
CHAPTER 8

8.0 REFINED PLANNING PROJECTIONS

8.1 Introduction

This Chapter defines the "refined" planning projections of total population, sewerage population and sewage generation in Orange County. The projections presented herein are the result of the integration of baseline planning projections (Chapter 6) with updated planning information (Chapter 7) from local municipal officials. The refined planning information is presented down to the city, town and village level to identify individual needs in all areas of the County. The refined data are presented as current estimates (year 1990) and planning projections (through year 2020).

It should be noted that the refined planning projections were summarized for the Orange County Sewer Committee prior to the release of final 1990 U.S. Census Bureau data. Final 1990 U.S. Census Bureau data was released in January 1991, well after the refined projections for this Study were made. Overall, the final 1990 U.S. Census Bureau data concurred with the Project Team's estimate of 1990 population to within three percent of the actual total County population.

Each city, town and village in Orange County was afforded the opportunity to review, comment upon and provide further insight about the refined population projections presented in this Chapter. A complete set of concise refined planning projections was given to every supervisor and mayor in Orange County's 40 communities for this purpose. Feedback from this interaction helped finalize the data presented during the Project Team's numerous working sessions with the County Sewer Committee. In addition, meetings were conducted with the Orange County Department of Planning and Development to review and discuss projections. The result of this effort is a compilation of conservative, realistic expectations for future growth trends in the County.

The refined planning projections presented herein are used for the remainder of this Study solely for structuring, sizing and subsequent cost estimating of potential sewage conveyance and treatment facilities.

8.2 Refined Population Estimates and Projections

Baseline population projections developed from the Orange County Data Book estimates presented in Chapter 6 show that the County population could reach over 400,000 by the year 2020. Chapter 7 presents a summary of the updated planning information obtained through contact with local municipal officials. Using this information, the baseline projections were adjusted to reflect assessments of local municipal growth and future development potential for the Study period. This

merging of the baseline population projections with the updated planning information is summarized herein to define the refined County population projections.

Table 8-1 displays the 1990 baseline population, updated population range, and refined population estimates developed for this Study. As shown, a total population of 316,400 is estimated for the County in the year 1990, an increase of 10,000 over the baseline estimate.

Table 8-2 displays the 2020 baseline population, updated population range, and refined population projections developed for this Study. As shown, a total population of over 492,200 is projected for the County in the year 2020, an increase of 91,850 over the baseline projection.

Table 8-3 summarizes the refined Orange County populations projected for this Study for years 1990 through 2020, in ten year increments.

Due to the inherent element of uncertainty in planning, it is seen that municipal officials in many instances gave a range of potential populations for the year 2020. It is noted that while some municipal officials disagree with the County's growth estimates and projections, others expect population growth in their communities to closely reflect the baseline projections made by the Orange County Department of Planning and Development.

8.3 Refined Sewered Population Estimates and Projections

Baseline sewered population estimates for 1980 developed using the Orange County Data Book were presented in Chapter 6 of this Study. As shown therein, the sewered County population in 1980 was 153,830 representing approximately 59 percent of the total County population of 259,603 that time. Baseline sewered population projections were not available from the Orange County Data Book, so refined projections for 1990 are based upon updated information obtained through discussions with municipal and planning officials throughout the County. The 1980 baseline and 1990 updated sewered population estimates were then conservatively projected forward to reflect recent local municipal growth and future development potential.

Table 8-4 displays the refined sewered population for the years 1990, 2000, 2010 and 2020. The sewered County population is projected to grow from an estimated 64 percent in 1990 to approximately 77 percent of the total population in 2020.

ORANGE COUNTY COMPREHENSIVE SEWERAGE STUDY

TABLE 8-1

REFINED 1990 ORANGE COUNTY POPULATION ESTIMATES

TOWN OR CITY (1)	CONSTITUENT (2) COMMUNITIES	1990 BASELINE POPULATION ESTIMATES		1990 UPDATED (3) PLANNING POPULATION ESTIMATES		DEVIATION (4) FROM BASELINE POPULATION ESTIMATES		1990 REFINED (5) POPULATION ESTIMATES
		Low	High	Low	High	Low	High	
Blooming Grove (T)	Washingtonville (V)	3,700	5,000	5,000	5,000	+1,300	+1,300	5,000
	Blooming Grove (UT)	10,600	13,000	11,000	13,000	+400	+2,400	12,000
Chester (T)	Chester (V)	3,100	3,300	3,000	3,300	-100	+200	3,200
	Chester (UT)	5,600	8,000	5,000	8,000	-600	+2,400	6,000
Cornwall (T)	Cornwall-On-Hudson (V)	3,400	3,800	3,000	3,800	-400	+400	3,400
	Cornwall (UT)	8,400	8,600	8,600	8,600	+200	+200	8,600
Crawford (T)	Crawford (UT)	5,700	6,000	6,000	6,000	+300	+300	6,000
Deerpark (T)	Deerpark (UT)	6,200	6,500	6,000	6,500	-200	+300	6,300
Goshen (T)	Goshen (V)	5,500	5,500	5,500	5,500	0	0	5,500
	Goshen (UT)	6,300	6,300	6,300	6,300	0	0	7,700 (6)
Greenville (T)	Greenville (UT)	3,700	4,000	3,500	4,000	-200	+300	3,800
Hamptonburgh (T)	Hamptonburgh (UT)	3,800	4,000	3,800	4,000	0	+200	3,900
Highlands (T)	Highland Falls (V)	4,400	4,200	4,000	4,200	-400	-200	4,100
	Highlands (UT)	10,000	10,000	10,000	10,000	0	0	10,000 (7)
Middletown (C)	Middletown (C)	21,400	26,000 (8)	25,000 (8)	26,000 (8)	+3,600	+4,600	25,500
Minisink (T)	Unionville (V)	600	700 (9)	700 (9)	700 (9)	+100	+100	700
	Minisink (UT)	2,300	2,300 (9)	2,300 (9)	2,300 (9)	0	0	2,300
Monroe (T)	Harriman (V)	900	3,000	3,000	3,000	+2,100	+2,100	3,000
	Kiryas Joel (V)	4,000	10,000 (10)	8,000 (10)	10,000 (10)	+4,000	+6,000	9,000
	Monroe (V)	7,700	7,700	7,700	7,700	0	0	7,700
	Monroe (UT)	7,800	7,000	6,500	7,000	-1,300	-800	6,700

