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Town of Plymouth Camelot Drive Wastewater Treatment Facility Single Environmental Impact Report

Plymouth, Massachusetts

EEA #16758

September 2025



Prepared for:
**Town of Plymouth
Sewer Division**

Prepared by:
Horsley Witten Group, Inc.

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1. Project Summary

<u>Project Name:</u>	Plymouth Wastewater Treatment Facility Treated Effluent Discharge
<u>Project Location:</u> (41.926606, -70.642249)	131 Camelot Drive, Plymouth MA 02630
<u>EEA Number:</u>	16758
<u>Date Noticed in Monitor:</u>	September 25, 2023 (EENF)
<u>Project Proponent:</u>	Town of Plymouth Department of Public Works

The Town of Plymouth (the Town) proposes to change the primary discharge point of treated effluent from the Wastewater Treatment Facility (WWTF) at Camelot Drive Industrial Park from the harbor outfall to the existing on-site, open sand disposal beds. The Town is also proposing to increase the total, average annual discharge volume from the WWTF from the current 2.5 million gallons per day (MGD) to 3.0 MGD in conjunction with the requested approval to discharge 3.0 MGD at the existing WWTF disposal beds. The harbor outfall would be retained as a backup for times when the beds may be receiving maintenance, other operational considerations, or in case of unforeseen emergency conditions.

Since the EENF was filed the Project has been updated to include additional alternatives analyses, update the data included in the groundwater nutrient analysis, reassess nitrogen attenuation along the Eel River, provide clarity on the proposed mitigation measures, assess the greenhouse gas benefits of the Project, assess the Project's resiliency to climate change, reassess the potential sources of pollution within the Project's designated geographic area, analyze the Project's impact on the public drinking water supply, assess the Project's consistency with groundwater discharge regulations, develop draft Section 61 findings, and respond to comments.

Several alternatives to the Project were assessed, both as a part of the EENF and additionally as a part of this DEIR. Assessed alternatives include discharging to Site DD, Site MM, Site 101, the Cold Spring Elementary School, sites outside of the Eel River Watershed, a deep-water tunnel outfall extension, increasing WWTF nitrogen treatment while maintaining discharge at the existing outfall, and the Project itself. Ultimately the Project remains the preferred alternative as the other assessed sites are unfeasible due to site constraints such as size or hydrogeology, regulatory constraints such as the Ocean Sanctuaries Act, and/or cost and practicality considerations.

The primary environmental impact of the Project is associated with phosphorus migration to the Eel River. To avoid this impact the Project includes mitigation triggers based off of data to be collected from a series of monitoring wells. When triggered based on observed increases of phosphorus level in these various wells, mitigation measures include the evaluation, design, and implementation of improved phosphorus treatment at the WWTF prior to discharge, application of post-discharge treatment in the discharge beds, and, if necessary, curtailing discharge at the WWTF.

From a public health perspective, concerns have been raised about the Project's impact on the public drinking water supply due to the Plymouth-Carver Sole Source Aquifer, analysis shows that there are no known or potential public drinking water supplies that could be impacted and that public water supply is available for any properties that remain on private well supply with the potential to be impacted. Another potential public health impact of the Project that groundwater mounding associated with the increase in discharge could impact a very small number of on-site wastewater treatment systems (aka

septic systems). To mitigate this impact the Town will relocate or replace those systems as necessary. Lastly, while there is no construction associated with moving the discharge prioritization from the outfall pipe to the beds at the WWTF, there will be a small amount of construction associated with the installation of eight monitoring wells. To minimize the impact of the temporary increase in emissions and noise on the Environmental Justice population, construction equipment will be shut off when not in use and air and noise quality will be managed in accordance with DEP regulations.

2. Project Description and Permitting

2.1 Project Description

The Town of Plymouth (the Town) currently owns a Wastewater Treatment Facility (WWTF) located in the Industrial Park at 131 Camelot Drive, Plymouth. This WWTF has been in operation for over two decades and is currently operated by Woodward and Curran, Inc. As currently permitted, most effluent from the WWTF is discharged directly to Plymouth Harbor via an outfall with the remainder discharged to sand infiltration beds on site. The Town is proposing to reverse the prioritization of these two outfalls to discharge primarily to the sand infiltration beds, with the harbor outfall retained for emergency situations.

The existing WWTF went online in May 2002 pursuant to all applicable permitting. The Town completed an extensive Environmental Impact Report (EIR) process through the Massachusetts Environmental Policy Act (MEPA) and received a MEPA certificate in June 1997 (EOEA # 8228). The WWTF has a current Groundwater Discharge Permit (GWDP) from the Massachusetts Department of Environmental Protection (MassDEP) (July 25, 2011) (SE #1-677) and a National Pollution Discharge Elimination System (NPDES) permit (Permit No. MAG590040). The NPDES permit authorized the use of an outfall discharge into Plymouth Harbor. The current GWDP authorizes a total treatment capacity of up to 5.2 million gallons per day (MGD) at the WWTF and subsequent discharge of a lesser volume of treated effluent discharge at two locations (Figure 1).

An annual average discharge of 1.75 MGD of treated effluent discharged from the WWTF is permitted for discharge to the surface water outfall in Plymouth Harbor. Only daily effluent flows in excess of that 1.75 MGD can be conveyed to discharge at a secondary groundwater infiltration facility adjacent to the WWTF. Discharges to the infiltration facility is limited to an annual average of 0.75 MGD (275 million gallons per year). The maximum daily discharge to the infiltration beds is permitted at 3.45 MGD, equal to the WWTF design capacity (5.2 MGD) minus the primary volume discharged via the harbor outfall. The current total average daily discharge volume under the GWDP is 2.5 MGD with the ability to be increased to 3.0 MGD with prior authorization from MassDEP. The MEPA certificate also identifies the ability to increase authorized total discharge up to 3.0 MGD.

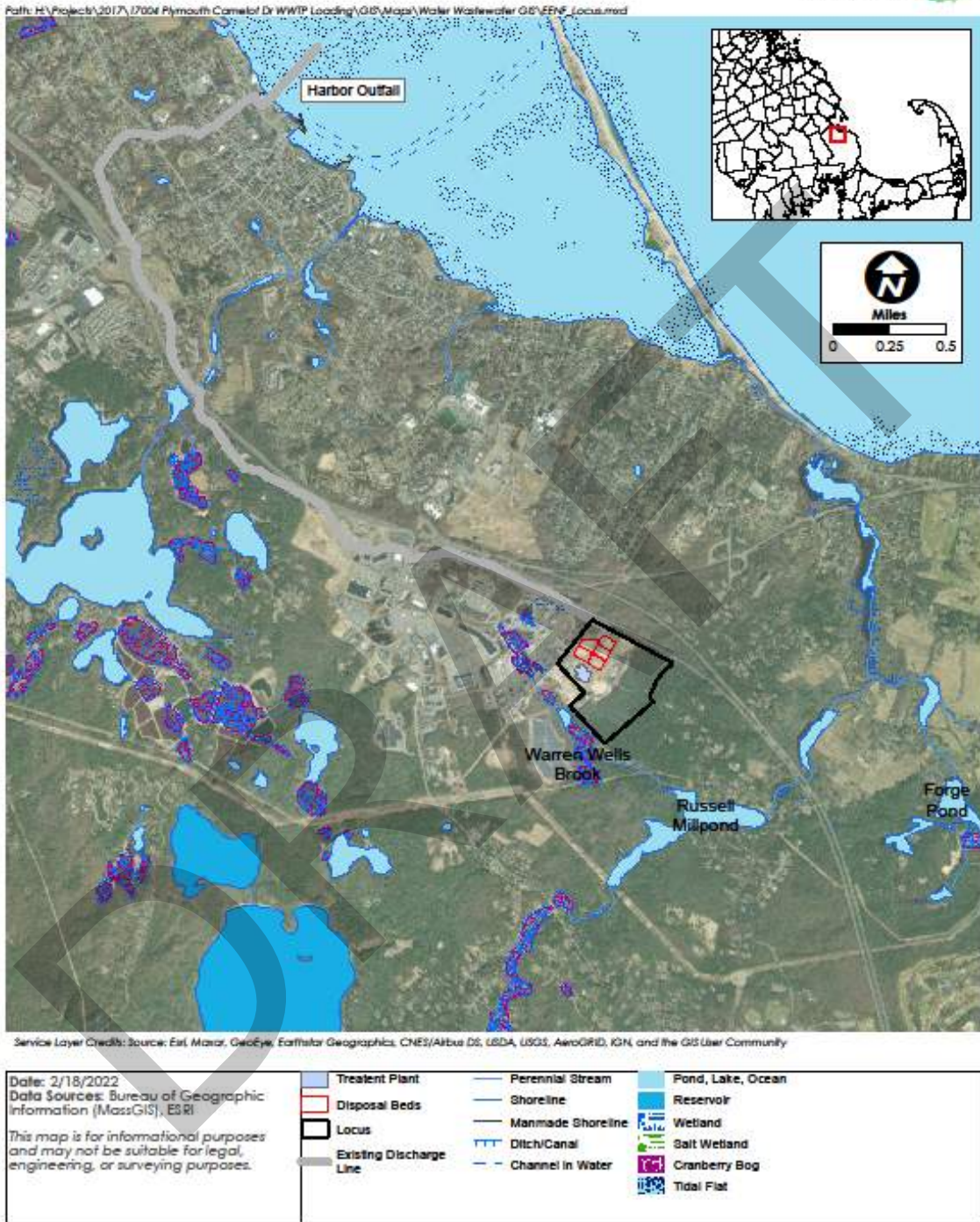


Figure 1
Locus Map

Figure 1: Location of Wastewater Treatment Facility, sand filter beds, discharge line, and outfall.

The current GWDP requirement for primary effluent discharge to the harbor has negative water quality impacts to the harbor, an important recreational and commercial aquaculture resource for Plymouth, Duxbury, and Kingston. Direct discharge to the harbor also has negative impacts on the recharge and availability of groundwater in the aquifer to support baseflow to streams and other water resources during drier time periods. Additionally, transporting treated effluent to the harbor requires pumping with consequent energy expenditure, monetary cost, and negative climate change impacts. Seeking to improve upon the current negative impacts from primary harbor effluent discharge, the Town is proposing to switch the GWDP-required prioritization of discharge locations by making groundwater infiltration at the WWTF the primary discharge point and retaining the Plymouth Harbor outfall as a secondary discharge location. While all treated effluent water discharged to the ground at the WWTF would eventually make its way to the harbor through groundwater and/or surface water path lines, the discharge of effluent to groundwater would provide for increased travel time and treatment of the effluent before it reaches the harbor. Notably, key contaminants of concern (pathogens, phosphorus, and nitrogen) would all receive varying degrees of increased treatment and/or retention via groundwater discharge compared to that which currently occurs under direct harbor discharge.

Accompanying this requested switch of discharge location prioritization, the Town is also requesting to increase the total authorized average annual discharge from 2.5 MGD to 3.0 MGD, as identified as an allowable change under the original 1997 MEPA certificate. No new infrastructure is required to switch the prioritization of discharge locations. The only new infrastructure required as a part of the Project is the proposed installation of 8 new monitoring wells. The purpose of this proposed change in discharge location prioritization is to realize multiple environmental benefits including:

- Improved water quality in the Harbor and Plymouth/Kingston/Duxbury (PKD) Bay to support recreational and commercial shellfishing, aquaculture, eelgrass, and recreational interests.
- Increased recharge of groundwater to offset public drinking water withdrawals and provide potential future mitigation credits relevant to MassDEP Water Management Act (WMA) requirements;
- Increased recharge/retention of fresh groundwater within the Plymouth-Carver Aquifer (PCA) to support baseflow to the Eel River and, potentially, Wellingsley Brook; and
- Reduced energy use required to pump treated effluent from the WWTF to the harbor outfall.

