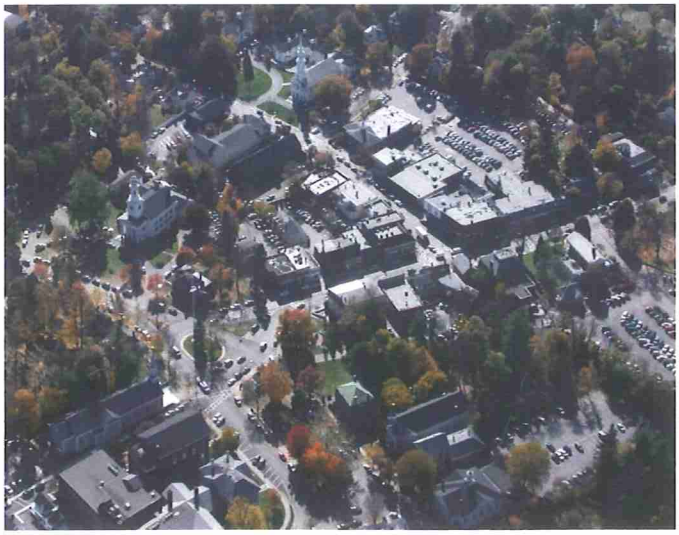
TOWN OF CONCORD, MASSACHUSETTS

WASTEWATER PLANNING TASK FORCE

SUMMARY REPORT

An Integrated Planning Initiative to supplement the findings of *The Status of Municipal Wastewater Treatment in Concord, MA*

FEBRUARY 2009



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EXECUTIVE SUMMARY

The Wastewater Planning Task Force (WWPTF) includes the Town Manager and representatives of the Board of Selectmen, the Planning Board and the Public Works Commission, as well as Town staff and citizen representatives. Driven by limited municipal wastewater capacity, the Task Force was called upon to better define potential development and land use changes in Concord in order to quantify how much additional municipal wastewater capacity might be needed in the future.

The WWPTF was created in February 2008 to provide guidance on the "Integrated Planning Initiative," an undertaking by Town staff to better coordinate planning goals with wastewater management in Concord. The Integrated Planning Initiative project team had previously evaluated the existing municipal wastewater system in Concord, which culminated in the creation of a report entitled, *The Status of Municipal Wastewater Treatment in Concord, MA, December 2007.* The main finding of this report was confirmation that inadequate municipal wastewater capacity exists to implement the recommendations of the *Comprehensive Long Range Plan* and the *Planned (Housing) Production Plan* while still meeting the goals of the 2004 Comprehensive Wastewater Management Plan.

The primary goal of the WWPTF was to establish an estimate of the future wastewater flow likely to require municipal management. To arrive at this estimate, the Task Force considered a variety of present and potential future sewer uses, using sound planning practices and previously determined town-wide goals. Table 1 summarizes the future flow projections developed by the Task Force.

Table 1: Summary of Future Wastewater Flow Projections

	Potential Flow Increases Under Existing Zoning	*Potential Flow Increases With Revised Zoning and Baker Ave. Sewered*
Future CWMP Phase (2, 3, and 4) Sewer Extensions	98,000 gpd	98,000 gpd
Village Center (VC) focus areas, sewered parcels [1]	61,000 gpd	233,000 gpd
Baker Avenue focus area, unsewered parcels [2]	-	57,000 gpd
Large Flow Sewer Users (infill) [3]	75,000 gpd	124,000 gpd
Other Non-Residential Infill [4]	20,000 gpd	20,000 gpd
Residential Infill [5]	22,000 gpd	22,000 gpd
Future Sewer Area Residential Infill [6]	44,000 gpd	44,000 gpd
Total	**320,000 gpd**	**598,000 gpd**

[1] Will require revised zoning in the Village Center areas to achieve the projected flow increase.

[2] Will require extension of sewer system to achieve the projected flow increase.

[3] Based on development information provided by individual entities and may require zoning revision to achieve the projected flow increase. The low range for this category was estimated at 60% of the total flow projection for large flow users.

[4] Based on projection of a historic 0.11% per year non-residential SIF flow increase over 20-years at the permitted WWTP discharge flow (1.2 mgd), reduced by build-out under existing zoning previously accounted for in this analysis.

[5] Based on a population increase of 5.25% over the 20 year planning period applied to the 2000 Census population in Concord and reduced to the sewered area (1/3 of the Town), 309 more people are expected to generate flow to the sewer. Flow value assumes 70 gpd/person.

[6] Based on potential subdivision/re-development of existing residential parcels in the sewer extension areas of future CWMP Phases.

The WWPTF planning process began with the evaluation of land uses and parcels with likely development potential within the areas of town presently connected to the municipal sewer

system. In addition, Baker Avenue/Baker Ave. Extension, which is presently largely unsewered, was added to this analysis. The analysis was then further refined to focus on targeted areas identified in the Town's recent Village Center Study: West Concord, Concord Center and the Thoreau Street/Sudbury Road neighborhood. A planning sub-committee was assigned to define redevelopment scenarios in these three neighborhoods in accordance with the general tenets outlined in the 2005 *Comprehensive Long Range Plan*, the *Recommendations for the Village Center Study,* and the principles of "smart growth." The Town's consultants created a model to generate wastewater flow values for present land-use, build-out under existing zoning, and at least one redevelopment scenario for each area as defined by the planning sub-committee. The estimated wastewater flow increases for the Village Center analysis areas are presented in **Figure 1** and are summarized in Table 1, above.

To supplement these flow projections, the Task Force performed public outreach to the current large-flow sewer system users. The purpose of this effort was two-fold: to present information on the Integrated Planning Initiative and to obtain input from these entities on anticipated future expansion needs and interests for their specific parcels. The parcels considered in this analysis and the associated future wastewater flow projections are also shown in **Figure 1** and summarized in Table 1.

Similarly, to ensure the longevity of flow projections over the 20-year planning period, the WWPTF estimated future infill flow projections within the existing sewer area and within future sewer extension service areas. The existing sewer area and locations of future phases are also shown on **Figure 1,** and the projected flow component is carried in Table 1.

As shown in Table 1, the future flow potentially requiring municipal wastewater management ranges from 320,000 to 598,000 gallons-per-day (gpd). The WWPTF concludes that this range is an appropriate estimate to use going forward, to be refined as alternatives are considered and as decisions are made as to which of the needs listed in Table 1 are to be served by the municipal wastewater system.

The final task for the Wastewater Planning Task Force is to identify wastewater management alternatives to accommodate the potential future flow. Alternatives to be considered include:

- A no build alternative (i.e., no expansion of wastewater capacity), which does not translate to 'no action' or 'no growth,'
- An increase to the current NPDES discharge permit at the existing Concord Wastewater Treatment Plant (WWTP),
- Supplemental groundwater discharge with treatment at the existing Concord WWTP,
- Construction of new neighborhood treatment system(s),
- Evaluation of use patterns and/or behaviors (i.e. demand management),
- Construction of a new municipal WWTP with groundwater discharge,
- Partnership(s) with private development(s) to serve municipal needs, and
- Seeking regional partnership(s).

Specific decisions regarding which alternative or combination of alternatives is most appropriate to meet the Town's future needs will be made in the next phase of this Integrated Planning Initiative, once public support is garnered.

1.0 BACKGROUND AND OBJECTIVES

1.1 INTEGRATED PLANNING INITIATIVE BACKGROUND

1.1.1 Integration of the CWMP and CLRP/PPP

The Town has been actively planning in relation to wastewater management and local growth/housing needs since 1998, via numerous citizen boards and committees. The Town of Concord's Integrated Planning Initiative was undertaken jointly by Concord Public Works (CPW) and the Department of Planning & Land Management (DPLM) to coordinate and align previous planning efforts. Specifically, this effort seeks to integrate differing goals and address future growth and development principles that were vetted in the following three planning efforts:

- The Comprehensive Wastewater Management Plan (CWMP), dated February 2004,
- The Planned Production Housing Plan (PPHP), dated June 2004, and
- The Comprehensive Long Range Plan (CLRP), dated March 2005.