ORANGE COUNTY COMPREHENSIVE SEWERAGE STUDY

TABLE 8-1

REFINED 1990 ORANGE COUNTY POPULATION ESTIMATES

TOWN OR CITY	CONSTITUENT (2) COMMUNITIES	1990 BASELINE POPULATION ESTIMATES		1990 UPDATED (3) PLANNING POPULATION ESTIMATES		DEVIATION (4) FROM BASELINE POPULATION ESTIMATES		1990 REFINED (5) POPULATION ESTIMATES
		Low	High	Low	High	Low	High	
Montgomery (T)	Maybrook (V)	2,400	2,700	2,700	2,700	+300	+300	2,700
	Walden (V)	6,000	6,400	6,000	6,400	0	+400	6,200
Mount Hope (T)	Montgomery (V)	2,500	3,000	3,000	3,000	+500	+500	3,000
	Montgomery (UT)	7,400	7,400	7,400	7,400	0	0	7,400
Newburgh (C)	Otisville (V)	1,000	1,200	1,000	1,200	0	+200	1,100
	Mount Hope (UT)	3,800	3,800	3,800	3,800	0	0	5,700 (11)
Newburgh (T)	Newburgh (C)	22,900	22,900	22,900	22,900	0	0	22,900
	Newburgh (UT)	24,200	24,000 (12)	24,000 (12)	28,000 (12)	-200	+3,800	25,000
Port Jervis (C)	New Windsor (T)	21,900	26,000 (13)	26,000 (13)	26,000 (13)	+4,100	+4,100	26,000
	Port Jervis (C)	8,800	9,000	9,000	10,000	+200	+1,200	9,000
Wallkill (T)	Tuxedo Park (V)	900	900	900	1,200	0	+300	1,000
	Tuxedo (UT)	2,500	2,400	2,400	2,400	-100	-100	2,400
Warwick (T)	Wallkill (UT)	25,100	25,100	25,100	25,100	0	0	25,100
	Florida (V)	3,400	2,500	2,500	2,500	-900	-900	2,500
Wawayanda (T)	Greenwood Lake (V)	3,000	3,200	3,200	3,200	+200	+200	3,200
	Warwick (V)	5,800	8,000	8,000	8,000	0	+2,200	6,000
Woodbury (T)	Warwick (UT)	14,300	12,300	12,300	14,300	-2,000	0	13,300
	Wawayanda (UT)	4,900	5,000	5,000	5,000	+100	+100	5,000
COUNTY TOTALS (14)	Woodbury (UT)	7,900	8,500	8,500	8,500	+600	+600	8,500
		293,800	305,400	305,400	326,500	+11,600	+32,700	316,400

NOTES:

(1) Town or City is denoted by (T) or (C), respectively, after each entry in this column.

ORANGE COUNTY COMPREHENSIVE SEWERAGE STUDY

TABLE 8-1

REFINED 1990 ORANGE COUNTY POPULATION ESTIMATESNOTES: (continued)

- (2) Village or Unincorporated Town or City is denoted by (V), (UT) or (C), respectively, after each entry in this column.
- (3) The 1990 updated planning population estimates are based upon contact and discussions with local municipal officials and/or community planners. If a population estimate range was given, it is shown as the low and high estimates. If a population estimate range was not given, the given numerical estimate is shown as both the low and high estimates.
- (4) Deviation from baseline population estimates compares the 1990 updated planning population estimates to the 1990 baseline population estimates. Both the low and high 1990 updated planning population estimates are compared individually to the baseline population estimates. It should be noted that entries in this column that have a value of zero are typically a result of municipal officials concurring with the 1990 baseline population estimates.
- (5) The 1990 refined population estimates represent the estimation of values, rounded to the nearest 100, to be used for planning purposes in this document. Generally, the entries in this column represent an average of the low and high 1990 updated planning population estimates.
- (6) Goshen (UT) 1990 refined population estimate includes the Orange County Home and Infirmary population of 1,400 people.
- (7) Highlands (UT) 1990 refined population estimate includes the U.S. Military Academy at West Point population of 7,000 people.
- (8) Middletown (C) officials believe that their community has historically been undercounted by the U.S. Census Bureau. These entries reflect this situation.
- (9) Minisink (UT) is unable to provide a 1990 updated planning population estimate. As such, the 1990 baseline population estimate is used.
- (10) Kiryas Joel (V) has undergone rapid growth that was not addressed in the 1990 baseline population estimate according to municipal officials in the Village.
- (11) Mount Hope (UT) updated planning population estimates include the population of both the Federal and State correctional facilities located therein of approximately 1,900 inmates.
- (12) Newburgh (UT) has undergone rapid growth that was not addressed in the 1990 baseline population estimates.
- (13) New Windsor (UT) has undergone rapid growth that was not addressed in the 1990 baseline population estimates.
- (14) County totals represent the actual sums of each column.

