SECTION 5.0 ALTERNATIVE 1 (NO ACTION) ANALYSIS

This Section identifies and describes the analysis of Alternative 1 (No Action). The different methods of analysis are described in Section 4. The analysis includes the following three major categories:

- Environmental Analysis
- Non-Monetary Analysis
- Planning Level Construction Costs

5.1 ENVIRONMENTAL ANALYSIS

This alternative would result in continued reliance on existing wastewater facilities and current methods of facilities planning, including extension of sewers and increases in discharges from existing wastewater treatment facilities (WWTFs), where current capacity and regulatory requirements allow. The WWTFs would be upgraded to meet the 2025 discharge limits at their existing discharge locations (see Appendix L of the Preliminary Findings Report for a summary of projected 2025 WWTF effluent limits).

Capacity in terms of new sewer connections would be restricted, depending on flow limitations at the existing WWTFs. Therefore, it is expected that a substantial portion of new growth would need to be accommodated by on-lot or other types of decentralized systems. In some parts of the project area, new development may not be feasible due to lack of sewers and unsuitable sites for on-lot systems. The following discussion summarizes the trends that would be likely to continue should the No Action alternative be selected.

5.1.1 Land Use and Growth

Land Use Compatibility and Aesthetics. Under this alternative, minimal direct impacts to land use are anticipated since existing WWTFs would continue to be used and no new facilities or regional infrastructure are proposed. The land use of the sites would remain the same as currently used, i.e. to support waste treatment/disposal for public purposes. Upgrades to the WWTFs may be required for this alternative (see Section 3.1.1) depending on the WWTFs' ability to meet future limits. The effect on aesthetics resulting from any exterior structural modifications or new facility components would be site specific.

Land Area Impacted. The extent of land area impacted for this alternative would be limited. The WWTF upgrades would largely occur within or adjacent to existing buildings at the existing WWTF sites, and no land acquisition or displacement of existing land uses would be expected. The exception may be WWTFs that have very limited available space on their property, such as the Portsmouth Peirce Island WWTF. In such instances, adjacent property or alternative facility location may need to be acquired to accommodate the upgrades. In the case of the Peirce Island WWTF, the City of Portsmouth has indicated that expansion of the WWTF is not desirable due to existing and planned recreational activities on the Island.

Indirect Growth. For this alternative, it is anticipated that growth and development would continue to follow existing trends and patterns (see "Section 9.0 Population Future Conditions" in the Preliminary Findings Report). Sewer extensions serving future residential, commercial, and industrial uses would continue as approved locally by municipalities as long as flow and treatment capacity remains in the various WWTFs. In areas without sewers, there would likely be a continued trend toward more spread out development due to on-lot system requirements unless developers can accommodate higher density by implementing cluster and other small treatment systems. Developers would continue to be encouraged and guided by the state's smart growth principles.

5.1.2 Air Quality

Continued operation of the WWTFs, after the required upgrades, is generally anticipated to result in minimal impacts to air quality to communities within the study area. While some of the upgrades may require the addition of open tanks, etc., these components when properly maintained are generally not considered odorous. The facilities will need to include odor control and air emission control in accordance with state and local regulatory requirements and community mandates.

5.1.3 Surface Water Flow, Ground Water Recharge, and Water Quality

Surface Water Flow and Ground Water Recharge. For Alternative 1 (No Action), the WWTF discharge flows in the study area increase by an average of 8.2% from 2004 to 2025. This increase is expected due to an increase in wastewater generation in the study area resulting from increased population and as a result of minor sewer expansions and infilling in those communities with WWTFs. New developments not able to connect to existing WWTFs would rely on on-lot disposal, which would contribute to continued recharge of ground water in localized areas.

During low flow (7Q10) conditions, the total volume discharged by the rivers to the Great Bay is 30.1 cubic feet per second (cfs), while the average WWTF discharge volume to the Great Bay under those low flow conditions (in September when low river flows typically occur) is 21.8 cfs (see Table 2 in Appendix C). This WWTF flow represents 72% of the river flows. Compared to the tidal flows, the volume of water discharged by the rivers during one tide cycle (under normal river flow conditions) is approximately 1% of the tidal prism (volume of water flowing in and out of the estuary during one tide cycle) (Ertürk et al, 2002). During low flow periods, the river flow is an even smaller fraction of the tidal flow.

Under this alternative, ground water recharge is not anticipated to change significantly.

Water Quality. The following is a summary of the water quality analysis for Alternative 1. This includes changes to the Great Bay salinity and a qualitative Great Bay pollutant loading analysis.

