units[7] | Estimated Additional Residential Demand[4] (GPD) | Estimated Total Dwelling Units[8] | Estimated Total Residential Demand[6] (GPD) |
| Airport Parkway | | 1,462,417 | 433,716 | 5,142 | NA | 835 | 175,350 | 5,977 | 1,637,767 | NA | 1,550 | 325,521 | 6,692 | 1,787,938 |
| | South Burlington | 1,151,215 | 200,763 | 4,497 | 85 units/yr | 622 | 130,620 | 5,119 | 1,281,835 | 85 units/yr | 1,244 | 261,240 | 5,741 | 1,412,455 |
| | Colchester Town | 178,120 | 56,035 | 452 | 1.14 | 213 | 44,730 | 665 | 222,850 | NA | 306 | 64,281 | 758 | 242,401 |
| | Colchester FD#1 | 133,082 | 176,919 | 193 | NA | NA | 0 | 193 | 133,082 | NA | NA | 0 | 193 | 133,082 |
| Bartlett's Bay | South Burlington | 619,000 | 492,665 | 1,491 | 85 units/yr | 206 | 43,260 | 1,697 | 662,260 | 85 units/yr | 412 | 86,520 | 1,903 | 705,520 |
| Burlington Main | | 4,672,700 | 358,171 | 13,252 | NA | 808 | 169,592 | 14,060 | 4,842,292 | NA | 1,662 | 349,082 | 14,914 | 5,021,782 |
| | Burlington | 4,622,425 | 336,720 | 13,093 | 1.06 | 786 | 164,972 | 13,879 | 4,787,397 | NA | 1,618 | 339,842 | 14,711 | 4,962,267 |
| | South Burlington | 50,275 | 21,451 | 159 | 85 units/yr | 22 | 4,620 | 181 | 54,895 | 85 units/yr | 44 | 9,240 | 203 | 59,515 |
| Burlington North | Burlington | 1,170,333 | 711,924 | 4,072 | 1.06 | 244 | 51,307 | 4,316 | 1,221,640 | NA | 503 | 105,693 | 4,575 | 1,276,026 |
| Burlington River | Burlington | 813,383 | 118,165 | 3,354 | 1.06 | 201 | 42,260 | 3,555 | 855,643 | NA | 415 | 87,056 | 3,769 | 900,439 |
| Essex Junction | | 1,724,000 | 1,056,728 | 8,941 | NA | 1,377 | 289,136 | 10,318 | 2,013,136 | NA | 2,749 | 577,278 | 11,690 | 2,301,278 |
| | Williston | 450,000 | 150,817 | 2,114 | see Table 3.1-1 | 688 | 144,480 | 2,802 | 594,480 | see Table 3.1-1 | 1,368 | 287,280 | 3,482 | 737,280 |
| | Essex Town | 539,000 | 486,796 | 3,199 | 58 units/yr | 580 | 121,800 | 3,779 | 660,800 | 58 units/yr | 1,160 | 243,600 | 4,359 | 782,600 |
| | Essex Junction | 735,000 | 419,115 | 3,628 | 1.03 | 109 | 22,856 | 3,737 | 757,856 | NA | 221 | 46,398 | 3,849 | 781,398 |
| Hinesburg | Hinesburg | 179,225 | 27,081 | 304 | 1.14 | 43 | 8,938 | 347 | 188,163 | NA | 91 | 19,126 | 395 | 198,351 |
| Milton | Milton | 154,043 | 11,552 | 1,168 | 1.163 | 190 | 39,981 | 1,358 | 194,024 | 1.34 | 397 | 83,395 | 1,565 | 237,438 |
| Richmond | Richmond | 113,500 | 108,140 | 281 | see footnote | 82 | 17,220 | 363 | 130,720 | see footnote | 146 | 30,660 | 427 | 144,160 |
| Shelburne FD#1 | Shelburne | 330,417 | -39,845 | 824 | 1.11 | 91 | 19,034 | 915 | 349,451 | 1.20 | 165 | 34,608 | 989 | 365,025 |
| Shelburne FD#2 | Shelburne | 295,500 | 104,748 | 1,240 | 1.11 | 136 | 28,644 | 1,376 | 324,144 | 1.20 | 248 | 52,080 | 1,488 | 347,580 |
| Winooski | Winooski | 791,583 | 334,436 | 2,713 | 1.03 | 81 | 17,092 | 2,794 | 808,675 | NA | 780 | 163,797 | 3,493 | 955,380 |
| Regional Total | | 12,326,101 | 3,717,481 | 42,782 | NA | 4,294 | 901,814 | 47,076 | 13,227,915 | NA | 9,118 | 1,914,818 | 51,900 | 14,240,919 |