To date, the Integrated Planning Initiative has helped to identify the disconnect in the implementation phases of these plans and initiate public review and input to clarify land use planning goals and quantify the associated wastewater flows. The integration process includes:

1. Documentation of the current status of the Town's wastewater management capacity;
2. Assessment and projection of potential re-development and new development throughout the Town; and
3. Development of an integrated planning policy based on the analysis of existing and projected conditions.

1.1.2 Development of *The Status of Municipal Wastewater Treatment in Concord, MA* document

To complete the first part of the integration process, CPW and the Town's consultants compiled and reviewed information from the CWMP. Data used to generate flows to the municipal system presented in the CWMP were supplemented to account for system expansion over the period of time that had elapsed since the previous planning phase (2003). The results and findings of this update and re-evaluation were published in the document titled, "*The Status of Municipal Wastewater Treatment in Concord, MA, December 2007.*"

This wastewater status report not only documents the '2007 State of the Union' for wastewater management in town, but also evaluates historic flows and trending to the existing sewer/treatment system to better quantify capacity constraints and flow allocations. Additionally, the municipal wastewater status report generally identifies possible

wastewater management alternative solutions should the Town decide such options should be explored.

The principle finding of this wastewater status review effort was that insufficient capacity currently exists at the Concord WWTP to meet future flow allocations for continued CWMP Recommended Plan implementation. Furthermore, no capacity exists for potential flow increases from redevelopment of parcels or reuse of existing buildings currently connected to the existing sewer system (including much of the Village Center areas), and no capacity was identified expressly for affordable housing initiatives.

To effectively manage the apparent disconnect between the aforementioned planning activities, *The Status of Municipal Wastewater Treatment in Concord* document posed five questions to help scope the next phase of the Integrated Planning Initiative:

1) How much wastewater flow is associated with the desired development or redevelopment of areas identified in the PPHP and CLRP?
2) For what portion of this flow can and will the Town provide municipal wastewater management options?
3) In what time frame is this new, municipally-handled flow anticipated to be generated?
4) How will the Town fund design and construction costs associated with any future wastewater management solutions?
5) Which areas that are currently under-serviced have the highest value to the Town in terms of sustaining continued economic growth through redevelopment and housing production?

1.1.3 Creation of the Task Force

In an attempt to broaden the discussion and help answer the five questions above, the Board of Selectmen called for the development of a Wastewater Planning Task Force (WWPTF). The WWPTF was assembled in February 2008 and includes the Town Manager and representatives of the Board of Selectmen, the Planning Board and the Public Works Commission, as well as Town staff and citizen representatives.

1.2 TASK FORCE GOALS & OBJECTIVES

The WWPTF has been working to accomplish the following objectives:

- Provide guidance and town perspective on zoning-related build-out analyses.
- Answer the 5 questions posed in the wastewater status document.
- Guide the continuing integration process.
- Provide a public forum for vetting of the integration process.
- Be liaisons to associated boards/commissions to communicate the results and impacts of the integrated planning project.
- Prepare recommendations for Town Meeting action.

2.0 INTRODUCTION

2.1 MUNICIPAL WASTEWATER STATUS SUMMARY

Wastewater management for property owners within the Town of Concord is accomplished in one of two ways: on-site (typically with septic systems) or off-site (typically with sewers to the town wastewater treatment plant). Approximately two-thirds of property owners treat and dispose of their wastewater within their own property. Most of these on-site systems are basic septic systems generally consisting of a septic tank and a soil absorption system or leaching field. A handful of properties subjected to more intense usage and higher flows use advanced privately owned and operated systems, consisting of equipment and processes to treat the wastewater, with discharge still occurring on-site.

The remaining one-third of town, generally the town centers where development is on smaller lots, is connected to the centralized sewer system and disposes of its wastewater at the Concord Wastewater Treatment Plant (WWTP) with a surface water discharge of treated effluent to the Concord River.

On-site systems have various individual limiting factors, but control of these on-site limitations is beyond the jurisdiction of the town. Alleviating limitations within the municipal centralized system, however, is the responsibility of the town, working within the framework of regulatory constraints and technological feasibility. Therefore, the focus of the integrated planning has been on capacity issues related to the centralized system.

2.1.1 Current Wastewater Flows

The Concord WWTP is presently limited to treating and discharging 1.2 million gallons per day (mgd) by the Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MA DEP) in the facility's National Pollutant Discharge Elimination System (NPDES) permit.

Currently, the Concord WWTP is receiving an annual average daily flow of approximately 1.16 mgd (see **Figure 2** below). Projected flows from properties already sewered, along with committed flow from properties previously bettered and approved for connection since the completion of the CWMP in February 2004, will cause total flows to reach the maximum discharge permit limit of 1.2 mgd. Table 2 of *The Status of Municipal Wastewater Treatment in Concord, MA, December 2007* provides a detailed breakdown of wastewater flow allocations through 2007.

Figure 2: Concord WWTP Effluent ADF & Rolling Average Trending May 2004 through December 2008

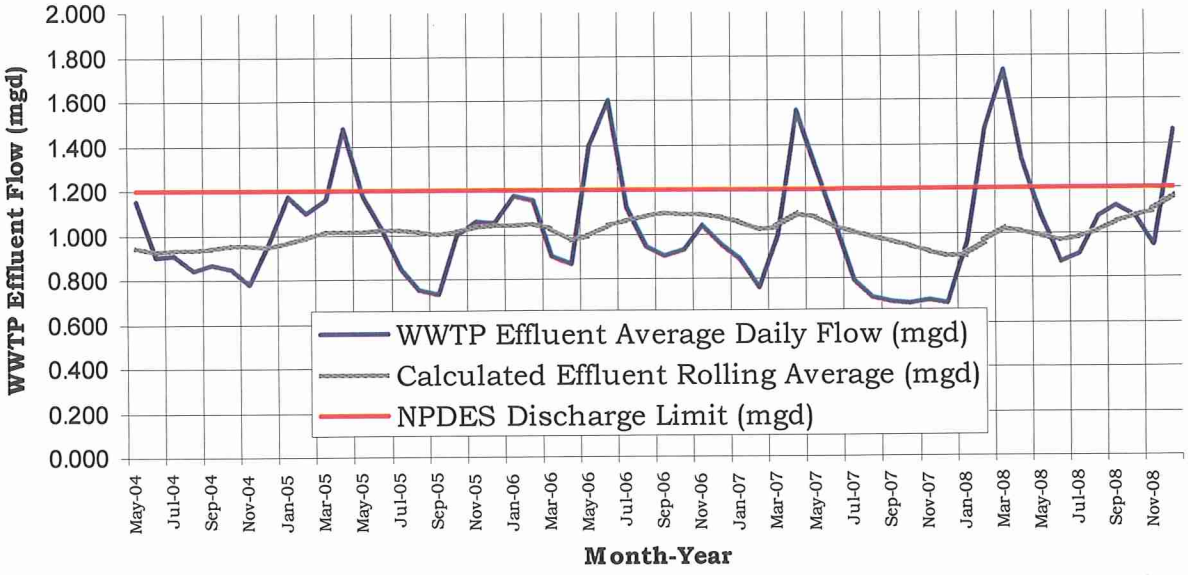

Figure 2: Concord WWTP Effluent & Rolling Average Trending, May 2004 through December 2008 provides an updated depiction of the recent flow variations at the Concord WWTP.

2.1.2 Anticipated Future Wastewater Flow Contributors

Future wastewater flow increases are anticipated from three distinct sources:

1. Recommended sewer extension to existing homes with inadequate on-site systems, as identified in the CWMP (Phases 2, 3, and 4),
2. Redevelopment of properties that are currently connected to the centralized sewer or have frontage along a sewer main that may petition for a connection, and
3. New development of parcels that are currently vacant and have frontage along a sewer main that may petition for a connection.