<u>Great Bay Salinity Changes</u>

Based on the salinity modeling for the Great Bay (under low flow conditions), the impact of increasing the WWTF effluent discharges on salinity (under low flow conditions) is anticipated to be 1 part per thousand (ppt) or less. This impact is much less than the natural variability of salinity concentrations due to tides, seasons, winds, etc. During high flow periods, the effect of WWTF effluent discharge increase would be less. Calculated salinities for Alternative 1 are shown in Figure 5 in Appendix C for different locations in the estuary system.

<u>Pollutant Loading Analysis</u>

Under this alternative, the pollutant loading to the Great Bay from the WWTFs for biochemical oxygen demand (BOD), total suspended solids (TSS), nitrogen, and phosphorus are all anticipated to decrease due to the new effluent limits projected for this study. This may result in some improvements to the dissolved oxygen (DO) concentrations and decrease potential for eutrophication in the Great Bay. There is anticipated to be a slight increase in toxics discharge to the Great Bay due to increased wastewater generation and incomplete removal during treatment.

It is important to note that while the loading to the Great Bay from the WWTFs will be reduced, other loading inputs to the Great Bay may minimize the improvements of the WWTF loading reductions. These other inputs include non-point sources such as stormwater run-off, atmospheric degradation, and inputs from on-lot systems (e.g. increases in bacterial contribution from malfunctioning or overstressed on-lot systems).

It is assumed that monitoring programs would continue and that trends in water quality and flow would be tracked by governmental and public interest groups. Some Total Maximum Daily Loads (TMDLs) may be prepared or finalized, which could in turn require additional limits on discharges from WWTFs.

5.1.4 Wetland and Terrestrial Resources

As noted above, it is possible that some extension of sewers may occur in those communities with some WWTF capacity remaining. In these cases, there would be minor reduction in ground water recharge that may support ground water fed wetlands resource areas. There would be a corresponding increase in surface water discharges. To the extent that the relocation of discharge occurs within the same sub-basins of a watershed, overall effects to hydrogeology would be expected to be relatively minor. Thus, the impact to wetlands and terrestrial resources as a result of changes in surface water flow or ground water levels related to implementation of the no action alternative is not expected to be significant.

5.1.5 Aquatic Resources

Similar to the anticipated effects to wetlands and terrestrial resources, no significant effects on aquatic life are anticipated, as major changes in stream flow are not anticipated to occur as a result of implementation of this alternative. As long as the WWTFs comply with the permit limits, including more stringent nutrient limits, aquatic life conditions would not be expected to degrade further as a result of WWTF operation. It is assumed that fisheries monitoring will continue in most of the receiving waters, and that these data will be correlated with water quality monitoring data. Implementation of TMDLs and waste load allocations may result in discharge limits which could, in turn, have beneficial effects on aquatic habitats.

5.1.6 Rare and Endangered Species

Effects on rare and endangered species would be related to any changes in habitat, whether wetlands, terrestrial, or aquatic. As noted above, no significant alterations in these habitats are anticipated as long as WWTFs continue to meet permit limits, which may include more stringent nutrient limits. To the extent that insufficient capacity exists at the WWTFs and existing on-lot systems fail or negatively affect water quality, there could be adverse effects to some rare and endangered species. The New Hampshire Natural Heritage Bureau (NHB) maintains records of these species and communities and would be involved in protection efforts in response to impacts related to future growth.

5.2 NON-MONETARY TECHNICAL ANALYSIS

The non-monetary analysis is divided into the following sub-categories:

- Complexity
- Public Testimony
- Implementation

5.2.1 Complexity

The complexity of this alternative has been evaluated as it relates to treatment, conveyance, and disposal. The following is a summary of those evaluations.

In this alternative, the treatment required is more sophisticated than the existing treatment in order to accommodate the new treatment limits that would be required for the existing discharge locations. As a whole, the treatment component of this alternative is considered to be of average complexity.

In this alternative, there is no conveyance component as the existing surface water discharge locations will be used.

The disposal component of this alternative is not complex. In this alternative, the existing WWTF outfalls will be used.

5.2.2 Public Testimony

Little positive or negative public testimony was given for this alternative. However, indirectly there was some public testimony indicating that it would be preferable for the wastewater effluent originating from ground water wells be put back on to the ground from where it came and not be "thrown away". This could be perceived as a negative comment about this alternative as wastewater effluent is being discharged to surface water and is not being put back into the ground.

5.2.3 Implementation

This alternative would require little or no agreement between the municipalities to implement (each town could maintain its own wastewater autonomy). However, there is a possibility that multiple towns would join together to share resources, leverage their combined purchasing power (for chemicals and other supplies and equipment), and potentially negotiate with the regulators (nitrogen trading, etc.)