1 = Dwelling Units data from CCRPC 2000 dwelling units point GIS database
2 = See Table 3.1-1
3 = Applied 10-year growth rate to 2000 dwelling unit count and subtracted 2000 dwelling unit count from result
4 = Assumed 210GPD (see endnote 1 for reference) per additional dwelling unit
5 = Applied 10-year growth rate to 2000 dwelling unit count
6 = Added additional demand to average demand in 2000
7 = Applied 10-year growth rate to 2010 dwelling unit estimate and subtracted 2000 dwelling unit count from result; or, where 20-year growth rate available, applied 20-year growth rate to 2000 dwelling unit estimate and subtracted 2000 dwelling unit count
8 = Applied 10-year growth rate to 2010 dwelling unit estimate; or, where available, applied 20-year growth rate to 2000 dwelling unit

**3.2 – Non-Residential**

Table 3.2-1 shows the breakdown, by wastewater treatment facility, of the 76,705 employees working within the areas served by public sewer service in Chittenden County in 2000. The study area used in this section of the Study includes all adopted sewer service areas, inclusive of all formally approved service areas, either currently served or not currently served. Table 3.2-1 also shows the employment growth rate used in estimating future non-residential demand upon the public sewer systems in 2010 and 2020.

**Table 3.2-1: Employees (2000) within existing and approved service areas and expected employment growth rate**

| Wastewater Treatment Facility | Municipality Served | Employees Served[1] | Employment growth rate[2] 2000-2010 | Employment growth rate[2] 2010-2020 |
|---|---|---|---|---|
| Airport Parkway | | 16,712 | NA | NA |
| | South Burlington | 11,678 | 1.22 | 1.17 |
| | Colchester Town | 3,555 | 1.22 | 1.17 |
| | Colchester FD#1 | 1,479 | NA | NA |
| Bartlett's Bay | South Burlington | 5,471 | 1.22 | 1.17 |
| Burlington Main | | 23,501 | NA | NA |
| | Burlington | 23,321 | 1.22 | 1.17 |
| | South Burlington | 180 | 1.22 | 1.17 |
| Burlington North | Burlington | 1,563 | 1.22 | 1.17 |
| Burlington River | Burlington | 5,381 | 1.22 | 1.17 |
| Essex Junction | | 16,365 | NA | NA |
| | Williston | 9,339 | 1.22 | 1.17 |
| | Essex Town | 4,325 | 1.22 | 1.17 |
| | Essex Junction | 2,701 | 1.22 | 1.17 |
| Hinesburg | Hinesburg | 666 | 1.22 | 1.17 |
| Milton | Milton | 1,520 | 1.22 | 1.17 |
| Richmond | Richmond | 393 | 1.22 | 1.17 |
| Shelburne FD#1 | Shelburne | 1,167 | 1.22 | 1.17 |
| Shelburne FD#2 | Shelburne | 1,609 | 1.22 | 1.17 |
| Winooski | Winooski | 2,357 | 1.22 | 1.17 |
| Regional Total | | 76,705 | 1.22 | 1.17 |

1 = Employees data derived from CCMPO 2000 employment points GIS database
2 = Employment growth rates from "Economic and Demographic Forecast", Economic & Policy Research, 2000.
NA = Not Applicable

To estimate the 2010 and 2020 non-residential demand upon each wastewater treatment facility, the anticipated number of employees within the service area needs to be known. Approximating the number of employees in 2010 was accomplished by factoring the count of employees within the service areas in the year 2000 with the expected 2000-2010 employment growth rate. The same methods were used to estimate 2020 employment, using the 2010 employee estimate as a baseline.

