SECTION 8
EVALUATION OF ENVIRONMENTAL IMPACTS

8.1 INTRODUCTION

All three of the wastewater plans that were considered have the same fundamental goal: improving the environment in Orleans, specifically water quality in ponds and coastal waters. Compared to the No Action Plan, Plans 1, 2 and 3 are vastly superior in an environmental sense. The purpose of this section of the report is to contrast the three plans within the framework of a standard set of environmental review parameters. Impacts are considered for both initial project construction and long-term project operation.

This section of the report is presented in the format of an Environmental Impact Report which will be filed with the Massachusetts Environmental Policy Act (MEPA) unit of the Executive Office of Energy and Environmental Affairs (EOEEA).

8.2 PROJECT DESCRIPTION

Orleans wastewater management planning activities are described in detail in the previous sections of this report and in three prior reports: the draft Needs Assessment Report (February 2007), the draft Alternatives Screening Report (December 2007), and the draft Alternatives Evaluation Report (May 2008).

8.3 ALTERNATIVES TO THE PROJECT

The Town has considered three wastewater plans to address its documented needs. These plans have many common features, but are distinctly different with respect to the location of wastewater treatment and disposal facilities and the ultimate receiving waters for effluent-impacted groundwaters. Also considered for comparison purposes is the No Action Plan, which involves the continued reliance on private on-lot wastewater disposal systems.

8.4 EXISTING ENVIRONMENT

The existing environment in Orleans is described in detail in Section 2 of this report. That section describes land use and demographics, environmentally sensitive areas, soils, groundwater and water use.

8.5 ASSESSMENT OF IMPACTS

Impacts of the three wastewater plans under consideration, and the No Action Plan, fall in the general categories of "direct", "indirect" and "cumulative". The direct impacts are those that occur as a direct result of either the construction of the proposed wastewater facilities, or their ongoing operation. Indirect impacts are those land use or demographic changes that eventually occur as a result of implementation of one of the wastewater plans, or as a consequence of taking no action. Cumulative effects result from the incremental impact of the proposed project when added to other past, present or future actions, regardless of who undertakes those other actions.

This section of the report identifies direct, indirect and cumulative impacts for a wide range of environmental issues. Direct impacts are discussed as either "short-term" (generally related to project construction) or "long-term" (generally related to ongoing operation of the constructed facilities).

8.5.1 Surface Water Quality

No significant short-term impacts on surface water quality are expected with any of the three wastewater plans. There is the possibility of erosion and sedimentation problems during the construction of sewers or the facilities for treatment and disposal, but those impacts can be closely controlled by requiring appropriate construction techniques and with close contractor oversight. Since the extent of sewers is approximately the same in each plan, and the impacts are small, the three plans can be considered equivalent in this regard.

There are major long-term benefits for surface water quality associated with all of the three wastewater plans, and major detriments to the No Action Plan. The driving forces behind this project are the current and expected future overloading of coastal waters from wastewater-related

nitrogen, and analogous phosphorus loading problems in selected freshwater ponds. The plans under consideration will all allow compliance with nitrogen-based TMDLs and reduce phosphorus loadings where important to pond quality.

Pleasant Bay and Cape Cod Bay are considered Outstanding Resource Waters (ORW). These two bays and their tributaries, and the Nauset system, will all benefit from reduction in nitrogen loads. The implementation of a public sewerage system, in any of the three plans, will result in reductions in wastewater nitrogen loads equaling or exceeding the following percentages, as contained in published or expected TMDLs:

Pleasant Bay	58%
Nauset system	55%
Rock Harbor	70%

In Plan 2, the residual nitrogen remaining after treatment at the Tri-Town site will increase the nitrogen loading to Namskaket Marsh and Little Namskaket Marsh, but only to 38% and 84% of their respective nitrogen thresholds.

Significant indirect long-term benefits will accrue to any of the three wastewater plans. The water quality improvements will allow improved swimming, fishing and boating activities; better environmental health with respect to eelgrass and bottom fauna; and preservation of tourism and property values.

8.5.2 Groundwater Quality

No short-term impacts on groundwater quality are expected with any of the three plans.

The elimination of septic systems that will occur in any of the three plans will result in long-term improvements in groundwater quality. It is that improvement in groundwater quality that will eventually lead to better surface water quality, as groundwater moves from inland areas to coastal discharge areas, or toward ponds from tributary areas. All of the plans serve roughly the same areas of Orleans, so they provide equal benefits with respect to enhanced protection of private drinking water wells that exist in some areas. Similarly, all plans provide for some sewering in the Zone II of public water supply well #7. The elimination of some of the

wastewater nitrogen in the Zone II area is not expected to have an appreciable impact on drinking water quality, since the nitrogen loading is quite small, even with the No Action Plan. However, septic systems do allow some other contaminants to reach the groundwater, and their elimination will provide general benefits beyond the nitrogen issue.