2.2 Project Updates

Elements of the Project were thoroughly detailed in an Expanded Environmental Notification Form (EENF), which was noticed in the September 25, 2023, edition of the Environmental Monitor. An EENF Certificate was issued by the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) Secretary on December 22, 2023 (Appendix A). The following changes or updates to the Project have occurred since the EENF was filed in order to address comments and concerns raised:

- Additional alternatives assessment;
- Update the data included in the groundwater nutrient analysis to the current time period;
- Reassess anticipated nitrogen attenuation along the Eel River flow path;
- Clarify the proposed mitigation measures;
- Assess the greenhouse gas benefits of the Project;
- Assess the Project's resiliency to climate change;

- Reassess the potential sources of pollution within the Project’s designated geographic area;
- Analyze the Project’s impact on the public drinking water supply;
- Assess the Project’s consistency with groundwater discharge regulations;
- Develop draft Section 61 findings; and
- Respond to comments.

2.3 EIR Scope

In the EENF filing the Proponent requested to file a Single EIR (SEIR) in lieu of the standard draft and final EIR process. The EENF Certificate denied this request, hence the filing of this draft EIR (DEIR). MEPA regulations at 301 CMR 11.07(6)(l) require a response to the Secretary’s Certificate. Section 2.3.1 through Section 2.3.10 below detail the specific elements of the scope described in the Certificate and where those elements are addressed within DEIR.

2.3.1 General

- Follow Section 11.07 of the MEPA regulations for outline and content and provide the information and analyses required in EENF Certificate (See Section 2.2).
- Clearly Demonstrate that the Proponent will avoid, minimize, and mitigate Damage to the Environment to the maximum extent practicable through project alternatives and design (See Section 9).

2.3.2 Project Description and Permitting

- Describe any changes to the project since the filing of the EENF (See Section 2.2).
- Identify, describe, and assess the environmental impacts of any changes to the project that have occurred between the preparation of the EENF and DEIR (See Section 5).
- Include an updated list of required Permits, Financial Assistance, and other state, local and federal approvals and provide an update on each of these pending actions (See Sections 2.5 and 2.6).
- Include a description and analysis of applicable statutory and regulatory standards and requirements, and a discussion of the project’s consistency with those standards (See Section 8.1).

2.3.3 Alternatives Analysis

- Provide a supplemental alternatives analysis that evaluates alternative disposal locations outside the Eel River Watershed. Alternatives should be considered through the lens that future hydraulic and nutrient loading of the Eel River Watershed may not be able to assimilate the loads associated with the proposed average annual discharge of 3.0 MGD (See Section 4.3).
- A reconsideration of Site 101 (Alternative 1) and additional consideration of the Cold Spring Elementary School property, which abuts the harbor outfall discharge line and would need little construction with the exception of a subsurface disposal system (See Section 4.1).
- Quantify and compare the environmental impacts of each of the alternatives considered; redefine the Preferred Alternative as appropriate; and describe the reasons(s) that the ultimate Preferred Alternative was chosen (See Section 4.6).
- For each new alternative present full analysis and modeling, including groundwater mounding and nutrient dispersal analysis to show how the conclusions about the time period, rates, or distance of nutrient dispersal would differ based on the new locations studied (See Section 4).

- Support the selection of the Preferred Alternative that includes all feasible measures to avoid Damage to the Environment, or to the extent Damage to the Environment cannot be avoided, to minimize and mitigate Damage to the Environment to the maximum extent practicable (See Section 4 and Section 9).
- Coordinate with MassDEP to develop the revised alternatives analysis (See Section 10.2).

2.3.4 Environmental Justice/Public Health

- Include a separate section on Environmental Justice and contain a description of measures the Proponent has taken, and intends to undertake, to promote public involvement by EJ Populations during the remainder of the MEPA review process and subsequent permitting, including a discussion of any of the best practices listed in the MEPA EJ Public Involvement Protocol that the project intends to employ or has employed by the time of the DEIR filing (See Section 7).
- Distribute to the EJ Reference List, and an updated list should be obtained from the MEPA Office prior to filing the DEIR so as to ensure that organizational contacts are up to date (See Section 6).
- Hold at least one public meeting prior to filing the DEIR and should specifically present at the meeting, in addition to overall project details and timeline, the Proponent's revised alternatives analysis, any updated data on nutrient loading for phosphorus and nitrogen, and revised monitoring plans (See Section 2.4).
- Supplement the EJ analysis presented in the EENF. Specifically, include a revised description of the potential sources of pollution within the DGA, based on mapping layers available through the DPH EJ Tool (See Section 7).
- To the extent further design changes are made, update the analysis of the Project's impacts to determine whether the project may result in disproportionate adverse effects, or increase the risks of climate change, on the identified EJ Population, in accordance with 301 CMR 11.07(6)(n)2. and the MEPA Interim Protocol for Analysis of EJ Impacts (See Section 7).
- Discuss any known or reasonably foreseeable public health consequences that may result from the environmental impacts of the project. Particular focus should be given to any impacts that could affect the Plymouth-Carver Sole Source Aquifer and public drinking water supply (See Section 8.1.1).
- Compare the impact of each alternative to groundwater and drinking water supply (See Section 4 and Section 8.1).
- Contain specific discussion of performance standards for groundwater discharge permitting, how such standards will protect public health, and whether the project will meet or exceed such standards (See Section 8.1.2).

2.3.5 Wastewater

- Include a narrative and simplified table describing potential impacts to environmental resources (including but not limited to groundwater and surface waters, drinking water supply, fisheries, state-listed species, etc.) resulting from the proposed Project (including, but not limited to nutrient loading, groundwater mounding, hydraulics, etc.) and mitigation that can be implemented to reduce potential impacts (See Section 5.2 and Section 5.4.1).
- Include an analysis of the potential mitigation measures to reduce the concentration of phosphorus in the treated effluent or to slow the migration of the phosphorus plume. The

analysis should include what each mitigation measure would entail, the amount of phosphorus attenuation provided, and how each mitigation measure would be implemented (See Section 5.4.1).

- In light of the identified transcription error, reassess the nitrogen attenuation provided by the Project and any conclusions drawn from the MEP report in relation to the proposed Project (See Section 5.1).
- Propose additional mitigation measures to reduce the future nitrogen impact in the southern portion of the PDK estuary (See Section 5.4.4).
- Present a revised monitoring plan to track the progress of both nitrogen and phosphorus dispersion through the Plymouth-Carver Aquifer and to implement mitigation measures before significant nutrient loading impacts the Eel River (See Section 5.3).
- Provide revised modeling and analysis regarding groundwater mounding and nutrient loading based on any alternative disposal locations studied for the Project (See Section 4).
- Discuss what mitigation will be provided in the event groundwater mounding analysis shows that wastewater flows would impact any nearby septic systems (See Section 5.4.2).

2.3.6 Climate Change

- Include a comprehensive discussion of the potential effects of climate change on the WWTF and describe features incorporated into the Project design that will increase the resiliency of the site to these changes (See Section 6.2).
- Document the capacity of the groundwater infiltration beds and discuss their ability to manage both the proposed average annual discharge of 3.0 MGD and any increased anticipated precipitation volumes resulting from climate change (See Section 6.2).
- Evaluate the effect of increased precipitation volumes in the groundwater mounding and dispersion analysis, and provide quantitative analysis or modeling to assess the extent to which increased precipitation volumes would affect the conclusions regarding the time horizon or distance over which nutrients are anticipated to disperse (See Section 6.2).
- Provide calculations of the GHG benefits associated with the reduction in energy use associated with moving the discharge location inland (See Section 6.1).
- Compare the GHG impacts associated with the additional alternative locations studied for the Project (See Section 6.1).

2.3.7 Construction Period

- To the extent an alternative location is advanced as the Preferred Alternative, fully describe construction impacts associated with the Project (See Section 4).
- Describe how construction activities will be managed in accordance with applicable MassDEP regulations regarding Air Pollution Control (310 CMR 7.01, 7.09-7.10), and Solid Waste Facilities (310 CMR 16.00 and 310 CMR 19.00, including the waste ban provision at 310 CMR 19.017) (See Section 5.4.3).
- Construction equipment should use engines meeting Tier 4 federal emissions standards, or if unavailable, confirm that the Project will require construction contractors to use Ultra Low Sulfur Diesel fuel, and discuss the use of after-engine emissions controls, such as oxidation catalysts or diesel particulate filters. Describe how the project will comply with all said applicable requirements (See Section 5.4.3).

2.3.8 Mitigation and Draft Section 61 Findings

- Include a separate chapter summarizing all proposed mitigation measures including construction-period measures, including a comprehensive list of all commitments made by the Proponent to avoid, minimize, and mitigate the environmental and related public health impacts of the Project (See Section 9).
- Include a separate section outlining mitigation commitments relative to EJ Populations (See Section 5.4.3).
- Contain clear commitments to implement these mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsible for implementation, and contain a schedule for implementation. The list of commitments should be provided in a tabular format organized by subject matter (traffic, water/wastewater, GHS, environmental justice, etc.) and identify the Agency Action or Permit associated with each category of impact (See Section 9).
- Draft Section 61 Findings should be separately included for each Agency Action to be taken on the project (See Section 9).
- Clearly indicate which mitigation measures will be constructed or implemented based upon project phasing to ensure that adequate measures are in place to mitigate impacts associated with each development phase (See Section 9).

2.3.9 Responses to Comment

- Contain a copy of the Certificate and a copy of each comment letter received (See Section 10).
- Include a comprehensive response to comments that specifically address each issue raised in the comment letter. This directive is not intended, and shall not be construed, to enlarge the scope of the DEIR beyond what has been expressly identified in the Certificate (See Section 10.2).

2.3.10 Circulation

- Circulate the DEIR to each Person or Agency who commented on the EENF, each Agency from which the Project will seek Permits, Land Transfers or Financial Assistance, and to any other Agency or Person identified in the scope (See Section 2.4).
- The Proponent may circulate copies to commenters in a digital format, by directing commenters to a project website address, or electronically (See Section 2.4).
- The Proponent must make a reasonable number of hard copies available to accommodate those without convenient access to a computer and distribute these upon request on a first-come, first-served basis (See Section 2.4).
- A copy should be made available for review in the Plymouth Public Library (See Section 2.4).

2.4 Project Outreach

Electronic copies of this DEIR are available upon request and a hardcopy will be provided to the Plymouth Public Library. Please see Appendix B for the DEIR distribution list, which includes all persons and agencies who commented on the EENF and all persons and organizations on the EJ reference list provided by the Executive Office of Energy and Environmental Affairs EJ Office.

Following the receipt of the MEPA Certificate on December 22, 2023, the Town of Plymouth Select Board created the Wastewater Groundwater Discharge Citizen Advisory Committee (the Committee). The following is included in the Committee description: “The primary function of the Citizens Advisory

Committee will be to provide a platform for citizen input, feedback, and collaboration with town departments, related to wastewater treatment and disposal. By being comprised of citizens directly, the Committee helps to enhance transparency, accountability, and inclusivity in policy development and implementation.”¹ The Committee has convened approximately ten times in meetings open to the public with agendas posted for public consumption at least 48-hours in advance in accordance with Massachusetts Open Meeting Law. Committee agendas, presentations, and documents related to the 2023 filing of the EENF can be found on the Committee website here: <https://www.plymouth-ma.gov/1436/Wastewater-Groundwater-Discharge-Citizen>.