ORANGE COUNTY COMPREHENSIVE SEWERAGE STUDY

TABLE 8-2

REFINED 2020 ORANGE COUNTY POPULATION PROJECTIONS

TOWN OR CITY (1)	CONSTITUENT (2) COMMUNITIES	2020 BASELINE POPULATION PROJECTION		2020 UPDATED (3) PLANNING POPULATION PROJECTION		DEVIATION (4) FROM BASELINE POPULATION PROJECTION		2020 REFINED (5) POPULATION PROJECTION
		Low	High	Low	High	Low	High	
Blooming Grove (T)	Washingtonville (V)	4,410		9,000	9,000	+4,590	+4,590	9,000
	Blooming Grove (UT)	16,330		17,000	17,000	-330	+670	16,500
Chester (T)	Chester (V)	5,670		4,000	5,000	-1,670	-670	4,500
	Chester (UT)	8,890		15,000(6)	19,000(6)	+6,110	+10,110	17,000(6)
Cornwall (T)	Cornwall-On-Hudson (V)	4,150		4,150	4,150	0	0	4,200
	Cornwall (UT)	13,270		13,270	13,270	0	0	13,300
Crawford (T)	Crawford (UT)	8,170		8,300	8,800	+130	+630	8,600
Deerpark (T)	Deerpark (UT)	8,310		9,000	10,000	+690	+1,690	9,500
Goshen (T)	Goshen (V)	7,580		7,200	7,200	-380	-380	7,200
	Goshen (UT)	9,080		9,600	10,000	+520	+920	11,200(7)
Greenville (T)	Greenville (UT)	4,170		6,000	9,000	+1,830	+4,830	7,500
Hamptonburgh (T)	Hamptonburgh (UT)	5,820		5,820	5,820	0	0	5,800
Highlands (T)	Highland Falls (V)	5,280		4,400	4,500	-880	-780	4,500
	Highlands (UT)	12,600		12,600	12,600	0	0	12,600(8)
Middletown (C)	Middletown (C)	23,430		30,000(9)	32,000(9)	+6,570	+8,570	31,000
Minisink (T)	Unionville (V)	870		870(10)	1,100(10)	0	+230	1,000
	Minisink (UT)	3,500		3,500(10)	3,500(10)	0	0	3,500
Monroe (T)	Harriman (V)	1,200		3,250	3,750	+2,050	+2,550	3,500
	Kiryas Joel (V)	8,230		25,000(11)	30,000(11)	+16,770	+21,770	28,000
	Monroe (V)	10,600		10,000	10,000	-600	-600	10,000
	Monroe (UT)	13,300		14,000	14,000	+700	+700	14,000

ORANGE COUNTY COMPREHENSIVE SEWERAGE STUDY

TABLE 8-2

REFINED 2020 ORANGE COUNTY POPULATION PROJECTIONS

TOWN OR CITY (1)	CONSTITUENT(2) COMMUNITIES	2020 BASELINE POPULATION PROJECTION		2020 UPDATED(3) PLANNING POPULATION PROJECTION		DEVIATION(4) FROM BASELINE POPULATION PROJECTION		2020 REFINED(5) POPULATION PROJECTION
		Low	High	Low	High	Low	High	
Montgomery (T)	Maybrook (V)	3,200	3,500	3,500	3,500	+300	+300	3,500
	Walden (V)	7,990	8,500	8,500	8,500	+510	+510	8,500
	Montgomery (V)	3,490	4,500	4,500	4,500	+1,010	+1,010	4,500
	Montgomery (UT)	10,810	10,810	10,810	10,810	0	0	10,800
Mount Hope (T)	Otisville (V)	1,410	1,300	1,300	1,300	-310	-110	1,200
	Mount Hope (UT)	5,510	5,510	5,510	5,510	0	0	7,400(12)
Newburgh (C)	Newburgh (C)	22,310	26,500	22,310	26,500	0	+4,190	24,000
Newburgh (T)	Newburgh (UT)	30,570	40,000(13)	30,000(13)	40,000(13)	-570	+9,430	35,000
New Windsor (T)	New Windsor (UT)	31,250	42,000(14)	38,000(14)	42,000(14)	+6,750	+10,750	40,000
Port Jervis (C)	Port Jervis (C)	8,980	11,500	11,500	12,500	+2,520	+3,520	12,000
Tuxedo (T)	Tuxedo Park (V)	1,200	1,200	1,200	1,200	0	0	1,200
	Tuxedo (UT)	3,710	5,000(15)	5,000(15)	25,000(15)	+1,290	+21,290	15,000(15)
Wallkill (T)	Wallkill (UT)	37,850	37,850	37,850	37,850	0	0	39,700(16)
Warwick (T)	Florida (V)	5,090	4,000	4,000	4,000	-1,090	-1,090	4,000
	Greenwood Lake (V)	4,000	6,000	5,000	6,000	+1,000	+2,000	5,500
	Warwick (V)	8,290	9,000	7,000	9,000	-1,290	+710	7,100
	Warwick (UT)	21,230	30,000(17)	21,230	30,000(17)	0	+8,770	28,900(17)
Wawayanda (T)	Wawayanda (UT)	6,700	7,000	7,000	9,000	+300	+2,300	8,000
Woodbury (T)	Woodbury (UT)	11,900	13,000	13,000	14,000	+1,100	+2,100	13,500
COUNTY TOTALS(18)		400,350	447,970	447,970	520,860	+47,620	+120,510	492,200

NOTES:

(1) Town or City is denoted by (T) or (C), respectively, after each entry in this column.