8.5.3 Wetlands

There are no mapped wetlands at the treatment or disposal sites in Plans 2 and 3, and the wetlands that exist at one of the sites in Plan 1 can be avoided. It is likely that the routes of sewer lines or the location of pumping stations will encroach on the 100-foot buffers of regulated wetlands. That may create the potential for wetland impacts, but standard mitigation measures, under the purview of the Conservation Commission, will limit that potential to very low levels. Thus, no significant short-term wetland impacts are expected.

Over the long term, effluent-impacted groundwater will emerge in the Namskaket Marsh and Little Namskaket Marsh systems as a result of effluent disposal at the Tri-Town site in Plans 1 and 2. At the other sites associated with Plans 1 and 3, effluent-impacted groundwater will emerge in Pleasant Bay or the Nauset system and will not pass through wetlands. Studies by the Massachusetts Estuaries Project have estimated the thresholds for nitrogen-related impacts on Namskaket and Little Namskaket Marshes, and Plans 1 and 2 keep the nitrogen loading below those thresholds. Impacts unrelated to nitrogen are not expected. While the Tri-Town site is different from the other sites in Plans 1 and 3 with respect to the contact of effluent-impacted groundwater with wetlands, there is no appreciable difference among the plans with respect to long-term wetland impacts.

8.5.4 Floodplains

None of the candidate treatment facility sites or effluent disposal areas is located in floodplains. There may be the need to locate a few pumping stations in floodplains, but those structures would be small, they would be flood-proofed, and they would pose little impact on potential floods. Therefore, none of the plans is expected to have any significant short-term or long-term impacts on floodplains.

8.5.5 Coastal Resources

Coastal resources include beaches and other swimming areas, commercial and recreational shellfishing areas, and marine/estuarine habitat. Some of these areas are within the two Areas of Critical Environmental Concern (ACEC) in Orleans (the Pleasant Bay ACEC and the Cape Cod ACEC).

There will be little if any construction in the ACECs, or in areas close to these coastal resources, that result in any significant direct short-term impact. In some cases, individual homes (or small clusters of homes) will be served by near-shore grinder pump stations. These pump stations can be installed quickly with little environmental impact, provided proper mitigating measures are undertaken. These grinder pumps will be used in any of the three wastewater plans; no one plan would be expected to have significantly more impact than another.

All of the three wastewater plans provide added protection for these resources, primarily through improved water quality. Conversely, the No Action Plan allows current water quality degradation to continue and worsen. In any of the three plans, when effluent-impacted groundwater eventually emerges in coastal waters, it would do so sufficiently offshore, and in sufficiently well-mixed areas, to pose no significant threat to any of these coastal resources. The emergence of effluent-impacted groundwater would occur many years after the initiation of treatment and disposal activities.

8.5.6 Open Space and Recreation

None of the wastewater plans will have any direct short-term or long-term impacts on designated open space in Orleans. There will be some clearing of land to build wastewater treatment and disposal facilities, but only on parcels now in public or private use, unrestricted with respect to open space.

It is the intention of the Town of Orleans to adopt regulations and bylaws that allow the selected wastewater plan to be "growth-neutral"; see the Community Growth and Land Use section

below. Therefore, there will be no indirect impacts on open space associated with any of the three wastewater plans.

8.5.7 Rare and Endangered Species

For any of the three plans, the construction of sewers and pump stations will occur largely within the rights-of-way of public roads, so any short- or long-term impacts on plant and animal habitat would be minimal at most. No cross-country sewer routes are now expected, but if cross-country routes are later found necessary for certain stretches of the sewer system, the avoidance of important habitat would be one of the principal criteria in that selection. Additional site-specific review may be warranted during the design phase of the project.

All of the treatment plant sites have been reviewed against available mapping of habitat for rare and endangered species. According to the 13th edition of the *Massachusetts Natural Heritage Atlas (October 1, 2008)*, only the Tri-Town site appears to be located within a Priority Habitat of Rare Species and an Estimated Habitat of Rare Wildlife. Preliminary review by the Natural Heritage and Endangered Species Program (NHESP) of the Massachusetts Division of Fisheries & Wildlife has determined that the Tri-Town site is within Priority Habitat of four species protected under the Massachusetts Endangered Species Act (MESA): the Eastern Box Turtle, the Diamond-backed Terrapin, Salt Reedgrass and Mitchell's Sedge. The NHESP preliminary review found that the proposed construction on the Tri-Town site has the potential to impact only one of those species, the Eastern Box Turtle. At the request of NHESP, the Town arranged for a formal assessment of box turtle habitat. That assessment, conducted by LEC Environmental, is presented in Appendix H.