The amount of flow from the future implementation of CWMP Phases 2 (sewer connection portion), 3 and 4 has been estimated at 98,000 gallons per day (gpd). Based on the current flow data for the Concord WWTP, there is not adequate discharge capacity to accommodate these additional flows. The CWMP described that capacity needed to accommodate planned flows from these future phases required the removal of extraneous inflow/infiltration (I/I) commensurate with the added flows from sewer extensions. Since the CWMP was completed, however, further analysis of the sewer system has led to the conclusion that only a portion of the Phase 2 through Phase 4 flows could be offset using

I/I removal. The December 2007 *Status of Municipal Wastewater* report concluded that only 20,000 to 45,000 gpd of I/I could be cost-effectively removed.

Approximately 50,000 gpd of capacity was allocated for infill development (expansion of existing uses) in the sewered areas over the 20-year CWMP planning period. This value was derived from a projected town-wide population growth of 5.25% – a conservative estimate in light of the recorded residential growth of just 3% in Concord between 1970 and 2001. Recent development and redevelopment in the existing sewered area has been greatly accelerated in comparison to planning assumptions included within the CWMP, effectively consuming the entire 20-year allocation. No remaining capacity exists for future development, redevelopment, or expansion.

2.2 LAND USE PLANNING

The Town's 2005 Comprehensive Long Range Plan (CLRP) is the community's comprehensive policy guide and planning tool through the year 2020. The result of numerous public meetings and workgroup sessions, the three-year planning process identified short and long-term goals and laid out steps to implement these goals that would help achieve a shared planning vision for the Town's future. Although all of the goals reflect a desire to protect the Town's unique and historic character, the plan also includes measures to generate revenue and increase economic opportunities to ensure that the Town can continue to meet its fiscal obligations and ensure a comfortable standard of living for all residents. Preservation of significant natural resources and open spaces was therefore balanced with the need to encourage new growth in already developed areas. While the CLRP did indicate a need to plan for additional wastewater management capacity, it did not quantify the additional capacity that would be needed to accommodate proposed new residential and non-residential growth.

A couple of years have passed since the completion of the CLRP effort. In that time, various projects and proposals have been brought before the Town involving significant site development and re-development. The Town has also updated the build-out projections and began implementation of various initiatives from the CLRP. These efforts factor into the wastewater flow estimations described in Section 3, below.

Planned Production Housing Plan

In addition to the CLRP, the Town's Planned Production Housing Plan (PPHP) assessed current and future housing demand, supply, cost and affordability in order to identify potential gaps in the supply of housing for individuals and households of a variety of incomes. One of the key considerations for a community in completing a PPHP is to identify solutions to set aside 10% of its year-round housing for low and moderate income residents. Concord has only recently met the State's requirement to provide 10% of the housing stock to low and moderate income residents, with the approval of the 350-unit rental project in the southwest corner of town. However, the provision of affordable housing units located in or close to the village centers where there is access to public transportation and services is still a goal of the CLRP and the PPHP. Additionally, the number of affordable housing units required is based on the ten-year census of housing units, so as the number of housing units increases so, too, does the required number of affordable housing units. Incorporated into the CLRP, the PPHP outlined strategies

for increasing the mix of housing options in the community and identified specific areas with housing growth potential. The PPHP identified the Town's housing goals as increasing the variety of housing to serve the needs of all of the Town's residents, providing a stock of affordable housing that meets the state-mandated goal of 10%, and following Smart Growth principles that support the character of Concord.

Smart Growth principles include the integration of mixed land uses into communities as a critical component of achieving better places to live; the provision of quality housing for people of all income levels that are integrated into places where people can live, work, learn, and play; more compact building design as an alternative to conventional, land consumptive development; directing development towards existing communities already served by infrastructure, seeking to utilize the resources that existing neighborhoods offer while conserving open space and irreplaceable natural resources on the urban fringe; and providing people with more choices in housing, shopping and transportation.

Village Centers

One of the goals of the CLRP is to maintain and enhance the character of the Town's village centers. After the completion of the CLRP, the Town Planning Board formed a Village Center Committee to develop the vision that would provide a framework for defining future zoning amendments and design guidelines for the three village center areas – Concord Center, the Thoreau Street/Sudbury Road area, and West Concord. With the assistance of The Cecil Group, the Committee prepared a report of recommendations in December 2007, entitled *Recommendations for the Village Center Study*. These recommendations covered a wide range of issues addressing economic viability of the centers, affordable housing, architectural design, open space and natural features, as well as infrastructure impacts (including wastewater capacity). Some of the recommendations from the study are listed below:

West Concord

- Consider zoning changes to support village scale and a mix of uses along Main St / Commonwealth Ave.
- Plan for expansion and redevelopment of a mix of uses (village scale) in underutilized areas – Bradford Street, Beharrell Street, Winthrop Street/Foundry area.

Concord Center

- Encourage more restaurants.
- Create incentives for a mix of retail uses on the ground floor.
- Allow shared parking and a mix of commercial uses (retail and office).
- Study the feasibility of a new mixed use area at the Keyes Road / Lowell Road intersection – encourage uses that support and complement the existing mix of uses (retail, restaurants, office, residential), examine redevelopment of Town property, develop the Keyes Road parking lot with structured parking and a mix of uses.

Thoreau Street/Sudbury Road Area

- Consider zoning changes to attract new businesses (including restaurants and local services)
- Allow and encourage mixed use redevelopment of existing commercial areas

- ❖ Study the feasibility of redevelopment of the Sudbury Road (Crosby's) commercial area (includes parcels easterly of Sudbury Road between the commuter rail and Grant Street), to include a parking deck or garage, increased density to encourage mixed use, and a grocery store.

Based on these recommendations, the CLRP goals, and the PPHP guidance, the Wastewater Planning Task Force identified different future scenarios for these three areas. Using this information, a sub-group comprised of the Department of Land Management staff and representatives from the Planning Board and the Village Center committee (also on the WWPTF) identified properties within the three areas where there were a variety of existing uses that generated different wastewater quantities or where development or redevelopment potential had been identified and formed focus areas. The sub-group noted that restaurant uses, food preparation-oriented uses, personal care services (barber shops, hair salons, day spas) and laundromats have a greater demand for wastewater capacity, while certain office uses have a lower wastewater demand. Defining an area with a mix of uses was important to understand the existing conditions. The consultant (Taintor & Associates) then applied different build-out scenarios as summarized below.

To reiterate, no capacity allocation at the WWTP currently exists for future development, redevelopment, or expansion in the village centers. The Integrated Planning Initiative is intended to coordinate Town policies that will allow for sufficient wastewater management capacity creation to sustain short and long-term housing and economic development goals. Quantification of the potential future capacity that may be needed is discussed in the next section of this report.

3.0 QUANTIFYING THE WASTEWATER NEED

Calculation of the amount of wastewater flow anticipated from potential future redevelopment and new development is much more involved than that for existing homes. The quantity of wastewater flow produced by a property is dependent on the type and density of land use. Therefore, in order to most accurately project what wastewater flows might result from development and/or re-development, a specific future land use and density must be assumed for each parcel included in the analysis.

Since major planning themes and recommendations had previously been established in the *Recommendations for the Village Center Study*, the three Village Center (VC) areas were selected for initial detailed evaluation in this planning initiative phase. Once the VC areas were analyzed and flows were generated, a public outreach meeting was hosted by the Wastewater Planning Task Force followed by individual direct contact to gain supplemental information from existing large-flow sewer users. As a final step in the future wastewater quantification process, assumptions were made to estimate additional infill growth and associated wastewater increases within other areas of the existing and future sewer system limits.