ORANGE COUNTY COMPREHENSIVE SEWERAGE STUDY

TABLE 8-2

REFINED 2020 ORANGE COUNTY POPULATION PROJECTIONSNOTES: (continued)

- (2) Village or Unincorporated Town or City is denoted by (V), (UT) or (C), respectively, after each entry in this column.
- (3) The 2020 updated planning population projections are based upon contact and discussions with local municipal officials and/or community planners. If a population projection range was given, it is shown as the low and high projections. If a population projection range was not given, the given numerical estimate is shown as both the low and high projections.
- (4) Deviation from baseline population projections compares the 2020 updated planning population projections to the 2020 baseline population projections. Both the low and high 2020 updated planning population projections are compared individually to the baseline population projections. It should be noted that entries in this column that have a value of zero are typically a result of municipal officials concurring with the 2020 baseline population projections.
- (5) The 2020 refined population projections represent the estimation of values, rounded to the nearest 100, to be used for planning purposes in this document. Generally, the entries in this column represent an average of the low and high 2020 updated planning population projections.
- (6) Municipal officials in Chester (UT) anticipate significant growth, as currently evidenced by the many proposed developments planned therein. The 2020 updated planning high population projection is based upon current zoning and the possibility of the development of a high density religious community, similar to that of Kiryas Joel (V).
- (7) Goshen (UT) 2020 refined population projection includes the Orange County Home and Infirmary population of 1,400 people.
- (8) Highlands (UT) 2020 refined population projection includes the U.S. Military Academy at West Point population of 7,000 people.
- (9) Middletown (C) officials believe that their community has historically been undercounted by the U.S. Census Bureau. These entries reflect this situation.
- (10) Minisink (UT) is unable to provide 2020 updated planning population projections. As such, the 2020 baseline population projections are used for this purpose.
- (11) Kiryas Joel (V) is expected to undergo rapid growth that is not addressed in the 2020 baseline population projections.

ORANGE COUNTY COMPREHENSIVE SEWERAGE STUDY

TABLE 8-2

REFINED 2020 ORANGE COUNTY POPULATION PROJECTIONS

NOTES: (continued)

- (12) Mount Hope (UT) updated planning population projections include the populations of both the Federal and State correctional facilities located therein of approximately 2,400 inmates.
- (13) Newburgh (UT) is expected to undergo rapid growth that is not addressed in the 2020 baseline population projections.
- (14) New Windsor (UT) is expected to undergo rapid growth that is not addressed in the 2020 baseline population projections.
- (15) Tuxedo (UT) may experience significant growth, depending upon the level of development in Sterling Forest. Based upon the 2020 updated planning low and high population projections and the assumption that the Sterling Forest Corporation's "principles-based concept" will be adopted, a 2020 refined population projection of 15,000 was estimated.
- (16) Wallkill (UT) updated planning population projections include the population of the future Orange County Prison located therein of approximately 1,800 inmates.
- (17) Part of Warwick (UT) may experience significant growth, depending upon the level of development in Sterling Forest. Based upon the 2020 updated planning low and high population projections and the assumption that the Sterling Forest Corporation's "principles-based concept" will be adopted, a 2020 refined population projection of 27,000 was estimated.
- (18) County totals represent the actual sums of each column.

ORANGE COUNTY COMPREHENSIVE SEWERAGE STUDY

TABLE 8-3

REFINED ORANGE COUNTY POPULATION PROJECTIONS : 1990-2020

TOWN OR CITY	CONSTITUENT (2) COMMUNITIES	REFINED POPULATION PROJECTIONS			REFINED (3) GROWTH RATE		
		1990	2000 (4)	2010 (4)	2020	Annual Percent	Total Percent
Blooming Grove (T)	Washingtonville (V) Blooming Grove (UT)	5,000	6,300	7,700	9,000	2.67%	80.0%
		12,000	13,500	15,000	16,500	1.25	37.5
Chester (T)	Chester (V) Chester (UT)	3,200	3,600	4,100	4,500	1.35	40.6
		6,000	9,700	13,300	17,000	6.11	183.3
Cornwall (T)	Cornwall-On-Hudson (V) Cornwall (UT)	3,400	3,700	3,900	4,200	0.78	23.5
		8,600	10,200	11,700	13,300	1.82	54.7
Crawford (T)	Crawford (UT)	6,000	6,900	7,700	8,600	1.44	43.3
Deerpark (T)	Deerpark (UT)	6,300	7,300	8,400	9,500	1.69	50.8
Goshen (T)	Goshen (V) Goshen (UT)	5,500	6,100	6,600	7,200	1.03	30.9
		7,700	8,900	10,000	11,200	1.52	45.4
Greenville (T)	Greenville (UT)	3,800	5,000	6,300	7,500	3.25	97.4
Hamptonburgh (T)	Hamptonburgh (UT)	3,900	4,500	5,200	5,800	1.62	48.7
Highlands (T)	Highland Falls (V) Highlands (UT)	4,100	4,200	4,400	4,500	0.33	9.8
		10,000	10,900	11,700	12,600	0.87	26.0
Middletown (C)	Middletown (C)	25,500	27,300	29,200	31,000	0.72	21.6
Minisink (T)	Unionville (V) Minisink (UT)	700	800	900	1,000	1.43	42.9
		2,300	2,700	3,100	3,500	1.74	52.2
Monroe (T)	Harriman (V) Kiryas Joel (V) Monroe (V) Monroe (UT)	3,000	3,200	3,300	3,500	0.56	16.7
		9,000	15,000	21,700	28,000	7.04	211.1
		7,700	8,500	9,200	10,000	1.00	29.9
		6,700	9,100	11,600	14,000	3.63	109.0