A public meeting was held in advance of this filing to present the Project and its timeline, the revised alternatives analysis, updated data on nutrient loading, and the revised monitoring plans. This was held on **INSERT DATE, TIME, LOCATION**

2.5 Regulatory Requirements

Following the Final EIR, the sole outstanding required permit is a Massachusetts Department of Environmental Protection (MassDEP) Groundwater Discharge Permit (GWDP) modification. GWDPs are required for any facility that discharges 10,000 gallons per day or more of sanitary wastewater. The Plymouth WWTP has an existing GWDP that has been administratively continued. This GWDP will need to be modified in order for the Project to proceed as proposed. A general condition of all GWDPs is that “no discharge authorized in the permit shall cause or contribute to a violation of 314 CMR 4.00: *Massachusetts Surface Water Quality Standards*.” In the Massachusetts Integrated List of Waters for the Clean Water Act 2022 Reporting Cycle, Eel River is classified as a Category 5 water (“Waters requiring a TMDL”) for the impairments of Fanwort and Benthic Macroinvertebrates and Russell Millpond is classified as a Category 5 water for the impairments of algae and dissolved oxygen.² Neither waterbody is among the waters listed as requiring a TMDL for Total Phosphorus or Total Nitrogen. It is anticipated that the reprioritization and increase in discharge will not be in violation of the Massachusetts Surface Water Quality Standards.

Before an application to modify the GWDP can be submitted the MEPA process needs to be complete and a hydrogeologic evaluation and report must be included in the application. Following this DEIR the next and final step in the MEPA process is a Final EIR (FEIR). A hydrogeologic evaluation and report has been completed and was included in the EENF.

2.6 State and Federal Financial Assistance

To date this project has not received any state or federal financial assistance.

3. Updated Groundwater Nutrient Analysis

The EENF for this Project included an analysis of nutrient data records for the WWTF effluent, groundwater, and surface water to evaluate any changes of nitrogen and phosphorous within the surrounding environment. The EENF utilized the most up-to-date data available, which ran through 2021.

¹ <https://www.plymouth-ma.gov/1436/Wastewater-Groundwater-Discharge-Citizen>

² <https://www.mass.gov/doc/final-massachusetts-integrated-list-of-waters-for-the-clean-water-act-2022-reporting-cycle/download>

As part of the development of this DEIR the Project Team updated this analysis to include newly available data extending the data set through 2024.

3.1 WWTF Effluent

3.1.1 Flow Data

Monthly averages of daily effluent flow were obtained from the treatment plant operators from May 2002 to December 2024. Flow data is calculated for both the effluent discharged to Plymouth Harbor and the effluent discharged to the on-site disposal beds (Basin). Figure 2 shows the annual average flows for both the harbor outfall and the Basin. On average the daily harbor effluent flow over the past 22 years is approximately 1.5 MGD, excluding 2016, 2022, 2023, and 2024. These years are excluded due to large periods when flow to the harbor outfall was minimized for a variety of reasons, as described below. Based on these flow data the WWTF is currently discharging a little over half the currently permitted discharge rate of 2.5 MGD.

There was no flow discharged to the harbor outfall between July 2016 and October 2016 due to construction to repair sewer main breaks. The average daily Basin flow in this time period was 1.6 MGD. In 2022 the Town conducted a Peracetic Acid (PAA) disinfection study in order to test switching the WWTF's disinfection from liquid sodium hypochlorite and bisulfate to PAA. To protect the surface waters of Plymouth Harbor from potentially receiving partially disinfected wastewater, MassDEP temporarily suspended the requirement that "the flows to the ocean outfall shall be maximized" for the term of the study, which ran from April 2022 to August 2022. Between April 2023 and June 2023 all effluent was discharged to the Basin to avoid the risk of permit violations while the Town demolished and replaced the existing fiberglass baffle walls in two chlorine contact tanks. Similarly all effluent was discharged to the Basin to avoid the risk of permit violations while the Town replaced two 18' plug valves for sequence batch reactor number one and number three – the first was replaced in March 2024 while the second was replaced in October 2024.

Notably, the significant increase in flow to the basins over the last several years has allowed for a more complete assessment of the groundwater impacts from basin discharge than had previously been the case.

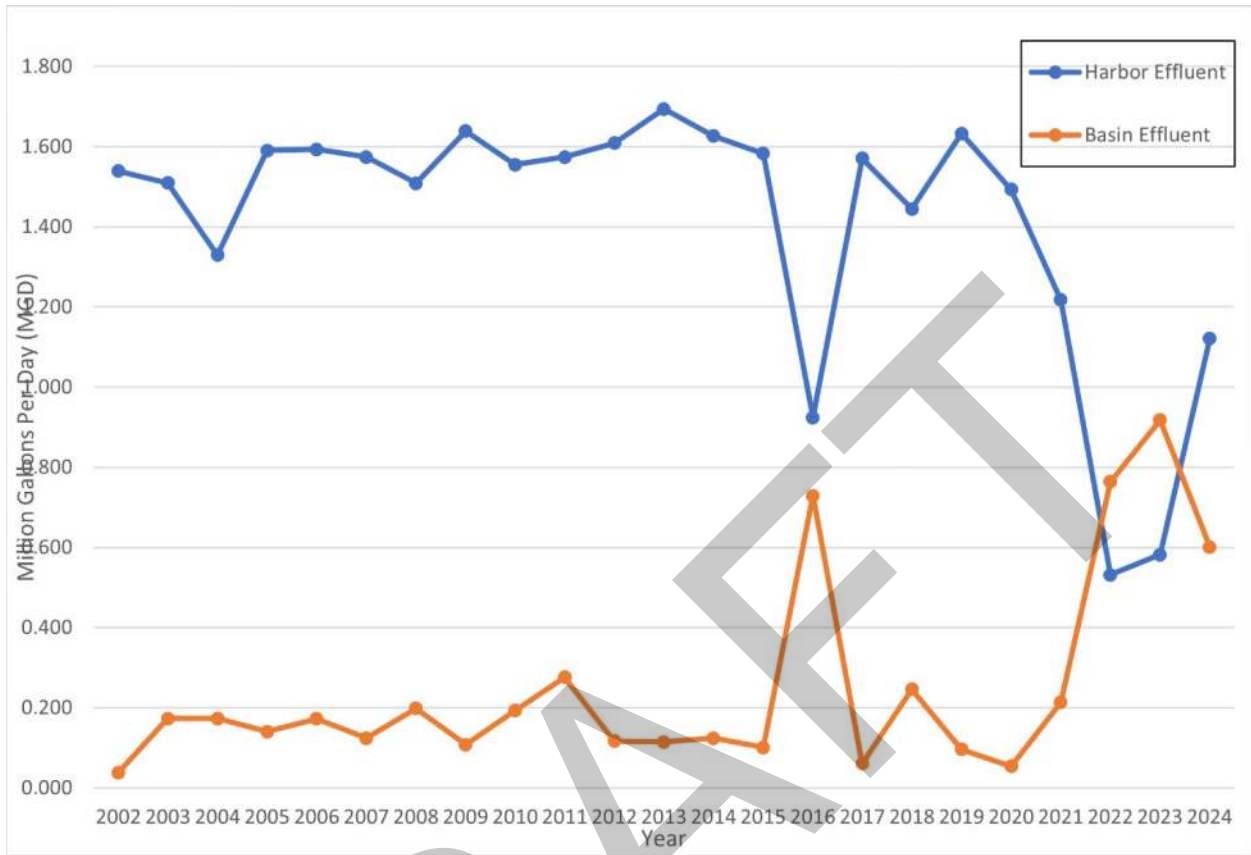


Figure 2 Annual average flow of WWTF effluent

3.1.2 Nutrient Data

Nitrogen and phosphorus concentrations were evaluated from May 2002 to December 2024. Figure 3 shows the annual average concentrations of the phosphorus and nitrogen in the WWTF effluent from 2002 to 2024. Average nitrogen concentrations have been below the maximum of 10 mg/L allowed as per the current MassDEP groundwater discharge permit. The overall average concentration of nitrogen in the WWTF effluent is 5.8 mg/L. There is no guidance on the maximum phosphorus levels in the current MassDEP groundwater discharge permit, but concentrations have remained below 6.5 mg/L since 2002 with an average concentration of 4.3 mg/L.