5.3 PLANNING LEVEL CONSTRUCTION COSTS

Included herein are estimated planning level costs for Alternative 1 (No Action). The planning level costs have been divided into three sub-categories; treatment, conveyance, and disposal.

The planning level treatment upgrade costs for each WWTF are presented in Table 5-1. There are no conveyance and disposal costs associated with this alternative. Table 5-2 presents the total planning level costs for treatment, conveyance and disposal on a town by town basis.

In summary, the estimated planning level construction costs for Alternative 1 are:

- Treatment Costs $110,600,000.
- Conveyance Costs $ -.
- Disposal Costs $ -.
- **Total Cost $110,600,000.**

Table 5-1. Alternative 1 Estimated WWTF Upgrade Costs

FACILITY	Year 2004 Max Mo. Flow, MGD	Year 2025 Max Mo. Flow, MGD	Economy of Scale $ Factor	Upgrades Anticipated	Incremental Flow Increase, MGD	Carbon Removal Upgrade Anticipated	Carbon removal upgrade @ $7.5/gallon	C only Filtration Upgrade Anticipated	Filtration Upgrade @ $2/gal	Nitrogen Upgrade Anticipated	Influent TN Load , lbs/day	Eff. TN Load (8mg/l), lbs/day	TN removed, lb/day	TN Removal @ $40/lb/day	TP Removal Anticipated	P-Flitration/ Chemical Addition @ $3/gallon	Other Upgrades Anticipated	Cost Assumptions (new flow only unless noted)	Other Upgrades $	Estimated Total Construction Cost
DOVER WWTF	4.57	4.87	0.70	C, TN	0.3	yes new flow	$ 1,580,000	no	$ -	yes	812.3	324.9	487.39	$ 4,980,000	no	$ -	IP, Pre, Dis	$6/gal	$ 1,800,000	**$ 8,360,000**
DURHAM WWTF	1.71	1.8	0.80	TN	0.09	no	$ -	no	$ -	yes	300.2	120.1	180.14	$ 2,100,000	no	$ -	IP, Pre, Dis	$6/gal	$ 540,000	**$ 2,640,000**
EPPING WWTF	0.32	0.429	1.00	C, TN, TP	0.109	yes new flow	$ 820,000	no MBR	$ -	yes new flow	18.2	7.3	10.91	$ 160,000	new flow chemical only	$ 20,000	Pre, Mem, Dis	$6.5/gal	$ 710,000	**$ 1,710,000**
EXETER WWTF	3.6	3.9	0.70	AS, C, TN	0.3	all flow	$ 20,480,000	no	$ -	yes	650.5	260.2	390.31	$ 3,990,000	no	$ -	Pre	$2.5/gal	$ 750,000	**$ 25,220,000**
FARMINGTON WWTF	0.52	0.57	0.90	C, TN, TP	0.05	yes new flow	$ 340,000	no for P only	$ -	yes	95.1	38.0	57.05	$ 750,000	yes	$ 1,540,000	IP, Pre, M	$5/gal + $100K metals study	$ 350,000	**$ 2,980,000**
HAMPTON WWTF	3.3	3.7	0.70	C, TN	0.4	yes new flow	$ 2,100,000	yes	$ 5,180,000	yes new flow	66.7	26.7	40.03	$ 410,000	no	$ -	M, Dis, SH	$6/gal + $100K metals study	$ 2,500,000	**$ 10,190,000**
MILTON WWTF	0.08	0.09	1.00	AS, C, TN, TP	0.01	all flow	$ 680,000	no for P only	$ -	yes	15.0	6.0	9.01	$ 130,000	yes	$ 270,000	NR	na	$ -	**$ 1,080,000**
NEWFIELDS WWTF	0.08	0.084	1.00	AS, C, TN	0.004	all flow	$ 630,000	no	$ -	yes	14.0	5.6	8.41	$ 120,000	no	$ -	NR	na	$ -	**$ 750,000**
NEWINGTON WWTF	0.18	0.2	1.00	TN	0.02	no	$ -	no	$ -	yes	33.4	13.3	20.02	$ 290,000	no	$ -	NR	na	$ -	**$ 290,000**
NEWMARKET WWTF	1.04	1.16	0.80	AS, C, TN	0.12	all flow	$ 6,960,000	no	$ -	yes	193.5	77.4	116.09	$ 1,360,000	no	$ -	IP, Pre, Dis	$6/gal	$ 720,000	**$ 9,040,000**
PEASE DEVELOPMENT AUTHORITY WWTF	0.72	0.86	0.90	NR	0.14	no	$ -	no	$ -	SBR mods only	0.0	0.0	0.00	$ 100,000	no	$ -	Dis	$1/gal	$ 190,000	**$ 290,000**
PORTSMOUTH WWTF	8.23	8.7	0.60	AS, C	0.47	all flow	$ 39,150,000	no	$ -	no	na	na	na	$ -	no	$ -	Dis, SH	$6/gal	$ 2,820,000	**$ 41,970,000**
ROCHESTER WWTF	5.51	6.1	0.60	TP	0.59	no	$ -	no for P only	$ -	yes new flow	98.4	39.4	59.05	$ 520,000	new flow	$ 1,060,000	2nd Clarifier	$1.5 M Clarifier	$ 1,500,000	**$ 3,080,000**
ROCKINGHAM COUNTY WWTF	0.085	0.118	1.00	AS, C, TN	0.033	all flow	$ 890,000	yes	$ 240,000	yes	19.7	7.9	11.81	$ 170,000	no	$ -	NR	na	$ -	**$ 1,300,000**
ROLLINSFORD WWTF	0.15	0.17	1.00	TP	0.02	no	$ -	no for P only	$ -	no	0.0	0.0	0.00	$ -	yes new flow	$ 60,000	NR	na	$ -	**$ 60,000**
SEABROOK WWTF	1.17	1.39	0.80	NR	0.22	no	$ -	no	$ -	no	na	na	na	$ -	no	$ -	Air	$1/gal	$ 220,000	**$ 220,000**
SOMERSWORTH WWTF	1.79	1.9	0.80	C, TN, TP	0.11	yes new flow	$ 660,000	no for P only	$ -	yes new flow	18.3	7.3	11.01	$ 130,000	yes new flow	$ 260,000	Pre	$2.5/gal	$ 280,000	**$ 1,330,000**
Totals	**33.055**	**36.041**			**2.986**		**$ 74,290,000**		**$ 5,420,000**		**2335.4**	**934.1**	**1401.2**	**$ 15,210,000**		**$ 3,210,000**			**$ 12,380,000**	**$ 110,510,000**