ORANGE COUNTY COMPREHENSIVE SEWERAGE STUDY

TABLE 8-3

REFINED ORANGE COUNTY POPULATION PROJECTIONS : 1990-2020

TOWN OR CITY	CONSTITUENT(2) COMMUNITIES	REFINED POPULATION PROJECTIONS				REFINED (3) GROWTH RATE	
		Year				Annual Percent	Total Percent
		1990	2000(4)	2010(4)	2020		
Montgomery (T)	Maybrook (V)	2,700	3,000	3,200	3,500	0.99%	29.6%
	Walden (V)	6,200	7,000	7,700	8,500	1.24	37.1
	Montgomery (V)	3,000	3,500	4,000	4,500	1.67	50.0
	Montgomery (UT)	7,400	8,500	9,700	10,800	1.53	45.9
Mount Hope (T)	Otisville (V)	1,100	1,100	1,200	1,200	0.30	9.1
	Mount Hope (UT)	5,700	6,300	6,800	7,400	0.99	29.8
Newburgh (C)	Newburgh (C)	22,900	23,300	23,600	24,000	0.16	4.8
Newburgh (T)	Newburgh (UT)	25,000	28,300	31,700	35,000	1.33	40.0
New Windsor (T)	New Windsor (UT)	26,000	30,700	35,300	40,000	1.79	53.8
Port Jervis (C)	Port Jervis (C)	9,000	10,000	11,000	12,000	1.11	33.3
Tuxedo (T)	Tuxedo Park (V)	1,000	1,100	1,200	1,200	0.67	20.0
	Tuxedo (UT)	2,400	6,600	10,800	15,000	17.50	525.0
Wallkill (T)	Wallkill (UT)	25,100	30,000	34,800	39,700	1.70	51.0
Warwick (T)	Florida (V)	2,500	3,000	3,500	4,000	2.00	60.0
	Greenwood Lake (V)	3,200	4,000	4,700	5,500	2.40	71.9
	Warwick (V)	6,000	6,400	6,700	7,100	0.61	18.3
	Warwick (UT)	13,300	18,500	23,700	28,900	3.91	117.3
Wawayanda (T)	Wawayanda (UT)	5,000	6,000	7,000	8,000	2.00	60.0
Woodbury (T)	Woodbury (UT)	8,500	10,200	11,800	13,500	1.96	58.8
COUNTY TOTALS(5)		316,400	375,200	433,400	492,200	1.85%	55.6%

NOTES:

(1) Town or City is denoted by (T) or (C), respectively, after each entry in this column.

ORANGE COUNTY COMPREHENSIVE SEWERAGE STUDY

TABLE 8-3

REFINED ORANGE COUNTY POPULATION PROJECTIONS : 1990-2020

NOTES: (continued)

- (2) Village or Unincorporated Town or City is denoted by (V), (UT) or (C), respectively, after each entry in this column.
- (3) The refined annual percent growth rate is the quantity year 2020 population less the year 1990 population, divided by the quantity of year 1990 population multiplied by the difference in years between 2020 and 1990, then multiplied by 100%. Mathematically,

$$\text{Refined Average \% Annual Growth Rate} = \frac{(\text{Refined Pop. 2020} - \text{Refined Pop. 1990}) \times 100\%}{\text{Refined Pop. 1990} \times (2020 - 1990)}$$

The refined total percent growth rate is the quantity year 2020 population less the year 1990 population, divided by the year 1990 population, then multiplied by 100%. Mathematically,

$$\text{Refined Average \% Total Growth Rate} = \frac{(\text{Refined Pop. 2020} - \text{Refined Pop. 1990}) \times 100\%}{\text{Refined Pop. 1990}}$$

- (4) The refined population projections, rounded to the nearest 100, for both the years 2000 and 2010 have been estimated by interpolation between the planning period endpoint populations in the years 1990 and 2020.
- (5) County totals represent the actual sums of each column, except for the refined average percent annual growth rate.

ORANGE COUNTY COMPREHENSIVE SEWERAGE STUDY

Table 8-4

Refined Orange County Sewered Population Projections: 1990-2020

Municipality	1990			2010			2020		
	Total Population	Percent Sewered	Sewered Population	Total Population	Percent Sewered	Sewered Population	Total Population	Percent Sewered	Sewered Population
Blooming Grove									
Washingtonville (V)	5,000	90%	4,500	6,300	93%	5,900	7,700	97%	7,400
Blooming Grove (UT)	12,000	33%	4,000	13,500	45%	6,100	15,000	58%	8,700
Chester									
Chester (V)	3,200	99%	3,200	3,600	99%	3,600	4,100	100%	4,100
Chester (UT)	6,000	49%	2,900	9,700	56%	5,400	13,300	63%	8,400
Cornwall									
Cornwall on Hudson (V)	3,400	95%	3,200	3,700	97%	3,600	3,900	98%	3,800
Cornwall (UT)	8,600	80%	6,900	10,200	82%	8,300	11,700	83%	9,800
Crawford (T)	6,000	30%	1,800	6,900	33%	2,300	7,700	37%	2,800
Deerpark (T)	6,300	0%	0	7,300	3%	200	8,400	7%	600
Goshen (1)									
Goshen (V)	5,500	95%	5,200	6,100	97%	5,900	6,600	98%	6,500
Goshen (UT)	7,700	42%	3,200	8,900	50%	4,400	10,000	57%	5,700
Greenville (T)	3,800	0%	0	5,000	3%	200	6,300	7%	400
Hamptonburgh (T)	3,900	0%	0	4,500	3%	200	5,200	7%	300
Highlands									
Highland Falls (V)	4,100	99%	4,100	4,200	99%	4,200	4,400	100%	4,400
Highlands (UT)(2)	10,000	80%	8,000	10,900	77%	8,400	11,700	73%	8,600
Middletown (C)	25,500	100%	25,500	27,300	100%	27,300	29,200	100%	29,200
Minisink									
Unionville (V)	700	0%	0	800	10%	100	900	20%	200
Minisink (UT)	2,300	0%	0	2,700	3%	100	3,100	7%	200
Monroe									
Harriman (V)	3,000	95%	2,900	3,200	97%	3,100	3,300	98%	3,200
Kiryas Joel (V)	9,000	100%	9,000	15,300	100%	15,300	21,700	100%	21,700
Monroe (V)	7,700	90%	6,900	8,500	93%	7,900	9,200	97%	8,900
Monroe (UT)	6,700	30%	2,000	9,100	40%	3,600	11,600	50%	5,800