To determine the additional non-residential demand within the service area, the estimated number of additional employees was then factored by 15 GPD[6]. When planning for future growth, this employee wastewater generation factor is intended to incorporate consideration of deterioration to the total system over time. Table 3.2-2 shows the estimated future non-residential demand in 2010 and 2020 for each treatment facility. Table 3.2-3 then compares the estimated additional future demand (residential demand plus non-residential demand) in 2010 and 2020 with the reserve capacity in 2000.

**Table 3.2-2: Estimated future employees and daily effluent for 2010 and 2020**

| | | 2000 | | | | 2010 | | | | | 2020 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wastewater Treatment Facility | Municipality Served | Average Daily Discharge (GPD) | Reserve Capacity (GPD) | Employees Served[1] | Employment growth rate[2] 2000-2010 | Estimated Add'l Emps[3] | Estimated Add'l Demand[4] 2000-2010 | Estimated Total Employees[5] | 2000 Average plus Est. Add'l Non-res. Demand[6] (GPD) | Employment growth rate[2] 2010-2020 | Estimated Add'l Emps[7] | Estimated Add'l Demand[4] 2010-2020 | Estimated Total Employees[8] | 2010 Estimated Demand plus Add'l Non-res. Demand[9] (GPD) |
| Airport Parkway | | 1,462,417 | 433,716 | 16,712 | NA | 3,351 | 50,269 | 20,063 | 1,512,686 | NA | 6,511 | 97,659 | 23,223 | 1,610,345 |
| | South Burlington | 1,151,215 | 200,763 | 11,678 | 1.22 | 2,569 | 38,537 | 14,247 | 1,189,752 | 1.17 | 4,991 | 74,868 | 16,669 | 1,264,620 |
| | Colchester Town | 178,120 | 56,035 | 3,555 | 1.22 | 782 | 11,732 | 4,337 | 189,852 | 1.17 | 1,519 | 22,791 | 5,074 | 212,643 |
| | Colchester FD#1 | 133,082 | 0 | 1,479 | NA | 0 | 0 | 1,479 | 133,082 | NA | 0 | 0 | 1,479 | 133,082 |
| Bartlett's Bay | South Burlington | 619,000 | 492,665 | 5,471 | 1.22 | 1,204 | 18,054 | 6,675 | 637,054 | 1.17 | 2,338 | 35,075 | 7,809 | 672,129 |
| Burlington Main | | 4,672,700 | 358,171 | 23,501 | NA | 5,170 | 77,553 | 28,671 | 4,750,253 | 1.17 | 10,044 | 150,665 | 33,545 | 4,900,918 |