3.1 VILLAGE CENTER BUILD-OUT ANALYSES

The VC areas include West Concord, Concord Center and the Thoreau Street/Sudbury Road area. In addition, properties along Baker Avenue were included in the West Concord area assessment because of their potential for additional development or expansion of existing uses, despite being largely unsewered at the present time. The build-out analysis conducted for this integrated planning initiative included: identification of parcels within each VC area that had anticipated development potential, review of existing development density and land use for those parcels, determination of their build-out potential under existing zoning, and quantification of their development potential under specified revised zoning scenarios. Detailed discussion of this process and its results for each VC area follow.

It should be noted that this build-out analysis very generally accounts for a percentage of each parcel to be reserved for parking, access and open areas. No detailed analysis of site considerations, traffic impacts, environmental impacts or utilities was performed for this planning exercise. Therefore, the analysis describes development potential that could only occur if none of those items were constraints.

3.1.1 West Concord Focus Area

Based on the goals of the CLRP and the PPHP and the recommendations outlined in the *2008 Village Center Study* report, with additional input received from the Wastewater Planning Task Force, forty-two (42) parcels were identified within this West Concord (WC) focus area as having development or re-development potential.

Build-out under existing zoning provided an estimate of nonresidential floor area and residential units if each parcel were built-out to its current allowable capacity. The

formula used to calculate these estimates was based on the current dimensional regulations for each zoning district. Details of this analysis are provided in **Attachment A1**.

Build-out under existing zoning for the WC focus area projected a decrease in the number of residential units from 17 to 12 units. This projected decrease was based on the assumption that existing residential uses in non-residential zoning districts would likely be converted to nonresidential uses. Nonresidential area was projected to increase by 147% (from approximately 850,000 square feet to almost 2.1 million square feet).

Build-out under revised zoning considered four different scenarios for future land uses in the WC focus area, assuming that the zoning was revised.

Scenario 1

- Allowed moderate density multi-family residential development along Bradford Street and a portion of the MA Department of Corrections property;
- A mix of uses (75% nonresidential, 25% residential), height of 3 stories (35 feet), maximum lot coverage of 75%, minimum open space of 10%, and minimum area per unit of 2,000 square feet for all remaining properties in the proposed Village Overlay District.
- No change to existing zoning for the Baker Avenue area.

Scenario 1 projected an increase of 266 residential units and a 114% increase in nonresidential floor area for the WC focus area compared to present conditions. The greatest change was an addition of 194 residential units on the Department of Corrections property (see the note at the end of Scenario 4) and an increase of over 860,000 square feet in the Bradford Street area. In addition, the Beharrell Street properties are projected to more than double the nonresidential floor area (adding over 128,000 square feet) and the Department of Corrections property has the potential to add over 175,000 of new nonresidential floor area.

Scenario 2

- Construction of a new fire station on the MA Department of Corrections property along with multi-family residential units;
- Conversion of the existing fire station in the West Gate Park area to a restaurant;
- A mix of uses (75% nonresidential, 25% residential) for all remaining properties in the proposed Village Overlay District;
- No change to existing zoning for the Baker Avenue area.

Scenario 2 projected an increase of 222 residential units and a 122% increase in nonresidential floor area for the WC focus area. Relocating the fire station did not impact the resulting build-out projections significantly.

Scenario 3

- Allowed moderate density multi-family residential development along Bradford Street and a portion of the MA Department of Corrections property;

- Dimensional regulations were adjusted for all remaining properties in the proposed Village Overlay District;
- A mix of uses for the 6 properties located on Beharrell and Bradford Streets (50% nonresidential and 50% residential);
- A mix of uses for the other 16 properties in the Village Overlay District (75% nonresidential, 25% residential);
- No change to existing zoning for the Baker Avenue area.

Scenario 3 projected an increase of 247 residential units and a 115% increase in the nonresidential floor area.

Scenario 4

- Same as Scenario 3, except that the height limit for the Beharrell and Bradford Street properties was increased from 3 stories to 4 stories.

Scenario 4 projected an increase of 251 residential units and a 116% increase in the nonresidential floor area for the WC focus area.

The number of units defined for the Department of Corrections land is based on the 1987 promise by Walden Woods Project to find an alternative site for 42 units of affordable housing and an assumption that the proposed development would be done as a 40B comprehensive permit, where only 25% of the units are required to be affordable. If the project were developed in a different manner, then the number of residential units could be significantly fewer under any of the four scenarios described above.

3.1.2 Concord Center Focus Area

Again based on the goals of the CLRP and the PPHP and the recommendations outlined in the 2008 Village Study Report, with additional input received from the Wastewater Planning Task Force, 11 parcels were identified within the Concord Center (CC) focus area as having development or re-development potential.

Build-out under existing zoning provided an estimate of nonresidential floor area and residential units if each parcel were built-out to its current allowable capacity. The formula used to calculate these estimates was based on the current dimensional regulations for each zoning district. Details of this analysis are provided in **Attachment A2**.

Build-out under existing zoning showed no new residential units and an increase of 109,000 square feet in nonresidential floor area within the CC focus area.

Build-out under revised zoning considered the impact on future land uses assuming zoning were altered for the CC focus area as follows.

Scenario 1

- Mix of residential and non-residential (50% residential, 50% nonresidential) for Lowell Road properties.
- It was assumed that all parking for Lowell Road would be surface parking and all of it would be accommodated on-site.
- 90% maximum lot coverage (building and parking) for Keyes Road and Main Street parcels. It was assumed that all land uses would be commercial (mostly small retail).
- Based on the recommendation of the Wastewater Planning Task Force and the 2008 Village Study Report, it was also assumed that one floor of structured parking would be located under buildings for the Keyes Road and Main Street parcels, and the remaining parking would be surface. This translates into 60% lot coverage for surface parking and 30% lot coverage for building area.

Buildout under revised zoning projected an increase of 177 new residential units and an addition of 245,000 square feet of nonresidential floor area for the CC focus area.

3.1.3 Thoreau Street/Sudbury Road Focus Area

Based on the goals of the CLRP and the PPHP and the recommendations outlined in the 2008 Village Study Report, with additional input received from the Wastewater Planning Task Force, 6 parcels were identified within the Thoreau Street/Sudbury Road (TS) focus area as having development or re-development potential.

Build-out under existing zoning provided an estimate of nonresidential floor area and residential units if each parcel were built-out to its current allowable capacity. The formula used to calculate these estimates was based on the current dimensional regulations for each zoning district. Details of this analysis are provided in **Attachment A3**.

Where there is currently one restaurant at 195 Sudbury Road, build-out under existing zoning assumed an addition of one restaurant of the same size (approximately 6,000 square feet seating 200 people) as well as small retail and service uses for the remainder of the property.

Build-out under existing zoning projected an additional 69,000 square feet of nonresidential area and no new residential units for the TS focus area.

Build-out under revised zoning considered the impact on future land uses assuming zoning were altered for the focus area based on the following two scenarios.

Scenarios 1
- A mix of residential and nonresidential uses (25% residential and 75% nonresidential)
- 50% of the required parking would be structured parking and 50% surface parking

Scenario 2:
- A mix of residential and nonresidential uses (50% residential and 50% nonresidential)
- 50% of the required parking would be structured parking and 50% surface parking

For both of these scenarios, types of uses were assumed to include small grocery, retail, office, residential and two restaurants. Based on the recommendation of the Wastewater Planning Task Force, not all of the parking would be accommodated on-site (approximately 76% of the parking would need to be located off-site if the entire site was built out to 50% building coverage). The remainder of the parking could be handled through shared parking, parking waivers, or additional structured parking.

Scenario 1 for the TS focus area resulted in an addition of 83 residential units where no residential units currently exist and Scenario 2 resulted in 169 new residential units. The nonresidential area quadrupled under Scenario 1 (adding 242,000 square feet) and added 140,000 square feet under Scenario 2.