ORANGE COUNTY COMPREHENSIVE SEWERAGE STUDY

Table 8-4

Refined Orange County Sewered Population Projections: 1990-2020

Municipality	1990			2000			2010			2020		
	Total Population	Percent Sewered	Sewered Population	Total Population	Percent Sewered	Sewered Population	Total Population	Percent Sewered	Sewered Population	Total Population	Percent Sewered	Sewered Population
Montgomery	2,700	99%	2,700	3,000	99%	3,000	3,200	100%	3,200	3,500	100%	3,500
Maybrook (V)												
Walden (V)	6,200	99%	6,100	7,000	99%	7,000	7,700	100%	7,700	8,500	100%	8,500
Montgomery (V)	3,000	99%	3,000	3,500	99%	3,500	4,000	100%	4,000	4,500	100%	4,500
Montgomery (UT)	7,400	5%	400	8,500	20%	1,700	9,700	35%	3,400	10,800	50%	5,400
Mount Hope	1,100	0%	0	1,100	7%	100	1,200	13%	200	1,200	20%	200
Otisville (V)												
Mount Hope (UT)(3)	5,700	39%	2,200	6,300	39%	2,500	6,800	40%	2,700	7,400	40%	3,000
Newburgh (C)	22,900	100%	22,900	23,300	100%	23,300	23,600	100%	23,600	24,000	100%	24,000
Newburgh (T)	25,000	35%	8,800	28,300	48%	13,700	31,700	62%	19,500	35,000	75%	26,300
New Windsor (T)	26,000	58%	15,200	30,700	67%	20,700	35,300	76%	26,900	40,000	85%	34,000
Port Jervis (C)	9,000	100%	9,000	10,000	100%	10,000	11,000	100%	11,000	12,000	100%	12,000
Tuxedo	1,000	95%	1,000	1,100	97%	1,100	1,200	98%	1,200	1,200	100%	1,200
Tuxedo Park (V)												
Tuxedo (UT)(4)	2,400	25%	600	6,600	74%	4,900	10,800	85%	9,200	15,000	90%	13,500
Walkkill (T)(5)	25,100	60%	15,100	30,000	67%	20,000	34,800	73%	25,500	39,700	80%	31,800
Warwick	2,500	98%	2,500	3,000	99%	3,000	3,500	99%	3,500	4,000	100%	4,000
Florida (V)												
Greenwood Lake (V)	3,200	0%	0	4,000	23%	900	4,700	47%	2,200	5,500	70%	3,900
Warwick (V)	6,000	100%	6,000	6,400	100%	6,400	6,700	100%	6,700	7,100	100%	7,100
Warwick (UT)(4)	13,300	11%	1,500	18,500	31%	5,800	23,700	43%	10,200	28,900	50%	14,500
Wayanda (T)	5,000	10%	500	6,000	27%	1,600	7,000	43%	3,000	8,000	60%	4,800
Woodbury (T)	8,500	65%	5,500	10,200	72%	7,300	11,800	78%	9,200	13,500	85%	11,500
TOTALS	316,400	62%	196,300	375,200	67%	252,600	433,400	72%	313,600	492,200	77%	381,400

NOTES: (1) Town of Goshen includes constant Orange County Home & Infirmary population of 1,400 people.
(2) Town of Highlands includes constant West Point Military Academy population of 7,000 people.
(3) Town of Mount Hope includes constant state and federal prison populations of 1,900 people.
(4) The Towns of Tuxedo and Warwick include populations of 11,500 and 7,600, respectively, for Sterling Forest by year 2020.
(5) Town of Walkkill includes Goshen jail population of 1,800 people for years 2000-2020.

8.4 Refined Sewage Generation Rates and Quantities

As discussed in Chapter 6 of this Study, sewage production is a function of residential, commercial and industrial water use, combined with any infiltration or inflow into the collection system. Typically, about 70 to 90 percent of the water used in a community makes its way into the sewer system. In general, sewage generation rates can be assessed in terms of a daily per-capita flow rate, described as gallons per capita per day. Sewage generation is generally higher for communities that have significant industry, and lower for communities that are mostly residential. Typical sewage generation rates range from 50 gallons per capita per day for a rural community to 250 gallons per capita per day or more for a well developed city.

To calculate the refined sewage generation rates, the average daily flow recorded at each municipal sewage treatment facility (see Chapter 4) was divided by the 1990 refined sewer population estimate (Table 8-4) for each municipality. This produced a refined per-capita sewage generation rate for each municipality in the County as shown in Table 8-5. A comparison was also made in Table 8-5 between the refined sewage generation rate and the estimated average water use rate to confirm that the refined per-capita sewage generation rate fell within a reasonable percentage of per-capita water use. The estimated average water use rate is based upon planning information used by the Orange County Water Authority.

From the year 1990 refined sewage generation rate, a judgement of the year 2020 refined sewage generation rate was made based upon four criteria:

- Projected growth trends in the area;
- Comparison to existing water use data;
- Predicted water conservation measures; and
- Anticipated removal of infiltration and inflow in areas, where significant.

To ensure a conservative approach, minimum values of 80 gallons per capita per day were assigned for rural areas, and 100 gallons per capita per day for more developed areas, for the year 2020. Values for the years 2000 and 2010 were interpolated between the 1990 and 2020 endpoints.

Refined sewage generation projections for the years 1990, 2000, 2010 and 2020 were calculated by multiplying the refined sewer population projections from Table 8-4 by the corresponding refined sewage generation rates from Table 8-5 (note that years 2000 and 2010 refined sewage generation rates are interpolated approximations). The resulting projected sewage production for each community