| | Burlington | 4,622,425 | 336,720 | 23,321 | 1.22 | 5,131 | 76,959 | 28,452 | 4,699,384 | 1.17 | 9,967 | 149,511 | 33,288 | 4,848,895 |
| | South Burlington | 50,275 | 21,451 | 180 | 1.22 | 40 | 594 | 220 | 50,869 | 1.17 | 77 | 1,154 | 257 | 52,023 |
| Burlington North | Burlington | 1,170,333 | 711,924 | 1,563 | 1.22 | 344 | 5,158 | 1,907 | 1,175,491 | 1.17 | 668 | 10,020 | 2,231 | 1,185,511 |
| Burlington River | Burlington | 813,383 | 118,165 | 5,381 | 1.22 | 1,184 | 17,757 | 6,565 | 831,140 | 1.17 | 2,300 | 34,498 | 7,681 | 865,638 |
| Essex Junction | | 1,724,000 | 1,056,728 | 16,365 | 1.22 | 3,600 | 54,005 | 19,965 | 1,778,005 | 1.17 | 6,994 | 104,916 | 23,359 | 1,882,921 |
| | Williston | 450,000 | 150,817 | 9,339 | 1.22 | 2,055 | 30,819 | 11,394 | 480,819 | 1.17 | 3,991 | 59,872 | 13,330 | 540,691 |
| | Essex Town | 539,000 | 486,796 | 4,325 | 1.22 | 952 | 14,273 | 5,277 | 553,273 | 1.17 | 1,849 | 27,728 | 6,174 | 581,000 |
| | Essex Junction | 735,000 | 419,115 | 2,701 | 1.22 | 594 | 8,913 | 3,295 | 743,913 | 1.17 | 1,154 | 17,316 | 3,855 | 761,229 |
| Hinesburg | Hinesburg | 179,225 | 27,081 | 666 | 1.22 | 147 | 2,198 | 813 | 181,423 | 1.17 | 285 | 4,270 | 951 | 185,693 |
| Milton | Milton | 154,043 | 11,552 | 1,520 | 1.22 | 334 | 5,016 | 1,854 | 159,059 | 1.17 | 650 | 9,745 | 2,170 | 168,804 |
| Richmond | Richmond | 113,500 | 108,140 | 393 | 1.22 | 86 | 1,297 | 479 | 114,797 | 1.17 | 168 | 2,520 | 561 | 117,316 |
| Shelburne FD#1 | Shelburne | 330,417 | -39,845 | 1,167 | 1.22 | 257 | 3,851 | 1,424 | 334,268 | 1.17 | 499 | 7,482 | 1,666 | 341,750 |
| Shelburne FD#2 | Shelburne | 295,500 | 104,748 | 1,609 | 1.22 | 354 | 5,310 | 1,963 | 300,810 | 1.17 | 688 | 10,315 | 2,297 | 311,125 |
| Winooski | Winooski | 791,583 | 334,436 | 2,357 | 1.22 | 519 | 7,778 | 2,876 | 799,361 | 1.17 | 1,007 | 15,111 | 3,364 | 814,472 |
| Regional Total | | 12,326,101 | 3,717,481 | 76,773 | 1.22 | 16,550 | 248,246 | 93,255 | 12,574,347 | 1.17 | 32,152 | 482,274 | 108,857 | 13,056,621 |