3.2 WASTEWATER FLOW PROJECTIONS FOR VILLAGE CENTER AREAS

Once the future land use and build-out projections were completed for the Village Center focus area parcels, wastewater flows associated with the potential development/redevelopment were generated.

In order to form a consistent basis for comparison between areas and scenarios, a Title 5 (Massachusetts 310 CMR 15.203, The State Environmental Code) calculation basis was used to estimate future wastewater flows for the various land use data presented in the build-out analyses. A spreadsheet model was created to standardize the calculation of wastewater flow.

3.2.1 West Concord Focus Area Flow Projections

The West Concord (WC) focus area (42 parcels) is unique in that while many of the parcels considered in this analysis are connected to the existing municipal sewer system, several parcels identified along Baker Avenue (all except #300 Baker Avenue) are <u>not</u> connected to the existing municipal system. The flow projections for this area were, therefore, segregated as municipal or on-site wastewater discharge.

Sewered WC Focus Area Parcels: Detailed calculations of the wastewater projections for West Concord are included in **Attachment B** as **Tables WC-1** through **WC-7**. Current wastewater flow to the municipal sewer system attributed to present land-use (17 residential units and approximately 850,000 square feet of non-residential space) is approximately 49,500 gallons per day (gpd).

Flow projections for the build-out under existing zoning for the sewered parcels in this focus area result in a net increase to the municipal sewer system of 27,000 gpd. It is important to note that while this value is not extremely high, no zoning changes need to occur

Sewered WC focus area
Build-out under Existing Zoning

- 5 units Residential
+ 1.2 million square feet Non-Residential

for this development to happen. No capacity allocation for these potential flow increases exists in the municipal system, therefore infrastructure constraints are a major limiting factor to development even under zoning currently in effect. Wastewater flow increases for the WC focus area under existing zoning are depicted in **Figure WC-1**.

Sewered WC focus area

Scenario 1 Zoning
+266 units Residential
+257,000 square feet Non-Residential

Scenario 2 Zoning
+222 units Residential
+324,000 square feet Non-Residential

Scenario 3 Zoning
+247 units Residential
+264,000 square feet Non-Residential

Scenario 4 Zoning
+241 units Residential
+270,000 square feet Non-Residential

The redevelopment scenarios analyzed would add a significant residential component (+245 average residential units) to this focus area, which currently has predominantly commercial/industrial land uses. A fair amount of commercial space (+280,000 average square feet) would also be added under these redevelopment scenarios. Residential development generates a higher wastewater flow than most non-residential development (excluding restaurants and other water intense uses). The redevelopment scenarios considered for the sewered parcels in this focus area result in net increases to the municipal sewer system ranging from 98,000 gpd (Scenario 2) to 109,000 gpd (Scenario 1). Zoning revisions would need to be approved by Town Meeting before this type and density of redevelopment could occur, so infrastructure constraints are not the only limiting factor to development under these scenarios. Wastewater flow increases for the WC focus area under revised zoning Scenario 1 (worst case) are depicted in **Figure WC-2**.

Unsewered WC Focus Area Parcels: Detailed calculations of the wastewater projections for the unsewered portion of the Baker Avenue area are included in **Attachment B** as **Tables WC-8** and **WC-9**. Current total wastewater flow to the on-site systems (which are independently owned and operated) attributed to present land-use (0 residential units and approximately 209,000 square feet of non-residential space) is approximately 16,000 gpd on a Title 5 basis.

Unsewered WC focus area
Build-out under Existing Zoning

0 units Residential
+ 709,000 square feet Non-Residential

Flow projections for build-out under existing zoning for the unsewered parcels in this focus area result in a net increase to the municipal sewer system of 41,000 gpd. Again, no zoning changes need to be approved for this build-out to occur, however on-site system constraints would have to be eliminated. No zoning alternative scenarios were considered for the Baker Avenue area.

If the unsewered portion of Baker Avenue were allowed to connect to the municipal system, approximately 16,000 gpd of flow (from existing land uses) plus potentially 41,000 gpd from build-out under existing zoning (for a total of approximately 57,000 gpd of potential new flow) could be added to the municipal system.

3.2.2 Concord Center Focus Area Flow Projections

The Concord Center (CC) focus area (11 parcels) is a more typical planning area, as all of the parcels considered in this analysis are connected to the existing municipal system. The flow projections for this area, therefore, are entirely tributary to the municipal wastewater system.

Detailed calculations of the wastewater projections for Concord Center are included in **Attachment B** as **Tables CC-1** through **CC-4**. Current wastewater flow to the municipal sewer system attributed to present land-use (1 residential unit and approximately 66,000 square feet of non-residential space) is approximately 4,500 gpd (on a Title 5 basis).

CC focus area
Build-out under Existing Zoning

0 units Residential
+ 109,000 square feet Non-Residential

Flow projections for build-out under existing zoning for the parcels in this focus area result in a net increase to the municipal sewer system of 6,000 gpd (more than double the current uses' flow). It is again important to note that while this value is fairly low, no zoning changes need to occur for this development to happen. Similar to the West Concord focus area, no capacity allocation for these potential flow increases exists in the municipal sewer system, therefore infrastructure constraints are a major limiting factor to development even under zoning currently in effect. Wastewater flow increases for the CC focus area under existing zoning are depicted in **Figure CC-1**.

The single redevelopment scenario analyzed would add a significant residential component to this focus area, which currently has predominantly commercial/public services land uses. The redevelopment scenario considered for this focus area results in a net increase to the municipal sewer system of 70,000 gpd. Zoning revisions would need to be approved by Town Meeting before this type and density of redevelopment could occur. Infrastructure constraints are therefore not the only limiting factor to development under this scenario. Wastewater flow increases for the CC focus area under revised zoning Scenario 1 are depicted in **Figure CC-2**.

CC focus area
Scenario 1 Zoning

+177 units Residential
+ 246,000 square feet Non-Residential

3.2.3 Thoreau Street/Sudbury Road Focus Area Flow Projections

The Thoreau Street/Sudbury Road (TS) focus area (5 parcels) is similar to Concord Center in that all of the parcels considered in this analysis are connected to the existing municipal system. The flow projections for this area, therefore, are entirely tributary to the municipal wastewater system.

Detailed calculations of the wastewater projections for TS focus area are included in **Attachment B** as **Tables TS-1** through **TS-5**. Current wastewater flow to the municipal sewer system attributed to present land-use (0 residential units and approximately 59,000 square feet of non-residential space) is approximately 10,600 gpd on a Title 5 basis.

Flow projections for build-out under existing zoning for the parcels in this focus area result in a net increase to the municipal sewer system of 28,000 gpd (more than double the current uses' flow from only 5 parcels). It is again important to note that no zoning changes need to occur for this development to happen. Similar to the other focus areas, no capacity allocation for these potential flow increases exists in the municipal system, therefore infrastructure constraints are a major limiting factor to development even under zoning currently in effect. Wastewater flow increases for the TS focus area under existing zoning are depicted in **Figure TS-1**.

TS focus area
Build-out under Existing Zoning

0 units Residential
+ 69,000 square feet Non-Residential

Two redevelopment scenarios were analyzed for this focus area, which currently has predominantly commercial land uses.

Redevelopment Scenario 1 would result in a net increase to the municipal sewer system of 32,000 gpd. Wastewater flow increases for the CC focus area under revised zoning Scenario 1 are depicted in **Figure TS-2**.

TS focus area
Scenario 1 Zoning

+83 units Residential
+ 243,000 square feet Non-Residential

TS focus area
Scenario 2 Zoning

+169 units Residential
+ 142,000 square feet Non-Residential

Redevelopment Scenario 2 would result in a net increase to the municipal sewer system of 55,000 gpd.

Zoning revisions would need to be approved by Town Meeting before this type and density of redevelopment could occur, so infrastructure constraints are not the only limiting factor to development under this scenario.