The box turtle habitat assessment considered four possible layouts of wastewater treatment and disposal facilities, and estimated the extent of disruption for each alternative. That disruption would range from 4.6 acres to 6.5 acres during construction, and 0.5 acres to 1.6 acres would be restored after construction is complete. The Town has evaluated the four alternative layouts with respect to several factors including the degree of box turtle habitat disruption. More discussion on minimizing the impacts to turtle habitat with respect to the four alternative site layouts is

provided in Section 11.4.7. After receiving comments during the MEPA review, the Town has selected an alternative that optimizes site development with respect to box turtle habitat and avoids a "take". The Town will also implement appropriate mitigating measures approved by NHESP.

8.5.8 Archaeological and Historic Resources

The construction of sewers and pump stations will occur largely within the rights of way of public roads, so there will be no direct short-term impacts on historic and archaeological sites and resources. Each of the candidate treatment plant sites has been reviewed against available mapping of such resources. Significant archaeological resources were discovered at the Tri-Town site prior to construction of the Septage Treatment Facility there. These resources were removed from the site prior to construction. Coordination with the Massachusetts Historical Commission (MHC) has determined that any remaining archaeological resources are unlikely to exist within the area of the proposed new facilities for wastewater treatment and disposal at the Tri-Town.

Undisturbed portions of the cluster sites (see Section 11.4.6) are either within, or proximate to, areas where archaeological resources could be present. The archaeological sensitivity is primarily due to the environmental setting (proximity to water and in level areas with well-drained soils). A reconnaissance archaeological survey should be conducted to assess all of the cluster sites. The Town has committed to this work and set a budget in its capital plan for surveys during the preliminary design phase of the project.

Areas north and west of Route 6A in Orleans are within the Old Kings Highway Regional Historic District. A portion of this District is included in the proposed sewer service area for all wastewater plans, primarily for protection of Rock Harbor. None of the structures in the District would be impacted by the project, since construction will occur primarily in public road rights-of-way. Any above-grade structure built as part of the project (treatment plant buildings at the Tri-Town site or pump stations located elsewhere in the District) would be designed with architectural features consistent with District standards.

It is the intention of the Town to review the designs of its wastewater facilities with MHC to ensure that historical and archaeological resources are appropriately identified and protected.

8.5.9 Traffic

One of the most significant direct short-term impacts of the proposed project would be traffic congestion resulting from construction activities in public roadways. The vast majority of the 75 to 80 miles of sewer lines will be installed in roadways or roadway shoulders. The Town will schedule this work for the October-to-May period when traffic is generally less intense, and will segment the work to avoid disruption of lengthy stretches of principal roads at any one time. Plan 2 involves the least amount of collection system, so it would have the least short-term impact on traffic; however the difference among the three plans is small.

There will also be long-term traffic impacts as well, but at a much lower level. These include the vehicles accessing any of the treatment plant sites for normal operation, and the deliveries of septage and liquid sludge to the Tri-Town site. Section 7.13 of this report presents data on annual truck trips for each of the plans. These activities are relatively limited in scope and will not cause major traffic congestion. However, in Plan 1, the decentralized treatment plant sites are located in residential neighborhoods, and even a small number of additional vehicular trips may be noticeable to the neighbors. All plans result in fewer septage deliveries to the Tri-Town site, and Plan 2 offers the most advantage when liquid sludge deliveries are also included.

8.5.10 Air Quality

Construction vehicles can be the source of added air emissions and represent a direct short-term impact. Dust from construction sites is another common source of air quality concern. There should be no appreciable difference among the three wastewater plans, because each involves the same general level of construction activity.

Direct long-term impacts include potential odor releases at treatment plants and pump stations and air emissions from vehicles accessing any of the treatment plant sites for normal operation.

None of these sources of air emissions is considered significant, since all can be subject to routine emissions control.

8.5.11 Noise

Much like air quality, noise impacts can occur both during construction and as a result of routine operation.

As a direct short-term impact, construction noise is unavoidable. Noise controls on construction equipment are available and are required, but are rarely capable of allowing noise-free construction. None of the three wastewater plans has any particular advantage in this regard. Pumps, blowers, standby generators, ventilation systems and other equipment emit noise at treatment plants and pump stations. All can be fitted with noise control devices that are largely successful in avoiding nuisance noise conditions. The use of earthen berms and vegetated buffers can help limit off-site noise impacts. This may be most difficult to accomplish in Plan 1 which includes some small treatment plant sites in residential neighborhoods.