1 = Employees data derived from CCMPO 2000 employment points GIS database
2 = Employment growth rates from "Economic and Demographic Forecast", Economic & Policy Research, 2000.
3 = Applied 2000-2010 growth rate to 2000 employee count & subtracted 2000 count from result
4 = Assumed 15GPD (see endnote 1 for reference) per additional employee
5 = Applied 2000-2010 growth rate to 2000 employee count
6 = Added additional demand to average demand in 2000
7 = Applied 2010-2020 growth rate to 2010 employee estimate and subtracted 2010 employee estimate from result
8 = Applied 2010-2020 growth rate to 2010 employee estimate
9 = Added additional demand to estimated demand in 2010

**Table 3.2-3: Estimated future residential and non-residential demand for 2010 and 2020 compared with reserve capacity**

| | | 2000 | 2010 | | | | 2020 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Wastewater Treatment Facility | Municipality Served | Reserve Capacity (GPD) | Estimated Additional Residential Demand (GPD) | Estimated Additional Non-residential Demand (GPD) | Estimated Additional Total Demand (GPD) | Is capacity investment needed to serve future growth? | Estimated Additional Residential Demand (GPD) | Estimated Additional Non-residential Demand (GPD) | Estimated Additional Total Demand (GPD) | Is capacity investment needed to serve future growth? |
| Airport Parkway | | 433,716 | 175,350 | 50,269 | 225,619 | NO | 325,521 | 97,659 | 423,180 | NO |
| | South Burlington | 200,763 | 130,620 | 38,537 | 169,157 | NO | 261,240 | 74,868 | 336,108 | YES |
| | Colchester Town[1] | 56,035 | 44,730 | 11,732 | 56,462 | YES | 64,281 | 22,791 | 87,072 | YES |
| | Colchester FD#1 | 0 | 0 | 0 | 0 | NO | 0 | 0 | 0 | NO |
| Bartlett's Bay | South Burlington | 492,665 | 43,260 | 18,054 | 61,314 | NO | 86,520 | 35,075 | 121,595 | NO |
| Burlington Main | | 358,171 | 169,592 | 77,553 | 247,145 | NO | 349,082 | 150,665 | 499,747 | YES |
| | Burlington | 336,720 | 164,972 | 76,959 | 241,931 | NO | 339,842 | 149,511 | 489,353 | YES |
| | South Burlington | 21,451 | 4,620 | 594 | 5,214 | NO | 9,240 | 1,154 | 10,394 | NO |
| Burlington North | Burlington | 711,924 | 51,307 | 5,158 | 56,465 | NO | 105,693 | 10,020 | 115,713 | NO |
| Burlington River | Burlington | 118,165 | 42,260 | 17,757 | 60,018 | NO | 87,056 | 34,498 | 121,554 | YES |
| Essex Junction | | 1,056,728 | 276,746 | 54,005 | 330,751 | NO | 564,888 | 104,916 | 669,804 | NO |
| | Williston | 150,817 | 132,090 | 30,819 | 162,909 | YES | 274,890 | 59,872 | 334,762 | YES |
| | Essex Town | 486,796 | 121,800 | 14,273 | 136,073 | NO | 243,600 | 27,728 | 271,328 | NO |
| | Essex Junction | 419,115 | 22,856 | 8,913 | 31,769 | NO | 46,398 | 17,316 | 63,714 | NO |
| Hinesburg | Hinesburg | 27,081 | 8,938 | 2,198 | 11,135 | NO | 19,126 | 4,270 | 23,396 | NO |
| Milton | Milton | 11,552 | 39,981 | 5,016 | 44,997 | YES | 83,395 | 9,745 | 93,140 | YES |
| Richmond | Richmond | 108,140 | 17,220 | 1,297 | 18,517 | NO | 30,660 | 2,520 | 33,180 | NO |
| Shelburne FD#1 | Shelburne | -39,845 | 19,034 | 3,851 | 22,885 | YES | 34,608 | 7,482 | 42,090 | YES |
| Shelburne FD#2 | Shelburne | 104,748 | 28,644 | 5,310 | 33,954 | NO | 52,080 | 10,315 | 62,395 | NO |
| Winooski | Winooski | 334,436 | 17,092 | 7,778 | 24,870 | NO | 163,797 | 15,111 | 178,908 | NO |
| Regional Total | | 3,717,481 | 889,424 | 248,246 | 1,137,670 | NO | 1,902,427 | 482,274 | 2,384,701 | NO |

# 4.0 Assumptions and Results Discussion

**4.1 – Baseline Dwelling Unit and Employee Counts**

The baseline numbers used in Section 3.0 of this Study consider all structures within the existing and formally approved sewer service. Therefore, this Study does not discriminate between structures within these areas that are connected and those that are not connected. This Study recognizes that the 2000 Reserve Capacity may be greatly absorbed by new connections resulting from existing structures rather than by an expansion of the existing and formally approved sewer service areas.

**4.2 – Wastewater Generation Rates**

As well, this Study assumes the same level of wastewater generation for all employment types, as well as the same level of wastewater generation for all dwelling unit types. The employment wastewater generation factor was based upon the 2002 Vermont Water Supply Rules and was chosen as a middle-ground figure that achieved a balance between high-generating and low-generating employment types. The residential wastewater generation factor was also based upon the 2002 Vermont Water Supply Rules and was chosen to reflect the majority dwelling unit type (single-family) in the region.