3.2.4 Total Village Center Focus Area Flow Projections

The estimated maximum projected wastewater flow increases for the Village Center area parcels included in this analysis are presented in **Figure 1**.

Consideration of the estimated maximum wastewater flow contribution generated under this analysis from each of the currently sewered parcels in Village Center areas results in a total additional flow of over 233,000 gpd to the existing sewer system.

Table 1: Village Center Areas Maximum Future Flow Projections	
Focus Area (maximum flow scenario)	***Projected Flow Increase to the Municipal System***
West Concord, sewered parcels (Scenario 1)	108,600 gpd
Concord Center (Scenario 1)	69,700 gpd
Thoreau St./Sudbury Rd. (Scenario 2)	55,200 gpd
Total	**233,500 gpd**

The unsewered Baker Avenue area would contribute an estimated additional 57,000 gpd of new flow to the municipal system, if it were allowed to connect. If this connection were to occur, the total additional flow contribution from the redeveloped Village Center focus areas to the existing sewer system would be over 290,000 gpd.

3.3 LARGE FLOW SEWER USER OUTREACH

Sewer flows can be greatly impacted by changes to existing sewer users. Such a change-in-use is precisely how the approximately 50,000 gpd day set aside for infill under the CWMP (as previously noted) has been consumed. To supplement the flow projections in this analysis, and not be shortsighted regarding future wastewater management needs within the existing sewer area, the Wastewater Planning Task Force requested staff perform public outreach to identified large-flow sewer system users. Town staff identified the largest exsting sewer customers by looking at historic water metering data and targeting those users with consistent high flow values for further public outreach.

The public outreach effort included invitation to a public meeting and subsequent phone conferences, e-mail correspondence or individual meetings with large-flow municipal sewer users. The purpose of the outreach was two-fold, 1) to present information on the Integrated Planning Initiative and 2) to obtain input from these entities on anticipated future expansion needs and interests for their specific parcels. The large users contacted are shown in red on **Figure 1**.

Based on the feedback received from those users, a composite flow value was determined for inclusion in this planning process. Where users were uncertain about their potential flow

changes, and their parcels were not included in the initial build-out analysis, build-out under existing zoning was used to determine potential future flows. As a result, the aggregate future wastewater flow estimated for the large users is 124,000 gpd. Since some of the development interests of the large users would require zoning changes, 60% of this value was used as the lower end of the range of potential flow increases from these parcels, amounting to 75,000 gpd.

3.4 SUMMARY OF FUTURE WASTEWATER FLOW NEEDS

Future wastewater flow increases to the municipal sewer system are anticipated from the following potential sources:

- Extension of sewer to future CWMP Phases.
- Development/re-development of the Village Center areas.
- Development/re-development of existing sewer customers (large flow users or other infill sources).

Previous sections of this report have quantified projected flows for most of these sources. Those projections are summarized below, along with some detail on remaining infill projections.

If current zoning regulations/bylaws are revised to conform to the assumptions of the build-out analyses included herein, and parcels considered in this analysis are developed under the revised zoning, somewhere between 200,000 gpd to 233,000 gpd of additional flow may be expected in the municipal system. An additional 124,000 gpd could also be added by further development by existing large sewer users.

If the town decides to extend sewer service to the unsewered parcels in the Baker Avenue area, approximately 57,000 gpd of additional flow may be expected in the municipal system.

Miscellaneous infill development within the existing sewered area is difficult to predict, albeit an important component of future flow projections. To conservatively approximate this number for the planning period (20-years), we have applied the following approach: Detailed analysis of potential large infill contributors (Village Center areas and existing large flow users) was performed to identify the most significant flow increases to the sewer system, as described previously in this report. Next, an approximate flow for the remaining non-residential sewer users was calculated using a projection based on historic increases tracked by the Sewer Improvement Fee (SIF) system. The final component of infill flow was the residential component; this value was calculated using a population increase basis assigned to the residential percentage of the sewered area.

The Sewer Improvement Fee (SIF) system provides a tracking of sewer flow additions to the existing Concord sewer system using a Title 5 basis. Though the SIF listing does not specifically designate residential versus non-residential uses, this division was estimated based on flow value and billing information. For fiscal year 2007 and 2008, the total SIF flow increases were compared to WWTP average daily flows for those periods to estimate an average annual percentage increase. For the non-residential component, that average annual percentage increase was applied to the permitted WWTP flow (1.2 mgd) for the 20-year planning. The resulting flow

projection was approximately 26,000 gpd of increased non-residential flow. However, previous analyses completed as part of this project have accounted for some of this future flow. Reducing this SIF projection by the ratio of number of parcels previously considered in the VC analysis (55 parcels) to the total number of non-residential billing customers (254 parcels) results in a non-residential infill projection of approximately 20,000 gpd.

Application of the SIF basis to the residential component results in 89,000 gpd of increased residential flow. Build-out under existing zoning for the Village Center areas did not include any residential additions, however, development under revised zoning scenarios did project residential flow increase to the predominantly commercial areas. It is therefore somewhat duplicative to add the 89,000 gpd increase to the future flow projections.

For comparison, a second method of calculation was applied to the residential infill component based on population increase in the sewered area. A conservative historic Concord population increase value of 5.25% over a 20-year period was used in the CWMP to calculate total (residential and non-residential) projected infill. Using a similar projection for only the residential component of the sewered area (which correlates more closely to population) yields an associated infill wastewater flow of approximately 22,000 gpd (using a per capita flow generation, rather than Title 5). This calculated value is more appropriate to carry for residential development in addition to the Village Centers and existing large flow users, as it is less duplicative.

This infill projection analysis focused on the existing sewer area, however, as future sewer extension phases of the CWMP Recommended Plan are implemented, this focus area must be expanded. A member of the WWPTF reviewed the future CWMP sewer extension areas and generated an additional residential infill flow value of 44,000 gpd that would address potential subdivision of lots that are recommended to be sewered in the future CWMP phases, should future *Concord Sewer Rules & Regulations* allow for connection of subdivided lots.

Table 3, below, summarizes the anticipated future flow increase ranges from the various sources outlined above. The lower end of the range reflects potential flow increases that could be seen with completion of the CWMP sewer extension phases but no changes to existing zoning. The upper end of the range shows the calculated maximum flow potential associated with the sewer extensions plus the zoning changes described above, as well as connection of the Baker Avenue area to the sewer system.

Table 3: Summary of Future Wastewater Flow Projections		
	Potential Flow Increases Under Existing Zoning	*Potential Flow Increases With Revised Zoning and Baker Ave. Sewered*
Future CWMP Phase (2, 3, and 4) Sewer Extensions	98,000 gpd	98,000 gpd
Village Center (VC) focus areas, sewered parcels [1]	61,000 gpd	233,000 gpd
Baker Avenue focus area, unsewered parcels [2]	-	57,000 gpd
Large Flow Sewer Users (infill) [3]	75,000 gpd	124,000 gpd
Other Non-Residential Infill [4]	20,000 gpd	20,000 gpd
Residential Infill [5]	22,000 gpd	22,000 gpd
Future Sewer Area Residential Infill [6]	44,000 gpd	44,000 gpd
Total	**320,000 gpd**	**598,000 gpd**

[1] Will require revised zoning in the Village Center areas to achieve the projected flow increase.

[2] Will require extension of sewer system to achieve the projected flow increase.

[3] Based on development information provided by individual entities and may require zoning revision to achieve the projected flow increase. Detailed buildout under existing zoning was only done for large-flow users that did not provide specific future development information. The low range for this category was estimated at 60% of the total flow projection for large flow users.

[4] Based on projection of a historic 0.11% per year non-residential SIF flow increase over 20-years at the permitted WWTP discharge flow (1.2 mgd), reduced by build-out under existing zoning previously accounted for in this analysis.

[5] Based on a population increase of 5.25% over the 20 year planning period applied to the 2000 Census population in Concord and reduced to the sewered area (1/3 of the Town), 309 more people are expected to generate flow to the sewer. Flow value assumes 70 gpd/person.