<u>Legend</u>

C = Carbon
TN = Total Nitrogen
TP = Total Phosphorus
AS = Activated Sludge

IP = Influent Pumping
Pre = Preliminary Teatment
Dis = Disinfection
Mem = Membranes

M = Metals
Air = Aeration
SH = Solids Handling
NR = Not Required

Table 5-2. Estimated Planning Level Construction Costs for Alternative 1

FACILITY	Treatment Cost	Conveyance Cost	Discharge Costs	Total Estimated Construction Costs
DOVER WWTF	$ 8,400,000	na	na	$ 8,400,000
DURHAM WWTF	$ 2,600,000	na	na	$ 2,600,000
EPPING WWTF	$ 1,700,000	na	na	$ 1,700,000
EXETER WWTF	$ 25,200,000	na	na	$ 25,200,000
FARMINGTON WWTF	$ 3,000,000	na	na	$ 3,000,000
HAMPTON WWTF	$ 10,200,000	na	na	$ 10,200,000
MILTON WWTF	$ 1,100,000	na	na	$ 1,100,000
NEWFIELDS WWTF	$ 800,000	na	na	$ 800,000
NEWINGTON WWTF	$ 300,000	na	na	$ 300,000
NEWMARKET WWTF	$ 9,000,000	na	na	$ 9,000,000
PEASE DEVELOPMENT AUTHORITY WWTF	$ 300,000	na	na	$ 300,000
PORTSMOUTH WWTF	$ 42,000,000	na	na	$ 42,000,000
ROCHESTER WWTF	$ 3,100,000	na	na	$ 3,100,000
ROCKINGHAM COUNTY WWTF	$ 1,300,000	na	na	$ 1,300,000
ROLLINSFORD WWTF	$ 100,000	na	na	$ 100,000
SEABROOK WWTF	$ 200,000	na	na	$ 200,000
SOMERSWORTH WWTF	$ 1,300,000	na	na	$ 1,300,000
TOTAL	**$ 110,600,000**	**$ -**	**$ -**	**$ 110,600,000**

REFERENCES

Ertürk, S.N., Bilgili, A., Swift, M.R., Brown, W.S., Çelikkol, B., Ip, J.T.C. and Lynch, D.R. 2002. Simulation of the Great Bay Estuarine System: Tides with Tidal Flats Wetting and Drying. Journal of Geophysical Research, Vol. 107, No. C5.