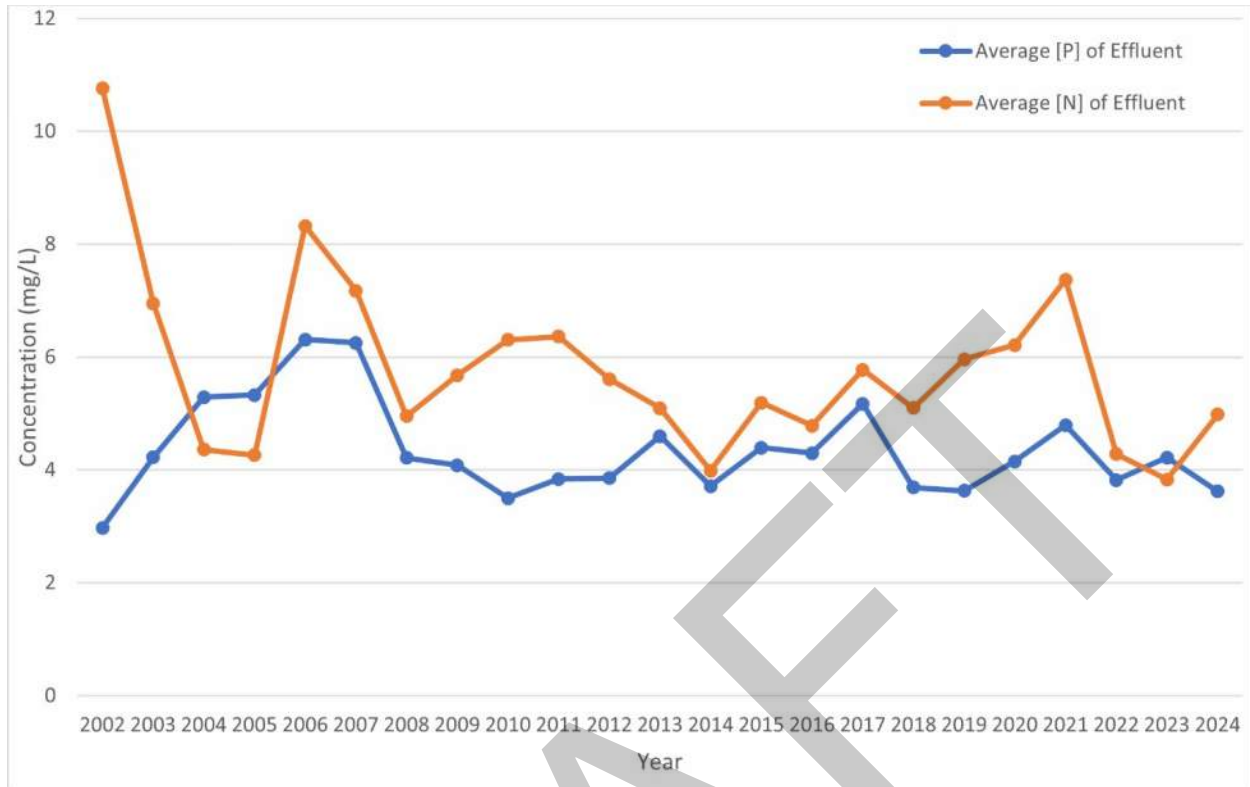


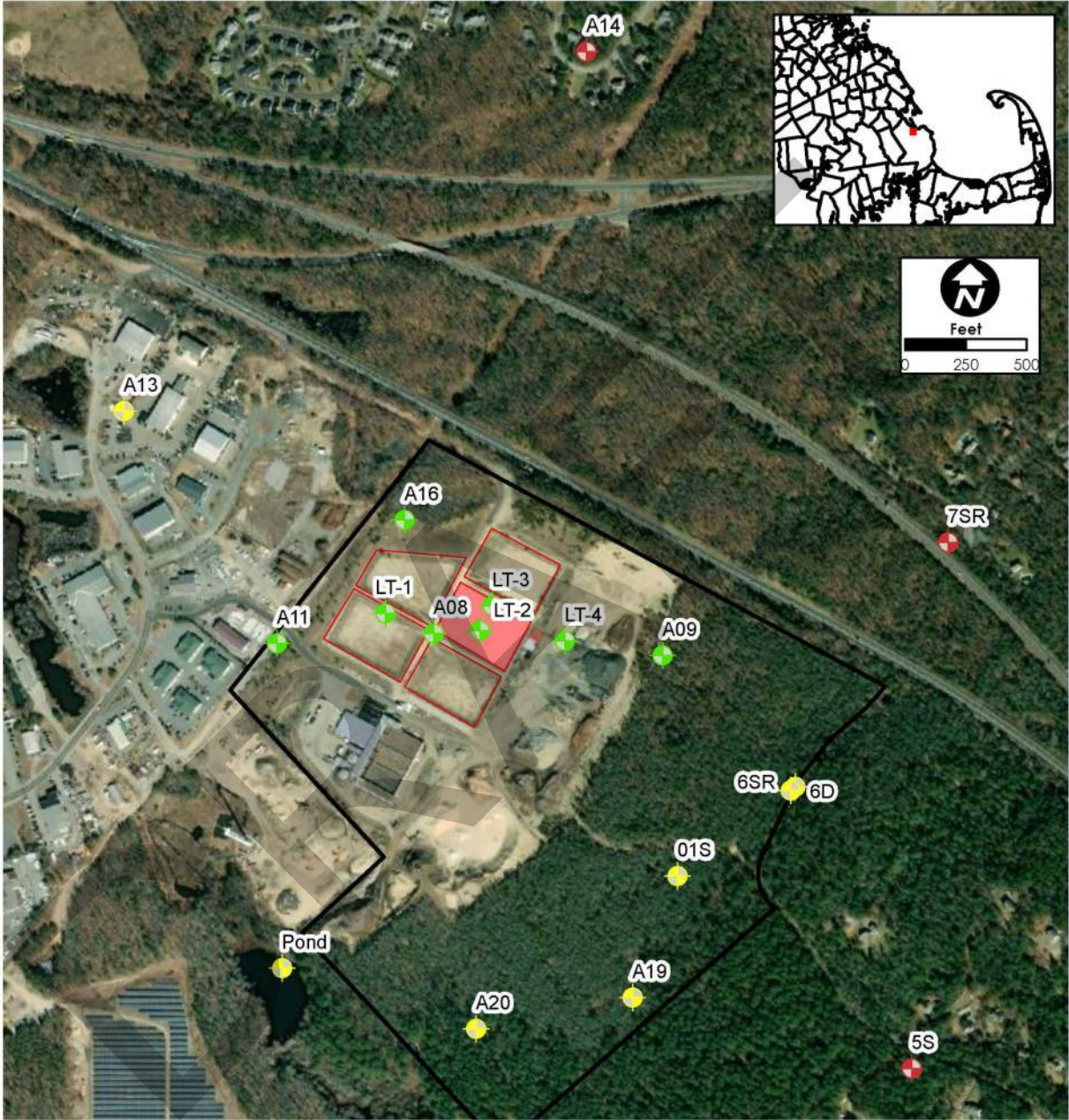
Figure 3 Annual average phosphorus (P) and nitrogen (N) of WWTF effluent

3.2 Groundwater Sampling

3.2.1 Well Locations

Under the Nutrient Management Plan (NMP), implemented to monitor water quality changes in the Eel River system, and the MassDEP groundwater discharge permit, the Town samples numerous groundwater wells either monthly, quarterly, or biannually to monitor any potential impacts to groundwater from the WWTF. Refer to Table 1 for a list of the wells analyzed and the distance each well is from the WWTF sand beds and to Figure 4 for a map of monitoring well locations. The majority of the wells have consistent data from 2006 to 2024 with a few wells having data back to 1998. Monthly data was collected at the majority of the wells. Wells LT1-4 were only sampled in 2021 and 2022.

Path: H:\Projects\2017\17004 Plymouth Camelot Dr WWTP Loading\GIS\Maps\EENF>LoadingTestSetup.mxd



Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

<p>Date: 2/22/2022 Data Sources: Bureau of Geographic Information (MassGIS), ESRI <i>This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes.</i></p>	<p>□ Locus</p>	<p>■ Disposal Beds</p>	<p>■ Loading Test Monitoring Wells</p>
		<p>□ Beds</p>	<p>⊕ Far</p>
		<p>■ Bed 4, recieved loading</p>	<p>● Mid</p>
			<p>● Near</p>

Figure 4 Monitoring Well Locations

Table 1 Groundwater monitoring wells and their distance from the WWTF sand beds

<i>Well</i>	<i>Distance from Center of sand beds (ft)</i>
<i>LT-1</i>	215ft (Directly under sand beds)
<i>LT-2</i>	185ft (Directly under sand beds)
<i>LT-3</i>	265ft (Directly under sand beds)
<i>LT-4</i>	545ft
<i>A8</i>	0ft (Directly under sand beds)
<i>A16</i>	428ft
<i>A9</i>	946ft
<i>A11</i>	651ft
<i>6SR</i>	1626ft
<i>6D</i>	1627ft
<i>1S</i>	1775ft

3.2.2 Nutrient Data

Nitrogen and phosphorous concentrations were evaluated at each well listed in Table 1 to determine the extent and level of nutrient migration that has occurred since the facility began operation in 2002. Figure 5 and Figure 6 compare the cumulative volume of effluent infiltrated at the sand beds with nitrogen and phosphorus concentrations, respectively, observed in the wells listed in Table 1.

Figure 5 indicates little to no correlation between nitrogen concentration observed in the groundwater wells and the cumulative volume of effluent infiltrated at the sand beds. One possible explanation for this finding is the combination of the fact that use of the sand beds has been generally sporadic and the fact that nitrogen travels relatively quickly through groundwater. If the timing of sampling did not always align consistently with timing of sand bed use, the observed nitrogen concentrations in wells would not produce a consistent relationship. The observed nitrogen concentrations in the wells (ranging generally from approximately 1 to 5 mg/L) are elevated above what natural background conditions would be and are not terribly far below the WWTF effluent concentrations. Therefore, even though a good correlation relationship is not evident from Figure 5, groundwater downgradient from the disposal beds does clearly show an elevated nitrogen influence from the WWTF.

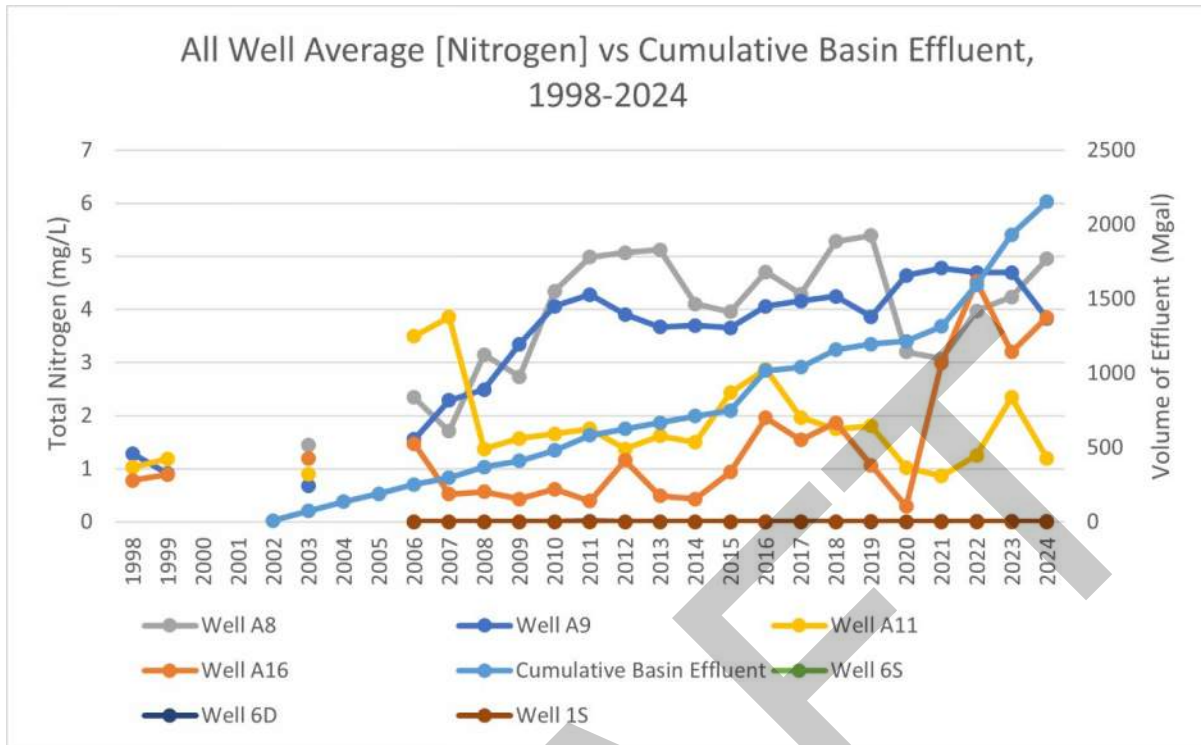


Figure 5 Groundwater wells annual average total nitrogen concentrations vs cumulative basin effluent volume, 1998-2024

As shown in Figure 6 the WWTF effluent released into the ground does appear to have had an effect on observed phosphorus concentrations at Well A8, directly below the sand beds. No other monitored wells have yet shown a clear indication of phosphorus impact, though the slight uptick in concentration for well A16 at the end of the data period may indicate that phosphorus from the discharge has begun to reach that next closest well. The LT series wells are not formally part of the NMP required monitoring and the current WWTF operators have not monitored those wells in recent years. They have been informed to resume monitoring of those wells.

The groundwater phosphorus concentration at Well A8 did not begin to rise significantly until approximately the 2010/2011 timeframe, a time at which a total of approximately 600 million gallons (Mgal) had been cumulatively infiltrated since WWTF operation began in 2002. Note that there have been some issues with sampling techniques over the years related to filtering and preserving of field samples that has created some variability in phosphorus concentrations. The two anomalously elevated phosphorous concentrations for Well 8 from 2008 and 2009 are likely to be one example of that issue. This issue is discussed in greater detail below relative to water quality sampling that occurred at the LT series monitoring wells immediately at the sand disposal beds for a short period in 2021 and 2022.