[6] Based on potential subdivision/re-development of existing residential parcels in the sewer extension areas of future CWMP Phases.

4.0 WASTEWATER MANAGEMENT ALTERNATIVES

With the quantification of potential future wastewater need established, the WWPTF expanded its focus to the question of what solutions may be available to provide for the anticipated need. The alternatives available to create capacity are discussed in general terms below. Detailed screening and analysis of these alternatives, which is beyond the scope of this current project phase, is required before recommendations can be made related to which alternative or combination of alternatives is most appropriate for Concord.

4.1 'No Build' Alternative

The baseline alternative for analysis is the no build alternative (i.e., do not create any new municipal wastewater management capacity). To avoid misconceptions about this alternative, 'no build' does not translate to no action, no growth, no development, no change or no municipal spending. The no build alternative considered here simply means that the town does not pro-actively plan for expanded municipal wastewater service needs, but instead must respond to future needs as they arise in a reactive mode. Without any available capacity in the existing sewer system, new flow or flow increases from an existing property will need to be handled on-site, even if a sewer connection currently exists.

Accepting a 'no build' alternative will result in a sewer moratorium in the near future, which would be felt by a wide spectrum of the community:

- ***Individual homeowners*** that are connected to the existing sewer would not be able to contribute any additional flow to the municipal system (including bedroom or other building additions).
- ***Private businesses and developers*** would feel this limitation as their businesses and any changes-in-use are affected by the moratorium. Limitations can result in legal suits, challenges and court actions.
- ***All existing sewer users*** could be subject to rate increases, if sewer overflows occur or if regulators impose a consent order due to permit exceedances at the wastewater treatment plant.
- ***The town as a whole*** risks exposure to legal challenges from hostile development and is unable to support desired economic development, expansion of institutional and regional facilities, and state-mandated affordable housing.

Management of the no-build alternative falls on the Town's zoning and planning boards, committees, and staff, in order to 1) manage the needs and desires of property owners and developers, 2) ensure that affordable housing and economic development goals can be met within this more restrictive framework, and 3) revisit and revise the implementation phases of the PPHP and CLRP to reflect the wastewater capacity constraints.

The costs of dealing with the implications of a 'no build' alternative are often higher than the costs of planning to accommodate future needs. Furthermore, a reactive implementation to

create wastewater capacity is likely to lead to a higher project cost without any opportunity for funding assistance.

4.2 Supplement the Existing Concord WWTP

As discussed in more detail in *The Status of Municipal Wastewater Treatment in Concord, MA, December 2007* document, the town has recently made improvements to the existing Concord WWTP to meet regulatory compliance for effluent quality now and in the future. Where feasible in the WWTP rehabilitation and upgrade design, unit processes were designed to treat an average daily flow slightly higher than the existing discharge limitation of 1.20 mgd. With additional system improvements, it is possible that more than 1.20 mgd may be processed through the existing facility. It is noted that such expansion would require extensive engineering evaluation to determine capacity bottlenecks at the plant, as well as potentially arduous regulatory review, negotiation and approval.

Regulatory approval required to expand the permitted flow capacity of the existing WWTP would necessitate one of two possible treatment alternatives.

4.2.1 Supplemental Groundwater Discharge

The first alternative to increasing discharge capacity for the existing Concord WWTP effluent to accommodate any future flows that exceed present NPDES discharge permit allowances would require the construction of a supplemental groundwater disposal system. The existing NPDES permit would remain for the discharge of flows up to the 1.20 mgd limit and additional effluent flows would be discharged to the ground. Groundwater discharge of effluent is consistent with the main tenets of the CWMP. The location of this groundwater disposal system may be at the WWTP or elsewhere in town. Such a system would consider water balance interests and possible benefits where appropriate.

For this alternative to be pursued, a detailed siting analysis and public acceptance effort would need to be performed, as well as extensive groundwater discharge permitting.

4.2.2 Revise Current NPDES Permit

A second alternative that may be available to increase the discharge capacity for the existing Concord WWTP is to request a revision to the current NPDES permit to allow a higher quantity of effluent discharge to the Concord River. Federal and state regulators have not previously been supportive of this type of revision because of inconsistency issues related to the Clean Water Act's anti-backsliding requirements, which are in place to protect surface waters from further degradation. Other communities' recent discussions with some state regulators have shown regulators to be more open to NPDES quantity increases, if effluent quality parameters can be maintained or improved with the higher flows.

Implementing a NPDES permit revision would require submitting a formal request with supporting documentation of the effluent quality parameter impacts (or lack thereof) to the U.S. Environmental Protection Agency and Massachusetts Department of Environmental Protection (DEP). Based on the amount of flow increase to be requested (assumedly greater than 100,000 gpd), the Town will be required to file an Environmental Notification Form (ENF) for the MEPA (Massachusetts Environmental Policy Act) Unit review process, as well as a modification of its existing NPDES permit.

4.3 Construct Additional Treatment System(s)/Facilities

To accommodate flows above the values previously committed, additional facilities for treatment of wastewater will need to be constructed. Additional discharge facilities will also need to be constructed under this alternative. While state regulators may be more open to consideration of NPDES quantity increases for existing WWTPs, regulatory support on issuance of a new surface water discharge permit is unlikely because anti-backsliding requirements cannot be met. Therefore, groundwater discharge is assumed for the two alternatives discussed below.

4.3.1 Build New Neighborhood Treatment System(s)

This type of system collects wastewater from a localized area that is larger than that allowed for a Title 5 system (i.e. will generate a flow greater than 10,000 gpd) and requires construction of a small, neighborhood treatment and groundwater disposal system. Typically neighborhood treatment systems (NTS) process residential flows of up to 40,000 gpd, with higher flow facilities being possible.

The NTS alternative offers the benefit of groundwater recharge with higher quality effluent than individual on-site systems for localized areas. This is important since almost all of Concord's drinking water supply is derived from groundwater sources.

A neighborhood treatment system generally includes below ground tankage and small-scale wastewater treatment components/equipment. Some treatment units may be enclosed in small above ground structures. Groundwater disposal systems are similar to leaching fields used in on-site systems, but they generally have a larger footprint designed to distribute greater flows of higher quality effluent. Groundwater discharges require a State permit from MA DEP (not federal like surface water discharges) to discharge the effluent to the ground.

The main difficultly associated with this alternative is public acceptance. Due mainly to the negative connotation associated with wastewater and the idea of having a 'treatment system' in a neighborhood, there can be great resistance on the part of local residents to allow a municipality to locate a NTS.

Most of the future flow projections associated with the analyses included herein are for properties currently connected to the existing sewer system. Therefore, implementation of this alternative might require diversion of a portion of flow from the existing Concord

WWTP to a new NTS type facility. The one notable exception to the municipal sewer connection is the unsewered Baker Avenue area, which may benefit from this alternative.

4.3.2 Build New WWTP with Groundwater Discharge

Very similar in principle to the NTS alternative is the construction of a new municipal WWTP with groundwater discharge. The main distinguishing factor is amount of flow processed (typically greater than 40,000 gpd) and the associated larger land area requirement. A wide range of treatment technologies are available today and several of these technologies were reviewed as part of the CWMP process (reference § 3.3.4.2 of the Concord *Comprehensive Wastewater Management Plan & Single Environmental Impact Report, EOEA 13088, February 2004* for more details). Selection of the most appropriate treatment technology is dependent both on quantity of flow and the required quality of effluent for discharge, as dictated during the groundwater discharge permitting process.

To accommodate the projected flows associated with the analyses included herein and summarized in *Section 3.4*, construction of a new municipal WWTP with groundwater discharge is likely to be the most effective approach to capacity creation. As with the previous alternative, implementation of this alternative might require diversion of a portion of flow from the existing Concord WWTP to this new facility.