ORANGE COUNTY COMPREHENSIVE SEWERAGE STUDY

TABLE 8-5

Refined Orange County Per-Capita Sewage Generation Rates: 1990 and 2020

Municipality	Average Water Use, gpcd (1)	Expected Sewage Generation Range as a Percentage of Water Use, gpcd		1990 STP Reported Sewage Generation Rate, gpcd (2)	1990 Refined Sewage Generation Rate, gpcd (3)	2020 Refined Sewage Generation Rate, gpcd (4)
		at 70 %	to 90 %			
Blooming Grove	193	135	174	87	76	100
Washingtonville (V)						
Blooming Grove (UT)	88	62	79	101	100	100
Chester	286	200	257	108	113	130
Chester (V)						
Chester (UT)	N/A	N/A	N/A	99	77	100
Cornwall	237	166	214	167	153	150
Cornwall-on-Hudson (V)						
Cornwall (UT)	N/A	N/A	N/A	142	136	140
Crawford (T)	96	67	87	60	60	80
Deerpark (T)	N/A	N/A	N/A	N/A	N/A	80
Goshen	170	119	153	157	161	150
Goshen (V)						
Goshen (UT)(5)	N/A	N/A	N/A	104	103	130
Greenville (T)	N/A	N/A	N/A	N/A	N/A	80
Hamptonburgh (T)	N/A	N/A	N/A	N/A	N/A	80
Highlands	246	172	222	95	122	120
Highland Falls (V)						
Highlands (UT)(6)	N/A	N/A	N/A	194	194	190
Middletown (C)	272	191	245	189	185	190
Minisink	126	89	114	N/A	N/A	100
Unionville (V)						
Minisink (UT)	N/A	N/A	N/A	N/A	N/A	80
Monroe	125	87	112	108	90	100
Harriman (V)						
Kiryas Joel (V)	81	57	73	108	70	100
Monroe (V)	113	79	102	108	100	100
Monroe (UT)	N/A	N/A	N/A	108	100	100

ORANGE COUNTY COMPREHENSIVE SEWERAGE STUDY

TABLE 8-5

Refined Orange County Per-Capita Sewage Generation Rates: 1990 and 2020

Municipality	Average Water Use, gpcd (1)	Expected Sewage Generation Range as a Percentage of Water Use, gpcd		1990 STP Reported Sewage Generation Rate, gpcd (2)	1990 Refined Sewage Generation Rate, gpcd (3)	2020 Refined Sewage Generation Rate, gpcd (4)
		@ 70 %	to @ 90 %			
Montgomery	138	96	124	125	94	100
Maybrook (V)	187	131	168	113	114	120
Walden (V)	106	74	95	100	101	100
Montgomery (V)	N/A	N/A	N/A	53	86	100
Montgomery (UT)						
Mount Hope	168	118	151	N/A	N/A	120
Otisville (V)	N/A	N/A	N/A	212	206	180
Mount Hope (UT)(7)						
Newburgh (C)	290	203	261	191	196	200
Newburgh (T)	225	158	203	153	166	170
New Windsor (T)(8)	119	84	107	163	286	250
Port Jervis (C)	213	149	192	148	144	150
Tuxedo	358	251	322	69	57	100
Tuxedo Park (V)	N/A	N/A	N/A	67	67	100
Tuxedo (UT)						
Wallkill (T)	184	129	166	167	151	150
Warwick	191	134	172	102	112	110
Florida (V)	140	98	126	N/A	N/A	100
Greenwood Lake (V)	214	150	193	148	107	120
Warwick (V)	N/A	N/A	N/A	160	162	140
Warwick (UT)						
Wayyanda (T)	N/A	N/A	N/A	75	75	100
Woodbury (T)	194	136	174	109	140	140
NUMERICAL AVERAGES:	183	128	165	124	124	124

Notes: (1) For the period of 1980 to 1990, from Orange County Report on Water Supply System Development, 1987.
(2) Calculated from STP Survey reported service area population and average daily flow.
(3) Calculated from STP Survey reported average daily flow and 1990 refined sewer population.
(4) Based upon local conditions and professional judgement of growth, water conservation and infiltration/inflow.
(5) 1990 Goshen (UT) rate = 161 gpcd; Orange County Home & Infirmary rate = 36 gpcd.
(6) 1990 Highlands (UT) rate = 50 gpcd; West Point Military Academy rate = 214 gpcd.
(7) 1990 Mount Hope (UT) rate = 117 gpcd; State and Federal Jails rate = 228 gpcd.
(8) 2020 New Windsor (T) gpcd rate does not include the effect of projected Stewart Airport flow of 3.36 mgd.

in Orange County is shown in Table 8-6.

8.5 Summary

The use of up-to-date accurate planning information is vital to the development of a suitable approach towards sewage treatment and management in the County. This Chapter defines this planning information.

The refined planning projections addressed in this section and are summarized as follows:

Total County Population:

1990 - 316,400

2020 - 492,200

Percent Growth - 55.60%

Average Annual Growth - 1.85%

Sewered County Population:

1990 Sewered Population - 196,300

1990 Percent Population Sewered - 62%

2020 Sewered Population - 381,400

2020 Percent Population Sewered - 77%

Sewage Generation Rates and Quantities:

1990 Average Sewage Generation Rate - 124 gpcd

1990 County Sewage Flow - 30 mgd

2020 Average Sewage Generation Rate - 124 gpcd

2020 County Sewage Flow - 59 mgd

This data is used in the development, identification and evaluation of alternatives for sewage collection and treatment works in Orange County.