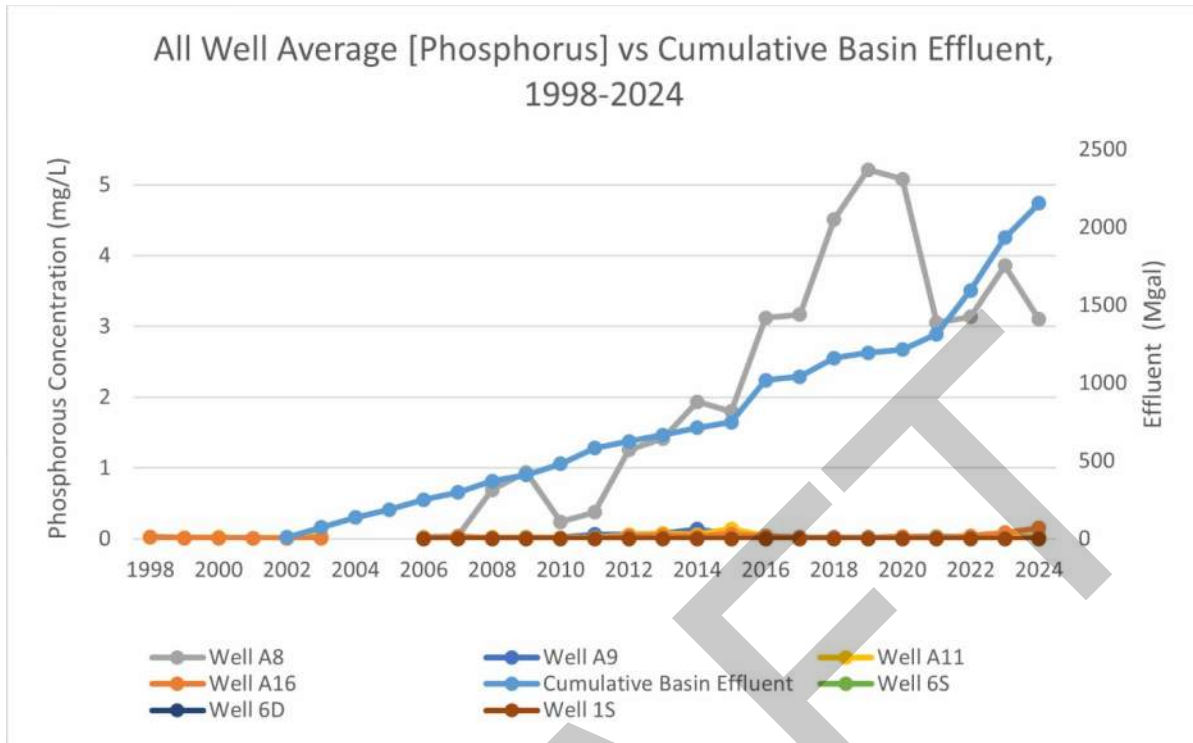


Figure 6 Groundwater wells annual average total phosphorus concentrations vs cumulative basin effluent volume, 1998-2024

Figure 7 depicts the relationship between Well A8’s observed phosphorus concentrations over time and the cumulative amount of WWTF effluent phosphorus that had been infiltrated up to that point in time. The depth to groundwater at Well A8 under current conditions is approximately 27.6 feet. Based on Figure 7, approximately 450lbs of phosphorus loading occurred before phosphorus could fully traverse the unsaturated zone and reach groundwater at Well A8. This equates to approximately 16lbs of phosphorus to traverse each vertical foot of unsaturated zone.

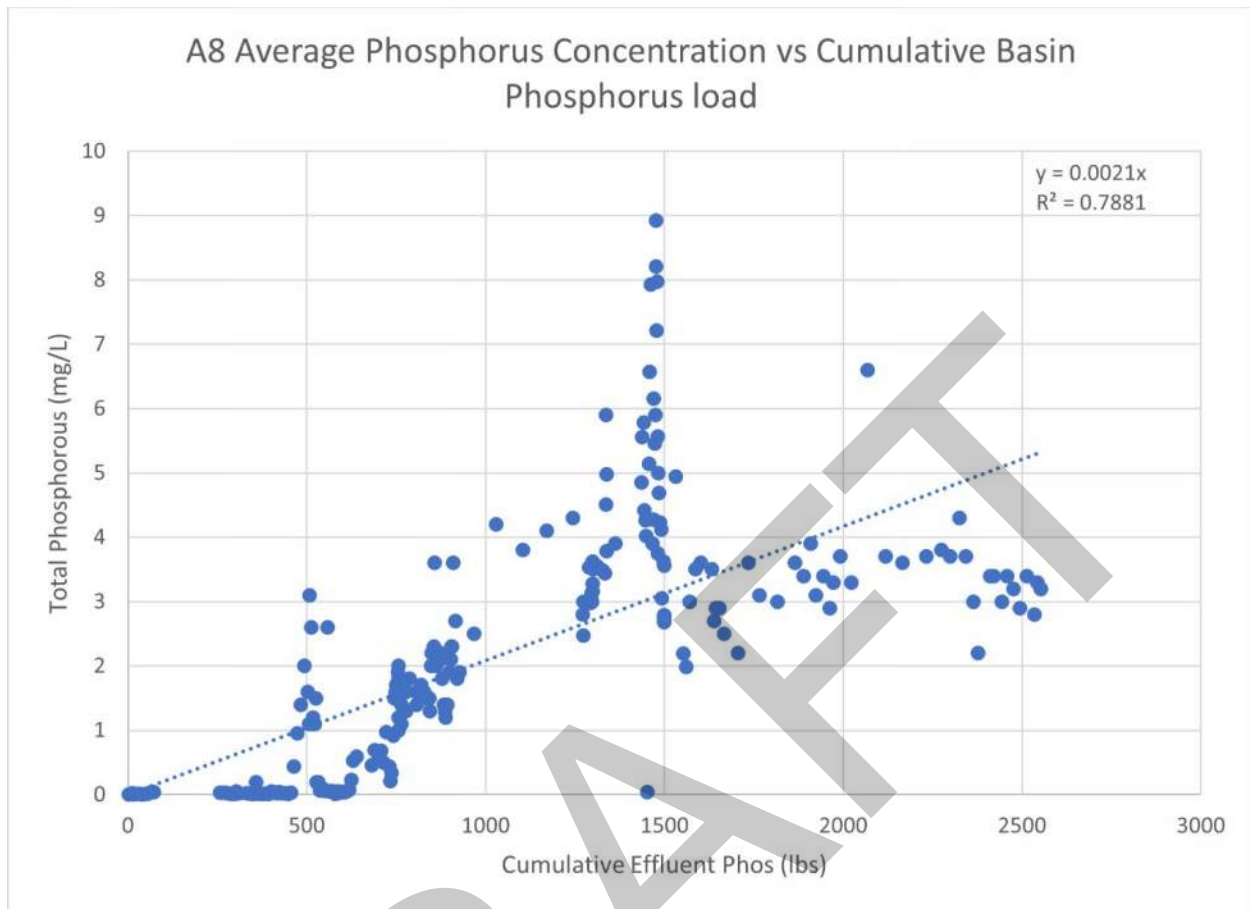


Figure 7 Well A8 average total phosphorus concentration vs cumulative basin phosphorus load

Based on effluent flow and phosphorus monitoring, the WWTF has infiltrated an estimated total of 2,553lbs of phosphorus from the start of operation in 2002 until December 2024. No significant phosphorus impact to any of the other monitored groundwater wells has yet been observed, excluding wells LT1-3 which are also located directly beneath the disposal beds and for which sampling only occurred for a short period in 2021 and 2022. The second closest well to the sand beds is Well A16 at 428ft from the center of the sand beds. The slight uptick in phosphorus concentration for well A16 in 2024 may indicate that phosphorus from the discharge has begun to reach that next closest well, though that cannot be determined as of yet.

Sampling of the LT series wells 1-4 only occurred between June of 2021 and November 2022 as those wells were only recently installed in preparation for the hydraulic loading test and are not part of the NMP or GWDP sampling programs. Sampling of these wells occurred roughly quarterly over that time period. The current WWTF operators did not sample the LT series wells when they began plant operations but are now aware of the need to sample them. Sampling dates and results for LT1-4 wells are shown in Table 2 and Table 3. As described in Table 1, LT-1, LT-2, and LT-3 are all directly under the WWTF sand beds. Well LT-4 is located approximately 545ft from the center of the sand beds. Based on Table 2, there is no significant difference in nitrogen concentration between the wells under the sand beds (LT-1-3) and the well to the east of the beds (LT-4). The anomalously high nitrogen value for the June 10, 2021 sampling date at LT-1 is considered to be an error of some kind. Table 3 indicates that the

wells under the sand beds have a significantly higher concentration of phosphorus than the well to the east (LT-4). Consistent with the conclusions made from the groundwater wells discussed in the previous section, phosphorus appears to have traversed vertically into groundwater but has not migrated horizontally far from the sand beds.

Table 2 LT wells nitrogen results

Sampling Date	Total Kjeldahl Nitrogen (mg/L)				Nitrite (mg/L)				Nitrate (mg/L)			
	LT-1	LT-2	LT-3	LT-4	LT-1	LT-2	LT-3	LT-4	LT-1	LT-2	LT-3	LT-4
6/10/2021	<2.0	<0.8	<0.8	<0.8	0.014	0.427	<0.01	<0.01	17.1	4.3	4.9	4.94
9/22/2021	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	3.8	3.8	8.9	4.2
11/16/2021	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	3.7	2.9	3.1	4
1/26/2022	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	2.2	4.1	4.1	2.8
4/24/2022	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<0.05	4	4.2	3.5	3.8

Table 3 LT wells phosphorus results

Sampling Date	Total Phosphorus (mg/L)					Total Ortho-Phosphorus (mg/L)					Total dissolved Phosphorus (mg/L)			
	LT-1	LT-2	LT-3	LT-4	A08	LT-1	LT-2	LT-3	LT-4	A08	LT-1	LT-2	LT-3	LT-4
6/10/2021	2.47	4.23	4.19	0.079		2.48	4.21	4.23	0.032					
9/22/2021	1.3	4.2	3.6	0.45		1.3	4.4	4.5	<0.02					
11/16/2021	10	1.4	8.1	0.051	3.5	1.4	1	2.6	<0.02	3.6				
12/14/2021	2.3	14	2.8	0.13		2.6	9.8	2.5	<0.02		1.3	2.3	1.4	0.12
1/26/2022	3.2	3.9	2.7	0.068		3.9	2.4	2.9	<0.02					
4/24/2022	2.7	2.2	3.3	0.028										
11/17/2022	3.7	3.5	4.4	0.016		3.2	3.1	3.5	<0.02					

The examination of historic phosphorus data and the initiation of a frequent sampling program at the LT series wells allowed for an assessment of field sampling techniques and implications on observed phosphorus data results. After discussions with Town staff, it appears that phosphorus samples collected near the disposal beds as part of the GWDP requirements were frequently not field filtered and then placed in acid-preserved bottles. Under these conditions, the acid preservative can liberate phosphorus sorbed to the sediment particles creating artificially elevated phosphorus results. More importantly, the observed concentrations of phosphorus will increase with the turbidity of the sample on any given day creating variability in observed phosphorus results unrelated to WWTF effluent infiltration. This became clear when looking at phosphorus data for the area around the disposal beds and noting that some wells far from the beds and clearly outside of current effluent influence would exhibit inconsistent time variable peaks of elevated phosphorus.