4.4 Partnering Opportunities

Another option to overcoming the capacity constraint issue is to seek 'public-private' or regional partnership opportunities with in-town private developers and/or out-of-town partners.

4.4.1 Partner with Private Development to Serve Municipal Needs

Private development of properties in Concord that are not currently connected to the sewer system requires the construction of an on-site system (a septic system for flows that are less than 10,000 gpd or an NTS/WWTP for flows greater than 10,000 gpd). Larger-scale private development that is proposed with an NTS/WWTP may present an opportunity to the town if it is in proximity to an existing wastewater needs area (as identified in the CWMP) or to a potential future wastewater needs area (as identified in this report). Public/private partnerships can have financial benefits to both parties in the sharing of capital costs and the transfer of operation and maintenance costs to a municipality. On a more subjective level, this kind of partnering can often make a private development more publicly acceptable. Furthermore, municipal management of such systems tends to be more reliable than private operation.

While this public/private partnership alternative is mutually beneficial in many aspects, it would take a unique combination of developments in specific areas of town to serve the current and potential future wastewater capacity needs. Implementation of this alternative is beyond the direct control of the town, but should be considered as opportunities (private development proposals) arise.

4.4.2 Seek Regional Partnership(s)

A more predicable wastewater management partnering opportunity is that with an adjacent community or state/federal entity. Adjacent communities that have existing WWTPs, such as Acton and Maynard, may have available capacity to meet some of Concord's wastewater needs.

Concord may also have an opportunity for in-town 'regional' wastewater partnership with the Department of Corrections (DOC) facility, which owns and operates an existing WWTP. This possibility was discussed during the CWMP process, but was met with resistance by DOC facility management. The Middlesex School also currently owns and operates an existing WWTP (off of Lowell Road) that may have a small amount of additional capacity.

The adjacent town of Bedford has sewer service to the Massachusetts Water Resources Authority (MWRA) system. It may be possible (though difficult) for Concord to become a partial MWRA sewer community and transmit flow through the Bedford interceptor.

The first step in any partnering approach is to identify what capacity might be available in an adjacent system and what in-town need(s) that capacity might be best suited for. Most importantly, contact must be made with the potential partner to gain an understanding of their receptiveness to the regional partnering concept.

4.5 Demand Management/Water Conservation

One of the most efficient ways to create capacity in the existing sewer system is for all of the current users to decrease the amount of water used indoors. The Town of Concord has had an aggressive water conservation program in place for approximately ten years to educate townspeople on how and why to conserve water. Since 1998, residential sewer customers have reduced their winter water consumption (which normally approximates indoor water use) by roughly 20%. This has brought indoor water use from an average of 168 gpd per single-family household down to 136 gpd, resulting in an estimated difference in total sewer flow of nearly 40,000 gpd. While continuation of this effort is necessary to keep wastewater flows minimized and to conserve drinking water resources, the impact of further water conservation measures in Concord is unlikely to have as dramatic of an effect on total sewer flow as the initial conservation campaign. Some percentage of households are already using water-efficient devices and have exhausted their savings potential, while others may not replace high-water-use fixtures until they are required to do so. Many of the customers most interested in water conservation are already doing their part. While the magnitude of capacity required to meet existing and future wastewater needs cannot simply be accommodated by water conservation practices alone, even if another 40,000 gpd reduction in flow could be realized over the next decade, capacity created through increased conservation certainly merits consideration and continued effort.

4.6 Wastewater Reuse

Wastewater reuse alternatives do exist and are becoming more publicly accepted with successful project implementation in New England. The range of wastewater reuse opportunities includes groundwater recharge (discharge of highly treated effluent to the ground), agricultural and landscape irrigation, wetlands augmentation and effluent recycling (toilet flush water). Massachusetts regulations governing reuse are evolving, but are not as developed as those in many other states/regions where water supply is in a critical state.

In New England, wastewater reuse alternatives often provide only a seasonal alternative to wastewater disposal and require the effluent to have a high level of treatment prior to reuse. The applicability of reuse alternatives would be analyzed during the design phase of any new treatment facility or groundwater discharge project but cannot be adequately evaluated at this preliminary planning stage.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The Wastewater Planning Task Force has provided a forum to effectively advance the integration of several important planning documents as charged. Most importantly, they have provided workable answers to several key questions previously noted and identified within *The Status of Municipal Wastewater Treatment in Concord.* Because of this effort, the greater community will be able to review these findings and participate in the decision as to how these planning interests and wastewater management alternatives can be responsibly integrated.

Specifically, in response to the question, *"Which areas that are currently under-served have the highest value to the Town in terms of sustaining continued economic growth through redevelopment and housing production?"* the WWPTF has identified a combination of areas/entities that have a high value to the Town in terms of sustaining continued economic growth through redevelopment and housing production. At a conceptual level, they have determined that the pre-defined Village Centers have the potential for adding a residential use component while maintaining the commercial use and 'village-style' aesthetic. The Baker Avenue area was also included in the analysis to sustain and expand economic growth in the business sector. Lastly, large-flow users (such as Emerson Hospital, Concord Academy, etc.) were included in the analysis as 'fixtures in the community' to ensure long-term viability of the future plan.

In response to the question, *"How much flow is associated with the desired development or redevelopment of areas identified in the PPHP and CLRP?"* the WWPTF has defined future wastewater needs in Concord in the range of 320,000 gpd to 598,000 gpd. To insure the long-term viability of this plan, the WWPTF recommends proceeding to the next phase of this project targeting the higher end of this anticipated flow range.

At this juncture, the WWPTF is not positioned to provide definitive recommendations as to the questions posed with respect to *"For what portion of this [wastewater] flow can and will the Town provide municipal wastewater management options?"* or, *"In what time frame is this new, municipally-handled flow anticipated to be generated?"* What they have determined is that the WWPTF is supportive of the Town's evaluation of wastewater management options for this entire amount of projected flow, if proven technically feasible and approved by Town Meeting. Furthermore, the actual generation of the projected flow is anticipated to be spread across the 20-year planning period, with the earliest availability of a new management alternative estimated at three years into the future, due to the additional planning and approval steps necessary prior to implementation of a capacity creation project. Once capacity is available, flows are most likely to increase gradually over time as individual property owners within the sewer area decide to develop/re-develop or change uses.

The one question that falls outside the scope of the WWPTF remains, *"How will the Town fund design and construction costs associated with any future wastewater management solutions?"* Before a response to this question can be formulated, more detailed planning (including technical feasibility and budgetary costs) of the available alternatives needs to be completed. The overall recommendation at this juncture is that the Town proceeds as follows:

1. Prepare a scope, get Town Meeting (Spring 2009) approval, and proceed with detailed evaluation (including technical feasibility and budgetary costs) of the available alternatives by which wastewater capacity can be created assuming a future flow incremental value of 598,000 gpd.

2. Perform a design/capacity assessment of the present WWTP and if expansion opportunities are identified, meet with state regulators (DEP) to determine the feasibility of a NPDES permit flow increase for the existing Concord WWTP and implement such increase as possible.

3. Perform a detailed evaluation of possible groundwater discharge sites to identify potential locations and refine available ground capacity limitations.

4. Further evaluate potential regional partnering opportunities and create an internal protocol for DPLM/planning board for identification and processing of private partnering opportunities for wastewater management.

5. Identify potential specific reuse opportunities in Concord to be evaluated during a future design phase.

6. Design and build additional wastewater infrastructure.

6.0 THE CONTINUING INTEGRATION PROCESS

The next step in the Integrated Planning Initiative is to bring the first recommendation of the Wastewater Planning Task Force to Town Meeting in spring 2009. Tasks leading up to Town Meeting include scoping of the future work and estimating the appropriate budget required, attending meetings of the stakeholder boards to discuss the findings and recommendations of this report and preparing and distributing information on the project so that townspeople can make an educated decision at Town Meeting regarding the future of this initiative.

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