8.5.12 Erosion Control

During construction, temporary erosion control measures will be warranted to avoid sediment migration. This is commonly achieved with the use of hay bales, siltation fencing, and geotextile materials. Storm events and construction dewatering would warrant the use of these controls. During the design process, detailed drawings and specifications will outline the controls required to be used by the construction contractor. Drawings and specifications will meet with regulatory standards such as the National Pollution Discharge Elimination System (NPDES) and Storm Water Pollution Prevention Plans (SWPPP).

8.5.13 Waste Material

During the construction process a stream of waste material will be generated. Brush, spoil material, and scraps of wood, metal, and plastics will be collected and removed from the construction sites by the construction contractor at periodic intervals. Storage between removal

days will be in a designated area. Collection and removal of such material must be by authorized individuals.

8.5.14 Existing Vegetation

During the construction process, portions of the site will be cleared to make room for new wastewater structures, and leave adequate space for construction vehicle access and lay-down area. To preserve the remaining vegetation other measures will be in place to limit dust and other debris from damaging the vegetation slated to remain. See previous sections. Some of these areas will be re-vegetated with the same or similar species that were initially present. In some cases different species will be selected to provide better visual or noise buffers for adjacent properties.

8.5.15 Energy

Energy use during construction is an unavoidable occurrence. Section 7.11 of this report evaluates each of the three wastewater plans with respect to their energy consumption during normal operations, and demonstrates that Plan 2 would use the least amount of energy on an annual basis. Since the greenhouse gas emissions are closely related to energy use, Plan 2 would have the lowest amount of those emissions.

8.5.16 Generation of Solid Waste

Any of the three wastewater plants would generate solid waste in the form of grit, screenings, and dewatered sludge. Since the quantities of wastewater treated are all within 10% of one another, so too would the quantities of these solid wastes. Solid waste generation is not a significant issue for this project, and the three plans are essentially the same in that regard.

8.5.17 Public Health

Section 3 of this report, the needs assessment, identifies those few properties in Orleans that might benefit from public sewers in a sanitary sense. Those properties are few enough in number, and the issues are benign enough, that public health is not a significant issue even in the No Action Plan.

8.5.18 Community Growth and Land Use

In many communities, the construction of public sewers allows unintended growth that can represent a significant indirect impact of the project. As detailed in Section 7.19 of this report, Orleans is undertaking steps to mitigate this impact or eliminate it altogether. The Town intends that this wastewater project will be "growth neutral"; that is, it will neither restrict growth nor will it promote more growth than allowed under current zoning bylaws. These tools are being developed; see Section 11.5.6. Given this approach by the Town, no significant indirect impacts are expected related to community growth or development of land beyond what would occur in the No Action Plan. This applies to each of the three plans being evaluated.

8.6 REGULATORY STANDARDS AND REQUIREMENTS

There are a number of regulatory programs and permitting requirements that apply to all three of the wastewater plans under consideration. These include:

- DEP approval of the CWMP.
- DEP Groundwater Discharge Permitting under 314 CMR 5.0. A groundwater discharge permit is required for each treatment facility and its associated effluent disposal sites.
- Compliance with the federal Clean Water Act through nitrogen-based TMDLs as implement by DEP.
- The DEP Reclaimed Water Permit Program (314 CMR 20.0) applies to the proposed golf course irrigation in Plan 3 and any supplement effluent reuse that might be incorporated into Plans 1 or 2.
- DEP Plan Review is required for any of the treatment plants, once final plans and specifications have been prepared.
- DEP Site Assignment under MGL Chapter 83 Section 6 is required for any publicly-owned wastewater site.
- DEP Sewer Extension Permits will be needed for system expansion after completion of the first phase.
- Compliance with the Massachusetts Wetlands Protection Act and local supplemental bylaws is necessary for all proposed work activities located within protectable Wetland Resource Areas and/or their associated Buffer Zones.
- The project must be reviewed under the requirements of the Massachusetts Environmental Policy Act (MEPA) which will require both an Environmental Notification Form and an Environmental Impact Report.