The same situation was true for the first 3 rounds of LT series wells sampling shown above in Table 3 where the total phosphorus values sometimes appear anomalously high. Note that the ortho-phosphorus samples are not collected in preserved bottles and therefore do not exhibit the same problem. To address this issue, the December 14, 2021 sampling round was conducted submitting both

preserved and unpreserved bottles to the lab in order to assess results for both absolute total phosphorus (including that component dissolved off of sediment particles) and total dissolved phosphorus. As can be seen, the total dissolved phosphorus values are generally significantly lower than the overall total phosphorus values. WWTF staff now request the lab to send both preserved and unpreserved sample bottles so that this more critical dissolved phosphorus quantity can be measured and tracked going forward for all samples collected.

This could also account for the higher levels of A8 Total Phosphorus at a Cumulative Effluent Phosphorus amount of approximately 1,500lbs in Figure 7. The dates corresponding with the higher levels of Total Phosphorus are approximately April 2019 through April 2021. Following April 2021 the average Total Phosphorus at A8 was 3.29 mg/l with only one sample (out of forty-four) that resulted in a Total Phosphorus level above 5 mg/l.

4. Alternatives Analysis

As a part of this DEIR the Project Team performed additional screening for and analysis of disposal locations outside of the Eel River Watershed. In response to the Project's EENF, the Massachusetts Department of Environmental Protection (MassDEP) recommended further consideration of Site 101 and the Cold Spring Elementary School property, as well as other alternatives outside of the Eel River Watershed (Figure 8). In addition to these suggested alternatives the Project Team evaluated the feasibility of a deep water outfall tunnel extension and providing additional nutrient treatment at the WWTF while increasing discharge at the existing harbor outfall.



Date: 05/29/2025
Data Sources: Bureau of Geographic Information (MassGIS), Google
This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes

- ★ Alternatives Assessed
- Permanently Protected Open Space
- ▨ Zone IIs
- Effluent Discharge Line
- Eel River Subbasin
- Parcels
- Parcels without buildings
- Eel River
- Google Aerial

Plymouth WWTP DEIR
Plymouth, MA

Figure 8 Alternative Discharge Location Screening

4.1 Site 101

Site 101 is located at 183 Samoset Street in North Plymouth. The parcel is approximately 43.5 acres, owned by the Town, and is currently undeveloped and forested. The Site is bounded to the north by Leach Pond and industrial buildings on Armstrong Road, to the east by the Algonquin Heights residential development and commercial properties, to the south by Samoset Street, and to the west by Plymouth Mobile Estates mobile home community. North Triangle Pond is located approximately 1,800 feet to the west, Leach Pond is less than 400 feet to the north, and Little Pond is approximately 2,900 feet to the south.

Site 101 was previously assessed by CDM during development of the original Wastewater Treatment Facilities Plan/Environmental Impact Report (FP/EIR) dated April 30, 1997. Details of the hydrologic investigation of Site 101 are included in Volume 7 of that report, dated September 13, 1996. In this investigation, CDM reviewed available hydrogeologic information pertaining to Site 101 and its surroundings and developed and performed field work to assess conditions within the parcel itself. Site investigation and review of geologic observations at the time of the Phase IIIB FP/EIR indicated that Site 101 is located atop predominantly sandy material in glacial kame or pitted plain deposits characterized by well-sorted sands and gravels with occasional lenses of fine-grained deposits. Borings conducted by CDM encountered mostly sandy material with only one sample having significant finer materials (approximately 30% silt or finer). Borings found little evidence of low permeability layers. Lower permeability morainal deposits are present to the north as close to the Site 101 as the Plymouth-Kingston town border, however this was not believed to impact groundwater flow near Site 101. CDM predicted that discharges greater than 0.5 to 0.7 MGD would impact the North Plymouth well and public drinking water wells in Kingston, with mounded effluent flowing radially from Site 101 and discharging primarily to the Jones River, Plymouth Harbor, Billington Sea, and Town Brook.

CDM conducted groundwater modeling to assess the impacts of effluent disposal at Site 101. Discharge volumes of 0.65 and 1.25 MGD were modeled to predict impacts including groundwater rise at Leach Pond and other ponds, nutrient transport from discharge, and potential impacts to the nearby North Plymouth Well and drinking water wells in Kingston. Groundwater mounding predicted by the model was worse at Site 101 compared to candidates in the Eel River Basin. Under the 1.25 MGD discharge scenario water levels at Leach Pond were predicted to rise by as much as 6.5 feet, and levels at Triangle Pond predicted to rise by as much as 3 feet. Modeling performed by CDM also predicted increases in baseflow at three reaches of Town Brook (0.12 CFS in Lower Town Brook, 0.35 CFS in Upper, and 0.67 CFS Billington Sea reaches) as a result of 1.25 MGD discharge and related mounding. The majority of increase in groundwater discharge due to effluent disposal at Site 101 would enter Plymouth Harbor as direct groundwater discharge to the coast (1.89 CFS).

Based on these prior concerns identified in the Phase IIIB FP/EIR, as part of this DEIR process, HW reviewed available information regarding the geology of the site and performed supplementary groundwater modeling of the anticipated impacts. Surficial geologic maps of the area indicate end moraine deposits present immediately west and south of the site, with the site itself situated within coarse glacially stratified deposits. Examination of the USGS regional groundwater model for the area incorporates a lower hydraulic conductivity at Site 101 (50 feet per day) than that at the Preferred Alternative (180 feet per day). HW updated modeling of 3 MGD of discharge over an area of approximately 22 acres (based on a design loading rate of 3 gpd/ft²) shows groundwater mounding rising

above the ground surface. Modeled mounding at the location of Leach Pond aligns with the prior 6-foot rise impact simulated by the 1.25 MGD scenario modeled by CDM.

Based on the updated groundwater mounding assessment, coupled with the results of the prior investigation performed by CDM, it is likely that hydraulic impacts from treated effluent disposal at Site 101 would occur to water levels at Leach and other surrounding ponds, as well as to other low-lying areas around Site 101.

The hydrogeologic shortcomings of Site 101 are further compounded by the other impacts inherent to developing a new discharge location, when compared to utilizing the already constructed beds in the preferred alternative. These other impacts include:

- Use of this site would require the clearing approximately 22 acres of currently undeveloped, forested land;
- Use of this site would require the construction of at least 1,400 feet of discharge line at an estimated cost of approximately \$750,000, plus site preparation costs;
- Site 101 is located near residential and commercial developments which will be impacted by construction of the site and its conversion to effluent disposal.

4.2 Cold Spring School

The Cold Spring Elementary School site is an elementary school located on approximately 7.6 acres of land at 25 Alden Street. This location was not previously evaluated for discharge during development of the 1997 FP/EIR or the 2024 EENF. It was requested for assessment by DEP during the EENF process. The site is currently occupied by the school building, paved parking lots, play areas, and open fields. Approximately 3 acres of accessible lot area are not currently occupied by the school buildings or paved parking lots and walkways, further limiting the available infiltration area without demolishing the existing buildings and features of the site. Were the entire parcels cleared and utilized for effluent disposal, the 7.6 acres of total lot area are significantly smaller than the approximately 12-acres occupied by the existing Camelot Park disposal beds. The opportunity to expand this site beyond the school lot is limited, as almost all surrounding parcels are already developed with single family or multi-family housing in place. The site is approximately 300 feet from a small wetland to the north and immediately adjacent to a small wetland to the east, on Court Street. The site is approximately 2,000 feet from Nelson Beach in Plymouth Harbor. The Cold Spring School site is located within an income-designated Environmental Justice community and is located in close proximity to residences on all sides.

The most significant hurdles of the Cold Spring School for its use as an effluent disposal site are its small useable area and the obvious conflict with its current use as an elementary school. Even if the school were eliminated and the entire 7.3 acres were used for discharge, the site would only be able to receive a maximum of 1 MGD of discharge at a design loading rate of 3 gpd/ft², even before consideration of potential mounding impacts. Due to the need for setbacks and other constraints on development, the actual useful area of the site for discharge (and thus the final design loading capacity) is likely even smaller. Not to mention that replacement school facilities would need to be provided at significant cost and effort.

No field exploration (borings, test pits, etc.) has been performed at this site. Review of available surficial geology information indicates that the site is located in similar coarse glacially stratified deposits as Site 101. The USGS regional groundwater model for the area incorporates the same hydraulic conductivity at Plymouth WWTF Treated Effluent Discharge Reprioritization DEIR

Horsley Witten Group, Inc.
September 2025

the Cold Spring School as is present at Site 101. No surface streams drain the aquifer in the vicinity of the Cold Spring School. The absence of any drainage, coupled with the lower-conductivity material which may be present, results in a modeled prediction of significant mounding. Modeling 1 MGD discharge at the Cold Spring School site, in line with the anticipated design loading rate over the entire 7-acre parcel, shows mounding of approximately 45 feet above the existing water table, enough to reach near the ground surface in the vicinity of the site and create high potential for mounding impacts to infrastructure and nearby aquatic resources. Three MGD of discharge at the Cold Spring School parcel is modeled to produce a groundwater mound height of 131 feet above the existing water table (well above the land surface).

4.3 Alternative Sites Outside of the Eel River Watershed

Reanalysis of alternatives outside of the Eel River watershed was performed to identify any other potential locations for effluent disposal. The analysis focused on the portion of Plymouth outside of the Eel River watershed and within reasonable proximity to the existing effluent disposal line running from Camelot Drive to the existing harbor outfall. This search area is constrained by several natural boundaries. The Eel River watershed extends approximately 2.5 miles to the south and east of the existing WWTP. Constructing such a conveyance, necessarily crossing the Eel River itself, would likely exceed the cost, complexity, and environmental impacts of any other proposed alternative except for the deep-water outfall extension alternative.

To the north of the WWTP, across Route 3, opportunities for discharge are limited by extensive residential and commercial development extending north to the Kingston Town border. To the west, the complex of Little Pond, Billington Sea, Lout Pond, and Briggs Reservoir, the complex of Cooks Pond, Little and Great South Ponds, and South Triangle Pond, a network of cranberry bogs between these complexes, and conservation restriction protected open spaces pose a challenge to routing a discharge conveyance in this direction.

The assessor's database of parcels and aerial imagery were reviewed to identify candidate parcels within the above-identified geographic constraints. Parcels without any buildings were identified from the parcels database, and other areas without significant development were identified from aerial imagery. From this analysis three potential sites were identified – 0 Jackson's Lane/60 Off Billington Street, 385 Sandwich Street, and 0 Off Orchard Hill Road (indicated on Figure 8) After a closer assessment, none of these sites were considered a viable alternative as described below.

- 0 Jackson's Lane/60 Off Billington Street consists of two adjacent, privately owned parcels totaling approximately 44 acres. While this is a site of sufficient size, it would require significant clearing to facilitate the construction of discharge beds and, more importantly from a viability perspective, is immediately adjacent to Town Brook meaning that any of the potential negative impacts for the Eel River associated with the Preferred Alternative would be the same or worse with regards to Town Brook for this site.
- 385 Sandwich Street is a 30-acre parcel currently owned by NSTAR Electric Company. The site is currently undeveloped except for a power line running along its northern border. The parcel abuts the boundary of the Eel River watershed. Preliminary analysis of groundwater flow directions in this location, based on the regional groundwater flow model, indicates that water in this location flows to the east, ultimately discharging to the Eel River or the upper Plymouth harbor. As such, relocating disposal to this location is not anticipated to fully resolve concerns

regarding nutrient contribution to the Eel River, and would require the added cost of acquisition, clearing, and development and connection of a new disposal location.