ORANGE COUNTY COMPREHENSIVE SEWERAGE STUDY

TABLE 8-6

Refined Orange County Sewage Production Projections: 1990-2020

Municipality	1990			2000			2010			2020		
	Sewered Population	Gallons/Person/Day	Average Flow, mgd	Sewered Population	Gallons/Person/Day	Average Flow, mgd	Sewered Population	Gallons/Person/Day	Average Flow, mgd	Sewered Population	Gallons/Person/Day	Average Flow, mgd
Blooming Grove												
Washingtonville (V)	4,500	76	0.34	5,900	84	0.50	7,400	92	0.68	9,000	100	0.90
Blooming Grove (UT)	4,000	100	0.40	6,100	100	0.61	8,700	100	0.87	11,600	100	1.16
Chester												
Chester (V)	3,200	113	0.36	3,680	119	0.43	4,100	124	0.51	4,500	130	0.59
Chester (UT)	2,900	77	0.22	5,400	85	0.46	8,400	92	0.78	11,900	100	1.19
Cornwall												
Cornwall on Hudson (V)	3,200	153	0.49	3,600	152	0.55	3,800	151	0.57	4,200	150	0.63
Cornwall (UT)	6,900	136	0.94	8,300	137	1.14	9,800	139	1.36	11,300	140	1.58
Crawford (T)												
Crawford (T)	1,800	60	0.11	2,300	67	0.15	2,800	73	0.21	3,400	80	0.27
Deerpark (T)												
Deerpark (T)	0	0	0.00	200	80	0.02	600	80	0.05	1,000	80	0.08
Goshen												
Goshen (V)	5,200	161	0.84	5,900	157	0.93	6,500	154	1.00	7,200	150	1.08
Goshen (UT)(T)	3,200	103	0.33	4,400	112	0.49	5,700	121	0.69	7,300	130	0.95
Greenville (T)												
Greenville (T)	0	0	0.00	200	80	0.02	400	80	0.03	800	80	0.06
Hamptonburgh (T)												
Hamptonburgh (T)	0	0	0.00	200	80	0.02	300	80	0.02	600	80	0.05
Highlands												
Highland Falls (V)	4,100	122	0.50	4,200	121	0.51	4,400	121	0.53	4,500	120	0.54
Highlands (UT)	1,000	50	0.05	1,400	60	0.08	1,600	70	0.11	1,800	80	0.14
West Point Academy	7,000	214	1.50	7,000	214	1.50	7,000	214	1.50	7,000	214	1.50
Middletown (C)												
Middletown (C)	25,500	185	4.72	27,300	187	5.10	29,200	188	5.50	31,000	190	5.89
Minisink												
Unionville (V)	0	0	0.00	100	100	0.01	200	100	0.02	300	100	0.03
Minisink (UT)	0	0	0.00	100	80	0.01	200	80	0.02	400	80	0.03
Monroe												
Harriman (V)	2,900	90	0.26	3,100	93	0.29	3,200	97	0.31	3,500	100	0.35
Kiryas Joel (V)	9,000	70	0.63	15,300	80	1.22	21,700	90	1.95	28,000	100	2.80
Monroe (V)	6,900	100	0.69	7,900	100	0.79	8,900	100	0.89	10,000	100	1.00
Monroe (UT)	2,000	100	0.20	3,600	100	0.36	5,800	100	0.58	8,400	100	0.84

ORANGE COUNTY COMPREHENSIVE SEWERAGE STUDY

TABLE 8-6

Refined Orange County Sewage Production Projections: 1990-2020

Municipality	1990			2000			2010			2020		
	Sewered Population	Gallons/Day	Average Flow, mgd	Sewered Population	Gallons/Day	Average Flow, mgd	Sewered Population	Gallons/Day	Average Flow, mgd	Sewered Population	Gallons/Day	Average Flow, mgd
Montgomery	2,700	94	0.25	3,000	96	0.29	3,200	98	0.31	3,500	100	0.35
Maybrook (V)	6,100	114	0.70	7,000	116	0.81	7,700	118	0.91	8,500	120	1.02
Walden (V)	3,000	101	0.30	3,500	101	0.35	4,000	100	0.40	4,500	100	0.45
Montgomery (V)	400	86	0.03	1,700	91	0.15	3,400	95	0.32	5,400	100	0.54
Montgomery (UT)												
Mount Hope	0	0	0.00	100	100	0.01	200	100	0.02	200	120	0.02
Otisville (V)	2,200	206	0.45	2,500	197	0.49	2,700	189	0.51	3,000	180	0.54
Mount Hope (UT)(2)												
Newburgh (C)	22,900	196	4.49	23,300	197	4.60	23,600	199	4.69	24,000	200	4.80
Newburgh (T)	8,800	166	1.46	13,700	167	2.29	19,500	169	3.29	26,300	170	4.47
New Windsor (T)	15,200	286	4.35	20,700	274	5.67	26,900	262	7.05	34,000	250	8.50
Stewart Airport	N/A	N/A	0.00	N/A	N/A	3.36	N/A	N/A	3.36	N/A	N/A	3.36
Port Jervis (C)	9,000	144	1.30	10,000	146	1.46	11,000	148	1.63	12,000	150	1.80
Tuxedo	1,000	57	0.06	1,100	71	0.08	1,200	86	0.10	1,200	100	0.12
Tuxedo Park (V)	600	67	0.04	1,100	78	0.09	1,500	89	0.13	2,000	100	0.20
Tuxedo (UT)	0	100	0.00	3,800	100	0.38	7,700	100	0.77	11,500	100	1.15
part Sterling Forest												
Walkkill (T)(3)	15,100	151	2.28	20,000	151	3.01	25,500	150	3.83	31,800	150	4.77
Warwick	2,500	112	0.28	3,000	111	0.33	3,500	111	0.39	4,000	110	0.44
Florida (V)	0	0	0.00	900	100	0.09	2,200	100	0.22	3,900	100	0.39
Greenwood Lake (V)	6,000	107	0.64	6,400	111	0.71	6,700	116	0.77	7,100	120	0.85
Warwick (V)	1,500	162	0.24	3,300	155	0.51	5,100	147	0.75	6,900	140	0.97
Warwick (UT)	0	100	0.00	2,500	100	0.25	5,100	100	0.51	7,600	100	0.76
part Sterling Forest												
Wawayanda (T)	500	75	0.04	1,600	100	0.16	3,000	100	0.30	4,800	100	0.48
Woodbury (T)	5,500	140	0.77	7,300	140	1.02	9,200	140	1.29	11,500	140	1.61
TOTALS (4)	196,300	154	30	252,600	163	41	313,600	159	50	381,400	155	59

NOTES: (1) Town of Goshen includes constant Orange County Home & Infirmary population of 1,400 people.
(2) Town of Mount Hope includes state and federal prison populations totaling 1,900 people.
(3) Town of Walkkill includes Goshen jail population of 1,800 people for years 2000-2020.
(4) Gallons per person per day is presented as a weighted average.