**4.3 – Treatment Facility Service Area versus Municipal Service Areas**

For wastewater treatment facilities serving more than one municipality, it is important to note that the permits for these facilities are written such that each community serviced by that facility has a specific share of the total effluent allowed for the facility. There are instances in which the facility may have sufficient capacity for the future growth expected in its total service area, but the individual allocations to each of the communities served by that facility are not sufficient to absorb the future growth for each community. Thus, there may be instances in which the facility has excess capacity, but one or more of the municipalities served by that facility does not have excess capacity.

For this reason, the effluent and capacity numbers are presented by community. For example, the Airport Parkway Facility has a permitted capacity sufficient to absorb the total growth expected within its entire service area. However, the individual allocations for Colchester Town and South Burlington are not sufficient to meet the expected 2020 needs within each community's designated service area.

**4.4 – Effluent "Strength"**

The analysis presented above assumes that effluent concentrations of Phosphorus (P), Biochemical Oxygen Demand (BOD), and Total Suspended Solids (TSS) will be at their current levels. However, the number of connections that can be accommodated by the region may be diminished if a large proportion of those connections produced "strong" (or industrial) wastewater. This is because the treated effluent from strong wastewater is likely to have higher levels of P, BOD, and TSS. Therefore, although a treatment facility may have the infrastructure capacity to take in a greater volume, the strength of the wastewater may result in effluent that exceeds permitted levels for P, BOD, and TSS.

It should also be noted that the estimates used in this Study do not consider the potential influence of Total Maximum Daily Load (TMDL) policies. In many instances, these policies may potentially affect both the number of connections that a facility can serve and the available funding for providing expanded sewer service.

**4.5 – Inflow/Infiltration and Combined Sewers**

Inflow, or stormwater which enters a sanitary sewer system from above the ground, and infiltration, or the water (stormwater or groundwater) which seeps into a sanitary sewer system via underground pipes, are two factors that may hasten a system's approach to permitted capacity. Sources of inflow include, but are not limited to: sump pumps, roof drains, combined sewer manholes, and foundation drains. Sources of inflow include, but are not limited to: service connections, faulty pipe joints, and openings in manhole covers.

Combined Sewer Overflows, or CSOs, are overflows from sewer systems designed to carry both sanitary and stormwater runoff loads. Newer systems have been designed to separate stormwater runoff from the sanitary system so that the runoff may be treated and discharged separately. This study does not explicitly account for stormwater inflow into combined systems. This study indirectly accounts for infiltration in that the facility's permitted capacity takes this into consideration.

**4.6 – Land Use**

The baseline numbers used to develop the growth projections were derived from data for housing and employment located within the sewer service areas in 2000. Nearly always, the sewer service area is coincident with the Metropolitan and Village Planning Areas, designated in the *2001 Regional Plan*.

The projections used in this Study assume that current patterns of land development relative to Metropolitan and Village Planning Areas (growth centers) will continue into the future. Therefore, although many of the regional and local planning goals speak to creating greater densities within the Metropolitan and Village Planning Areas, this Study does not assume that these greater densities will be achieved.

Consequently, this Study does not account for a potential shift in land use toward a pattern in which a greater proportion of the overall growth locates within the growth centers relative to the outlying areas of a community. Nor does this Study account for non-typical development projects, such as the redevelopment of an entire downtown area or the creation of an entirely new employment core. In certain instances, such as the Airport Parkway and Hinesburg facilities, the narrow margin between anticipated demand and current reserve capacity makes it unlikely that the current public sewer capacity could absorb large-scale development within growth centers.

## 5.0 Conclusion and Recommendations

The CCRPC Capacity Study Steering Committee recommends that this document serve as a planning tool that is available to the region and its member municipalities. As such, it is also recommended that this Study be updated every five years. Where data are readily available, select tables should be updated bi-annually. Several recommendations for improving the Study in future updates are described below.