- 0 Off Orchard Hill Road is a 30-acre privately-owned parcel. It is located within the Zone II Wellhead Protection Area for the Bradford public drinking water well. This eliminates this site from being a viable alternative for the Project.

4.4 Deep-Water Tunnel Outfall Alternative

In public meetings of the Town of Plymouth's Groundwater Wastewater Discharge Citizen Advisory Committee, the question was raised about whether or not an outfall tunnel extending past Plymouth Harbor and out a few miles into Cape Cod Bay is a viable alternative to the Project. Permitting such an outfall would require environmental studies and permitting in order to comply with the Massachusetts Ocean Sanctuaries Act (OSA), the Massachusetts Environmental Policy Act, the National Environmental Policy Act, the Federal Clean Water Act, National Pollutant Discharge Elimination System (NPDES), U.S. Army Corps of Engineers, the Massachusetts Clean Water Act, and the Massachusetts Wetland Protection Act. In particular, extensive environmental studies are required to comply with the OSA, including:

- Two years of baseline data including:
 - Eelgrass surveys;
 - Benthic samples and habitat assessment;
 - Finfish surveys; and
 - Water quality monitoring.
- Site-specific hydrodynamic modeling illustrating tides, bathymetry, mixing zones, and seasonal variations that impact the dilution and dispersion of nutrients, pathogens, and other contaminants;
- An evaluation of commercial and recreational fisheries, including the impacts of potential closures due to public health requirements and the potential impacts on the normal operation of fishing vessels or equipment; and
- A long-term monitoring plan to document that the new or modified discharge will continue to meet all applicable laws and regulations.

To conduct a preliminary evaluation of this alternative the Project Team researched similar outfall projects that have been completed or are in planning/assessment stages throughout the region, including the Deer Island Wastewater Treatment Plant Outfall Tunnel (MRWA outfall), the Marion outfall extension, and the Falmouth outfall pipe.

Completed in 2000, the MRWA outfall is a 25-foot diameter deep rock tunnel that extends 9.5 miles east of the Deer Island Wastewater Treatment Plant. At the end of the tunnel effluent is discharged through approximately 400 diffuser ports into waters 100-feet deep, a design and siting meant to prevent a single concentrated release of effluent and allow for better effluent dispersion and dilution.³ The monetary cost to construct the tunnel was \$390 million at the time and five lives were lost.⁴ Federal Clean Water Act permitting included consultations with the National Marine Fisheries Service (NMFS) regarding the

³ <https://www.mwra.com/your-sewer-system/sewer-treatment-facilities/deer-island-wastewater-treatment-plant/massachusetts>

⁴ <https://www.upi.com/Archives/2000/09/06/Sewage-tunnel-goes-into-operation-in-Boston/9241968212800/>

endangered Northern Atlantic Right Whale and Stellwagen Bank National Marine Sanctuary. At the time of permitting, the nearest critical habitat for the Northern Atlantic Right Whale was more than 16 miles away. Despite these distances the MRWA outfall required significant ongoing monitoring to ensure there would be no impact – monitoring that occurs to this day.⁵

While the proposed Project is designed to handle significantly less effluent than the MRWA outfall, it would still be required to undertake the same regulatory review process. One notable and complicating factor to this review process is that in 2016 the National Oceanic and Atmospheric Administration issued a new rule to replace the critical habitat for the North Atlantic Right Whale with two new areas.⁶ One of the two areas, the Northeastern U.S. Foraging Area, has a boundary at the edge of Plymouth Harbor. In order for a deep water outfall pipe to avoid this critical habitat completely it would have to wrap around Cape Cod over a distance of approximately 95 miles, therefore any potential outfall discharge would be within the critical habitat area and require stringent permitting requirements as a result.

In their 2023 Comprehensive Wastewater Management Plan, the Town of Marion, Massachusetts evaluated two outfall extension alternatives, both subject to the OSA, but outside of right whale habitat - Alternative C-1, an approximate 1-mile extension, and Alternative C-2, an approximate 3.4-mile extension.⁷ At the time C-1 was estimated to cost \$3.8 million and Alternative C-2 was estimated to cost \$44 million. The assessment for both alternatives acknowledged that the most challenging aspects would be the extensive permitting required and the “significant risk of unforeseen costs related to construction.” Neither alternative has been pursued.

The Town of Falmouth, Massachusetts began investigating the potential for an ocean outfall as early as 2018. Extensive modeling and monitoring has been ongoing in advance of permitting for several years. As of March 2025 marine borings were underway.⁸ While Falmouth has committed extensive resources towards the required studies, there are no available construction cost estimates for this outfall.

According to the Buzzard’s Bay Coalition, who have been involved in the planning and evaluation of both the potential Marion and Falmouth projects, the consideration of an ocean outfall for both of these projects was driven by a lack of suitable groundwater discharge options, a situation that is not the case for the subject Plymouth Project.

In order to locate the end point of a potential outfall extension for Plymouth, hydrodynamic modeling would need to be performed to achieve the desired effluent dilution and dispersal. Then, the above-mentioned ecological and habitat studies would need to be conducted to assess the viability of any potential location from a permitting perspective. Potential construction costs would depend on the ultimate location chosen for the outfall and the path required to get there. It seems likely that any

⁵ https://19january2021snapshot.epa.gov/npdes-permits/epasmasdeps-permit-mwras-outfall-and-combined-sewer-overflows-1999_.html#:~:text=The%20permit%20is%20issued%20jointly%20under%20the,outfall%20tunnel%20nine%20and%20a%20half%20miles

⁶ <https://www.federalregister.gov/documents/2016/01/27/2016-01633/endangered-and-threatened-species-critical-habitat-for-endangered-north-atlantic-right-whale>

⁷ <https://marionma.gov/DocumentCenter/View/924/CWMP-Final-Report-body-June-2023>

⁸ <https://www.falmouthma.gov/DocumentCenter/View/19022/WQMC-Presentation-03-19-2025-Outfall-Marine-Borings-Update>

potential outfall extension would require subsurface tunnel boring to get past Plymouth Long Beach and avoid navigation impacts.

Of the extended outfalls assessed, only one has gone through construction – at a price of approximately \$41 million per mile in 2000 prices. The estimates for the other researched projects are much less expensive, at approximately \$3.8 million per mile and approximately \$13 million per mile, respectively for Marion’s C-1 and C-2. Independent of the cost it is clear that with the extensive modeling, monitoring, and permitting required that it would take many years before implementation of this potential alternative could occur, delaying the benefits of the proposed Project.

4.5 Increasing Nitrogen Treatment While Maintaining Discharge at Existing Harbor Outfall

Another potential alternative raised during public meetings of the Town of Plymouth’s Groundwater Wastewater Discharge Citizen Advisory Committee was the potential to increase the level of nitrogen treatment at the WWTF while maintaining the existing harbor outfall as the primary discharge point for the proposed increased discharge. As discussed above in Section 3.1.2, the WWTF currently has a permit limit of effluent nitrogen concentration of 10 mg/l and averages an effluent concentration of 5.8 mg/l. The costs to improve nitrogen treatment to 5 mg/l varies by treatment facility, depending upon treatment already provided and the facility modifications and processes required in order to achieve the additional treatment. In 2008, an assessment, including the costs associated with reducing nitrogen discharge, was performed for 21 Massachusetts wastewater treatment facilities in the watersheds for Long Island Sound and Narragansett Bay. This study, performed on behalf of the MassDEP Central Regional Office, found that the capital costs to achieve an annual effluent concentration of 5 mg/l TN ranged from \$4.4 million to \$180 million. The average cost was approximately \$47 million while the median was approximately \$39 million, at the time of the 2008 study.⁹

Another important factor limiting the feasibility of this alternative is the OSA. Per the OSA: “In the Cape Cod Bay Ocean Sanctuary, within Plymouth, Kingston, Duxbury Bay, landward of a line between Gurnet Point and Rocky Point, no new or modified discharge shall be authorized in a depth of water that at mean low tide is less than 30 feet.”¹⁰ With the exception of the main nautical channel, the majority of Plymouth Bay is less than 30-feet deep at mean low tide, including the location of the existing outfall in the harbor. While the outfall already exists, the proposed Project includes an increase in the total authorized WWTF discharge volume from 2.5 MGD to 3.0 MGD in order to support future development and additional connections to the WWTF for properties currently serviced by septic systems. Per the OSA, a modified discharge is “an increase in volume or change in location of an existing discharge from a publicly owned treatment works.” The proposed increase in discharge volume would be considered a modified discharge under the OSA and therefore not be permissible within this relatively nearshore area of Plymouth Bay, requiring a longer outfall extension into deeper waters with all of the associated permitting and cost implications discussed above for the outfall extension alternative.

Outside of the costs for increased treatment, the more important dissuading argument against this alternative is that increased nutrient treatment at the WWTF can be accomplished at any time regardless of the disposal location. Therefore, the preferred Project alternative switch to primary groundwater

⁹ <https://www.mass.gov/doc/massdep-potw-nitrogen-evaluation-executive-summary-front-matter/download>

discharge would provide greater overall benefits to the harbor for any given level of nitrogen treatment at the WWTF.

4.6 Increase Discharge to 3 MGD and Reprioritize Discharge Location to WWTF (the Preferred Alternative)

Given the constraints of the assessed alternatives to the Project, both in this DEIR and in the EENF, increasing discharge to 3 MGD and reprioritizing discharge from the outfall to the beds at the WWTF remains the Preferred Alternative. This alternative has been studied and explained at length throughout the EENF and the DEIR. It remains the preferred alternative for the following reasons:

- It will best meet the Project's water quality and habitat improvement goals.
- No site clearing is required in order to prepare the beds to receive discharge.
- The only construction associated with the Preferred Alternative is the installation of 8 monitoring wells described in Section 5.3. The infrastructure to bring wastewater to the WWTF for treatment and discharge already exists.
- The groundwater mounding resulting from discharge at the WWTF are relatively minor compared to other alternatives assessed and can be easily mitigated as described in Section 5.4.2.
- Extensive study has been undertaken for the Preferred Alternative.
- There are no known or potential public drinking water sources in the area of impact of the Preferred Alternative (see Section 8.1.1).
- The Preferred Alternative will result in a minimal increase in nitrogen loading to Plymouth Harbor (1.1% increase in overall loading), an increase that can be offset by connecting existing septic system properties in the watershed to the WWTF for advanced treatment (see Section 5.1).
- The Preferred Alternative will result in a decrease in greenhouse gas emissions (see Section 6.1).
- No other evaluated alternative can achieve the Project goals to the same extent without incurring equal or greater potentially negative impacts to other natural resources or infrastructure and all other alternatives would require extensive, testing, evaluation, permitting, and construction costs and time delays to implement.