- The project must comply with the Cape Cod Commission's Regional Policy Plan and undergo review as a Development of Regional Impact (DRI).
- Review must be conducted under the Massachusetts Natural Heritage and Endangered Species Program, pursuant to the Massachusetts Endangered Species Act.
- Review must be conducted under the program of the Massachusetts Historical Commission.
- All activities must be consistent with the two Areas of Critical Environmental Concern.
- Any facilities constructed in the southeastern corner of Brewster must comport with its District of Critical Planning Concern.
- Compliance with the regulations of the Old Kings Highway Regional Historic District is required for above-grade structures located in the District (all areas of Orleans north and west of Route 6A).
- The Town must issue building permits for treatment facilities and pumping stations after compliance with the State Building Code is demonstrated.
- Permits are required from MassHighway for all construction work in state roads.

Compliance with these programs must be demonstrated at various stages of project development.

8.7 MITIGATION MEASURES

There are many mitigation measures that will be employed should any of the three wastewater plans be implemented. These include:

- Restricting sewer construction work to the period of October to May to avoid periods of high traffic;
- Segmenting sewer work on public streets to avoid protracted closures;
- Designing sewer lines and pump station to avoid floodplains and to minimize encroachment on the buffers of wetlands and other protected resource areas;
- Restricting work hours on construction sites near residential areas;
- Requiring contractors to implement dust control measures;
- Erosion and siltation controls at all construction sites as part of site-specific stormwater management plans;
- Compliance with all terms of Orders of Conditions for work in wetland buffers;
- Installation of odor and noise control systems on operating equipment and facilities;
- Implementation of policies that restrict potential odor-generating activities to times of the day with the least impact;

- Compliance with applicable standards for construction activities near historic structures;
- Facility siting to avoid, minimize, and mitigate impacts to habitat of rare and endangered species, including compliance with all NHESP conditions;
- Facility site design to include vegetated berms and to maximize natural buffers;
- Selection of wastewater treatment equipment to minimize energy use and maximize nitrogen removal; and
- Adoption of bylaws and regulations to ensure a "growth neutral" program.

8.8 THE "NO ACTION" ALTERNATIVE

It is very important to envision Orleans and its environment in the scenario where none of the documented wastewater management needs are formally addressed; that is under the "no action" alternative.

In some ways, the "no action" alternative has manageable impacts. The needs assessment has determined that very few properties in Orleans have on-site septic systems that would be expected to create serious unhealthful or nuisance conditions. The continuation of current on-site disposal practices poses no significant risk to the water supply. By definition, wastewater needs associated with convenience and aesthetic factors do not pose substantive risks to the town if they are not addressed with off-site solutions. The Town intends to develop a growth-neutral wastewater management plan that neither restricts nor promotes growth different than allowed under current bylaws and regulations. Therefore, failure to implement wastewater management solutions should not impact economic growth. With respect to 40B housing, failure to provide off-site wastewater management capacity could restrict the options for affordable housing developers and conceivably create an impetus to locate such projects in less densely developed areas of town.

All of the above-noted impacts are relatively minor in comparison with the likely negative effects on pond and estuary quality. With respect to surface water protection, failure to address excessive nitrogen loading to estuarine waters will allow the currently observed degradation to continue and worsen. The degradation that has already occurred and been documented in Pleasant Bay, Rock Harbor and the Nauset system could lead to sharply reduced fishing and

swimming, and the eventual decline in property values. Given the great importance of coastal water quality in the Town's character and economy (of great value to both year-round and seasonal residents), lack of actions to control nitrogen loading could have very serious long-term impacts on the very resources that define the Town. With the issuance of nitrogen-based TMDLs, an enforcement mechanism will be in place that could be used by DEP to require nitrogen control. Orleans' failure to act in that setting will expose the Town to serious legal penalties and associated financial impacts. For some of Orleans' freshwater ponds, failure to remove phosphorus sources will appreciably accelerate water quality degradation.

The "no action" alternative is explicitly contrary to the Orleans Comprehensive Plan. The Comprehensive Plan, as adopted on December of 1995 and amended in October 2006, sets forth the following explicit goals:

- to preserve and improve the ecological integrity of fresh and marine waters.
- to maintain coastal water quality that allows fishing, shellfishing, and/or swimming in all three estuaries, and to protect those coastal ecosystems which support shellfish and finfish habitat.

Inaction related to the documented needs to protect ponds and estuaries is directly contrary to these important Comprehensive Plan goals.

With respect to protection of surface waters, the ramifications of "no action" would be severe. These impacts include:

- degradation of fisheries;
- impairment of water clarity and associated deterioration to swimming and other water contact sports;
- reduced opportunities for recreational and commercial shellfishing;
- floating algal mats and associated odor and visual impact;
- reduction in property values; and
- negative impact on the tourism economy

In that the impacted resources are part of the very fabric of life in Orleans, these documented needs for surface water protection warrant serious concerted attention.