Rather than relying upon regionally based growth rates, future updates should include locally developed employment growth rates. As well, this study should consider employment wastewater generation rates for various employment categories. This version of the Capacity Study assumes the same level of wastewater generation for all employment types. The employment wastewater generation factor was based upon the 2002 Vermont Water Supply Rules and was chosen as a middle-ground figure that achieved a balance between high-generating and low-generating employment types.

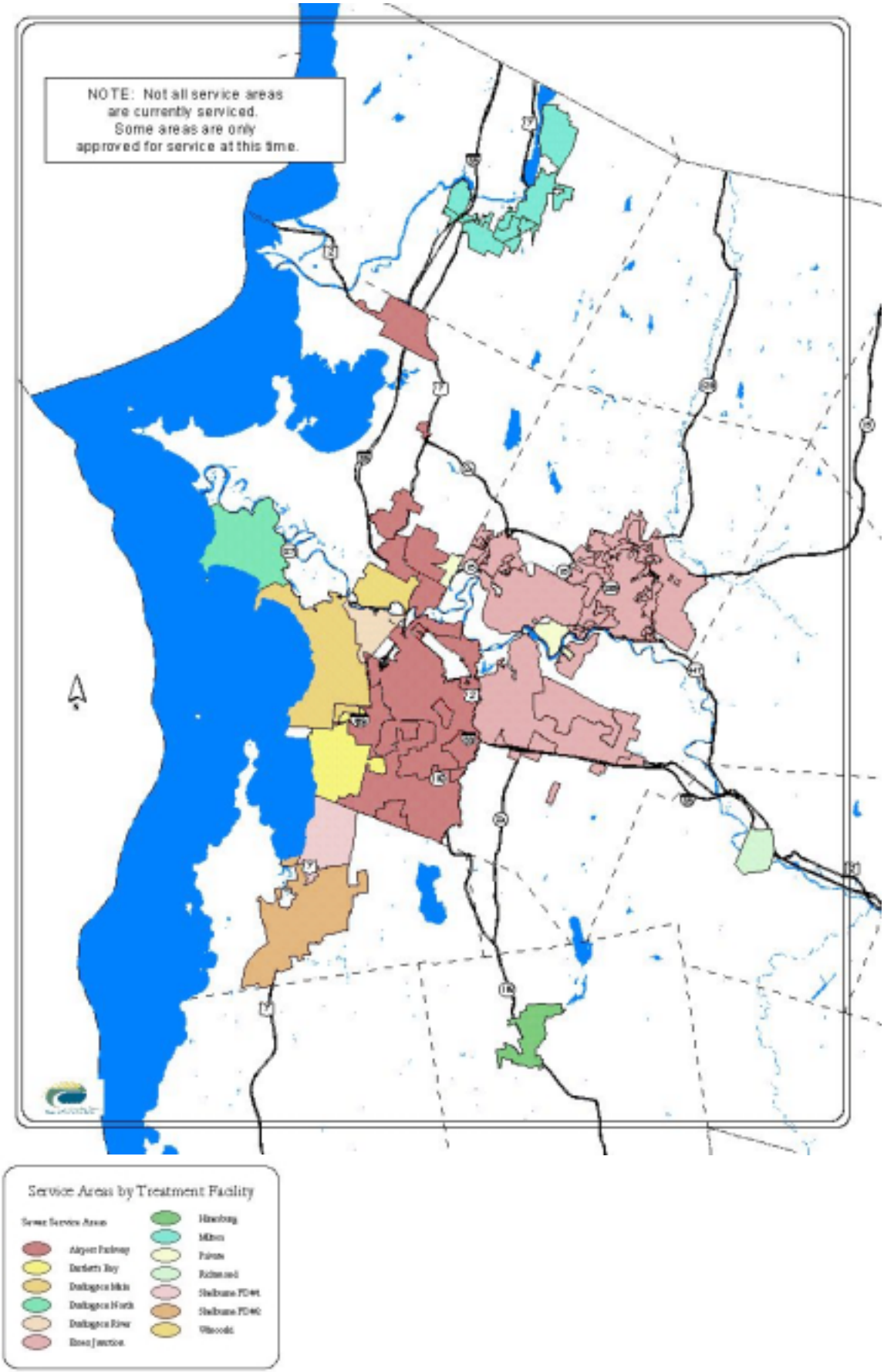
Similarly, future updates should aim to breakdown housing by dwelling unit types. This version of the Capacity Study assumes the same level of wastewater generation for all dwelling unit types. The residential wastewater generation factor was based upon the 2002 Vermont Water Supply Rules and was chosen to reflect the majority of dwelling unit type (single-family) in the region.

Future updates will need to provide a more detailed examination of the properties at Fort Ethan Allen. Given that this property lies within one of the region's most traveled corridors, there is substantial opportunity for this parcel to be redeveloped at higher densities. As mentioned in Section 4.0, such large-scale redevelopment was not considered in this edition of the Capacity Study. Thus, future updates to this Study will need to consider other large-scale development and re-development projects.

This Study does not conclude that capital improvements to the existing sewer facilities are necessary. Rather, this Study demonstrates the likely outcomes of forecasted trends. There are many different actions that maybe undertaken in response to these forecasted outcomes. These results are intended to help member municipalities and partner organizations in the development of plans and policies that are impacted by sewer allocations and capacities.

The Study recognizes that investments to sewer treatment facilities and investments in innovative septic technologies may assist communities in meeting their land use and environmental goals by providing wastewater treatment capacity in areas planned for future growth. Alternatively, innovative land use policies may be employed. As an example, in areas where the allocated capacity for a parcel has not been realized, this "excess" capacity may be transferred to parcels within areas planned for future growth, thereby providing sufficient capacity to realize the town's land use goals.

# Sewer Service Areas - 2000



[1] The findings presented here are based upon data for the calendar year 2000. It should be noted that, in some instances, there have been significant changes to the demand on particular wastewater treatment facilities and, thus, the available reserves for sewage treatment capacity.

[2] See the following documents for further reading on this subject: 1)"Costs of Sprawl-2000: TCRP Report 74" Transit Cooperative Research Program, 2002. National Academy Press, Washington, DC. 2)Burchell, Robert 1992. "Impact Assessment of the New Jersey Interim State Development and Redevelopment Plan. Report II: Research and Findings" Trenton: New Jersey Office of State Planning; 1995b (November). 3)"The Economic Impacts of Trend Versus Vision Growth in the Lexington Metropolitan Area." Report Prepared for Bluegrass Tomorrow, Lexington, KY, et al, 1997a. 4) "Fiscal Impacts of Alternative Land Development Patterns in Michigan: The Costs of Current Development Versus Compact Growth." Southeast Michigan Regional Council of Governments; et al, August 15, 1995. 5) "Impact Assessment of DELEP CCMP versus STATUS QUO on Twelve Municipalities in the DELEP Region." Report prepared by the Government Committee of the Delaware Estuary Program. Philadelphia, PA

[3] CCRPC hopes to complete a similar study of public water supply in the region.

[4] In the City of Winooski, the committed allocations for the year 2000 include the Downtown Redevelopment project. Therefore, the demand potential generated from the Downtown Redevelopment is already built into the reserve capacity in 2000 and was not estimated in the future conditions.

[5] "Wastewater System and Potable Water Supply Rules - Chapter 1: Small Scale Wastewater Treatment and Disposal Rules", March 27, 2002. State of Vermont, Agency of Natural Resources, Department of Environmental Conservation, Wastewater Management Division. Page 74.

[6] "Wastewater System and Potable Water Supply Rules - Chapter 1: Small Scale Wastewater Treatment and Disposal Rules", March 27, 2002. State of Vermont, Agency of Natural Resources, Department of Environmental Conservation, Wastewater Management Division. Pages 72-73.