5. Wastewater

5.1 Nitrogen Attenuation

The EENF for this Project included an estimated nitrogen loading reduction analysis utilizing nitrogen attenuation values for Eel River Watershed as assessed in the Massachusetts Estuaries Project report for Plymouth Harbor, Kingston Bay, and Duxbury Bay estuarine system (the MEP report). In its' comments, the Massachusetts Department of Environmental Protection (MassDEP) identified a transcription error within the MEP report. While a whole-watershed attenuation value of 60% was published in the MEP report, MassDEP observed that, based upon a separate table within the MEP report, that value should have read 35% instead. In addition, MassDEP commented that this value is not the result of uniform attenuation across the Eel River Watershed and that it would be more appropriate to utilize the attenuation factor of subwatersheds directly impacted by the increased discharge. In their comments, MassDEP noted that the subwatersheds that are likely to be impacted by the discharge are Eel River 53,

Eel River 54, and Eel River 58 and that a 4% attenuation factor should be applied to those subwatersheds.

As a result of these comments, HW conducted a reassessment of the nitrogen attenuation of wastewater effluent along the Eel River utilizing the particle trace analysis previously conducted as part of the EENF. HW used groundwater modeling to evaluate the fate of particles under steady state 3 MGD discharge at the WWTF to determine where along the Eel River particles originating from the WWTF enter the Eel River/ harbor system. Reanalysis of discharge transport and fate modeling results was performed to better characterize the volumes of effluent entering the subwatersheds of the Eel River system. Nitrogen attenuation calculations were performed based on these results utilizing the calculation methodology of the MEP report.

Particles released at the WWTF radiate outward along potential gradients established by mounding resultant of the discharge applied at the WWTF discharge beds. Particles which move initially to the west and south become intercepted by the draining influence of the Warren Wells Brook stream and discharge upstream of or within Russell Mill Pond. Particles which initially flow towards the east are intercepted by the draining influence of the Eel River upstream of or within Hayden Pond. MassDEP's comments regarding the impacted subwatersheds does not take into account that, under groundwater flow conditions established by the mounding resultant from discharge at the WWTF, particles enter Russell Millpond and Hayden Pond, part of subwatersheds 61 and 59, respectively (Figure 10).

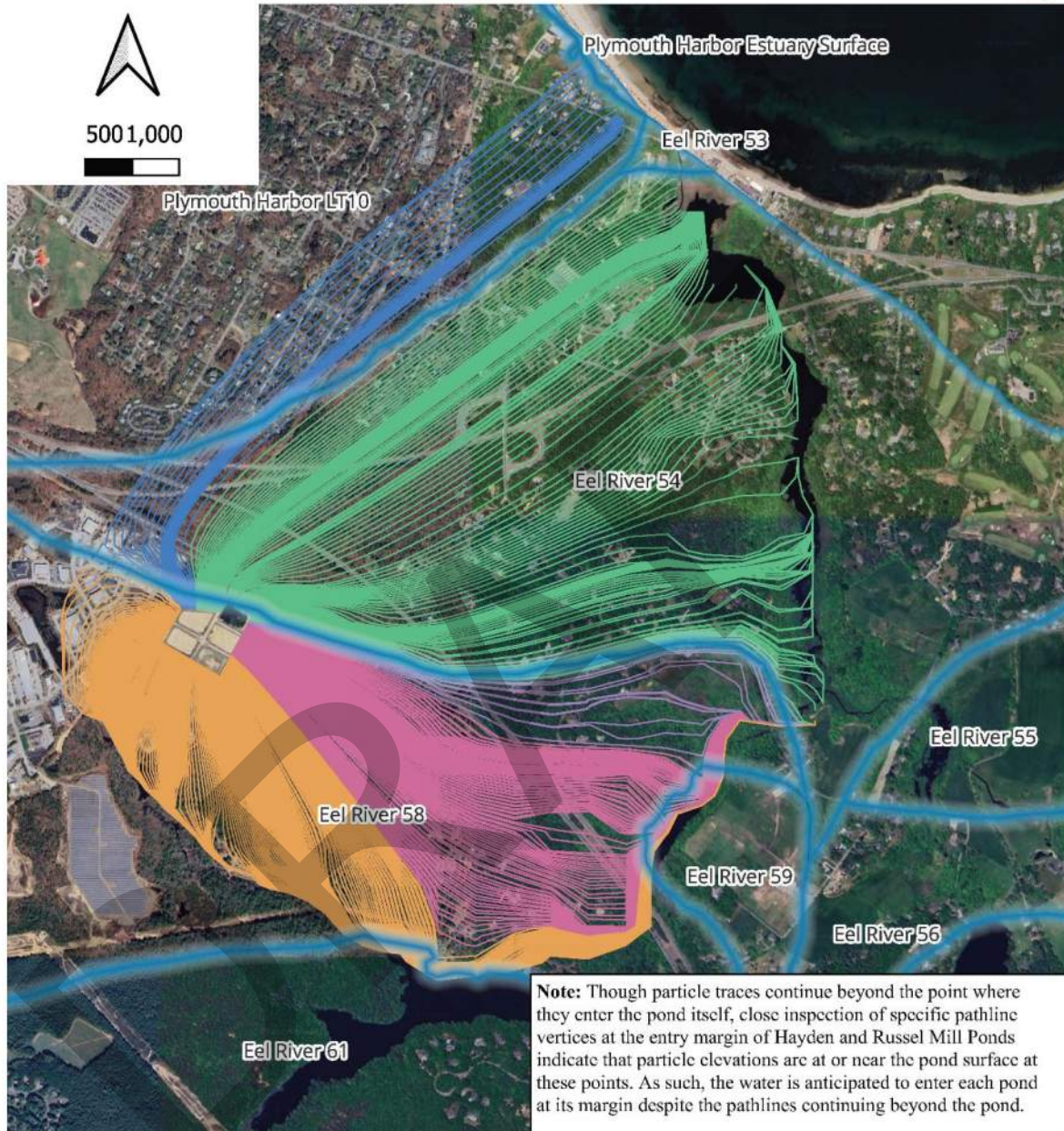
The watershed delineation for the subbasins of the PKD harbor watershed included in the MEP report, and referenced in MassDEP's comments, were performed by USGS technical staff utilizing the same model of the Plymouth-Kingston-Carver which was modified and refined by HW for discharge fate analyses following the 2018 Loading Test. At the time of the MEP Report subbasin delineation, no discharge was modeled to occur at the WWTF discharge beds. The discharge fate analysis performed by HW includes the proposed 3 MGD discharge at the WWTF, which creates a localized mound surrounding the WWTF. The mound alters the prevailing groundwater flow direction in the vicinity of the WWTF and subwatersheds 61 and 59, with a significant portion of the groundwater originating at the WWTF being directed by the established mounded gradient towards those subwatersheds 61 and 59. Under these modified conditions, reflecting the proposed scenario, particles entering the aquifer at the WWTF discharge beds discharge into Russel Millpond and Hayden Pond at the proportions listed below in Table 4.

Particle tracking analysis was performed to understand the fate of treated effluent discharged at the WWTF under the proposed 3 MGD scenario and to reassess which subwatersheds will receive what portions of the WWTF effluent and, therefore, what amount of nitrogen attenuation should be applied to each portion. Five hundred and sixty particles were uniformly placed around the perimeter of the WWTF discharge beds and tracked in three dimensions as they move outwards towards their discharge points. Particle tracks were counted based on the point that they intersect surface waters, and the proportion of particles intersecting each subwatershed is interpreted to equal the proportion of treated effluent which would ultimately be discharged to each reach. Please note that certain pathlines continue within the model beyond the point at which they likely intersect the surface water. Particles were assumed to enter the surface water when the elevation of their pathline at the water's boundary is at or near the surface elevation of that waterbody. Table 4 indicates the counts of particles intersecting each subwatershed.

This particle assessment shows that some of the particles intersect the river upstream of or in ponds which, under standard MEP protocol, receive additional nitrogen attenuation beyond pure stream segment attenuation. HW applied the attenuation factor of 50% for the portion of the effluent discharge that discharges in or above a pond. The 50% value is the factor utilized in the MEP report as a conservative estimate for attenuation provided by individual ponds unless there is sufficient monitoring and data available to calculate a pond-specific attenuation factor.

As such, Russell Millpond and Hayden Pond are each conservatively assumed to provide 50% attenuation of nitrogen inputs from their respective contributing areas. Despite their sequential configuration, the methodology employed by the MEP report credits this attenuation to each flow only once (e.g., flows entering Russell Millpond receive only 50% attenuation despite subsequently entering Hayden Pond). This conservative methodology was also followed by HW during this attenuation calculation. Additionally, again per MEP methodology, a 4% attenuation is provided to all flows within the Eel River regardless of which subwatershed contributed those flows. In a similar manner, a 4% attenuation was calculated for effluent which ultimately enters Eel River subwatersheds 54, 58, 59, and 61 but not to effluent entering the Plymouth Harbor LT10 subwatershed. The summary of nitrogen attenuation calculations and particle counts is provided in Table 4.

DRAFT



Date: 06/03/2025

Data Sources: Bureau of Geographic Information (MassGIS), SMAST, Google
This map is for informational purposes and may not be suitable for legal, engineering, or surveying purposes

Discharge Particle Traces

— Eel River 54

— Eel River 58

— Eel River 59 - Hayden Pond

— Plymouth Harbor LT10

— Eel River 61 - Russell Mill Pond

— MEP/SMAST Subwatersheds

Plymouth WWTP EIR

Plymouth, MA

H:\Projects\2017\17004 Plymouth Camelot Dr WWTP Loading\GIS\Maps\EIR\Particle Fate MEP Watersheds.qgz

Figure 9 Particle Fate Analysis MEP Watersheds 3MGD Discharge

Table 4 Revised Natural Nitrogen Attenuation Calculations Based on 3 MGD Discharge to MEP Subwatersheds

Particles discharged to subwatershed:	Particle Count	Proportion of total effluent flow (%)	Total Nitrogen Load Discharged to Beds (kg)	Attenuation factor for subwatershed	Remaining Proportion of Overall Load After Attenuation (%)	N Mass Removed through Attenuation (kg)	Remaining N Mass Following Attenuation (kg)
Eel River 61 - Russell Millpond	252	45%	34.10	50%	23%	-17.05	17.05
Eel River 59 - Hayden Pond	143	26%	19.35	50%	13%	-9.68	9.68
Eel River 58	18	3%	2.44	0%	3%	0.00	2.44
Eel River 54	125	22%	16.92	0%	22%	0.00	16.92
Total Eel River System Subwatersheds	538	96%	72.80	4%	61%	-26.73	46.08
Eel River System-wide Attenuation				4%	58%	-28.57	44.23
Plymouth Harbor LT10	22	4%	2.98	0%	4%	0	2.98
PKD Harbor Total	560	100%	75.78		62%	-28.57	47.21

*The total nitrogen load under proposed conditions is 75.78 kg/day, based on a concentration of 25.26 kg/million gallons (6.7 mg/L).

The resultant nitrogen load under the 3 MGD discharge scenario ultimately delivered to Plymouth Harbor, following attenuation through the subwatersheds as calculated in Table 4, is 47.21 kg N/day. This load is 62.3% of the nitrogen discharged to the disposal beds, reflecting a total attenuation of 28.57 kg N/day through natural processes (37.7%).

HW utilized the original MEP spreadsheet model of the PKD watershed system to estimate the change in overall nitrogen loading under the proposed configuration compared to overall baseline nitrogen loads (Appendix D). The MEP report estimated the load to the PKD harbor is 216,935 kg/year from all sources (MEP 2017, Table IV-5). The current discharge from the harbor outfall is reflected in this model as a 14,412 kg/year source input directly to the total. The total value included in the model reflects an average outfall discharge of 1.56 MGD at a nitrogen concentration of 25.26 kg/million gallons. Increasing the outfall discharge to the desired rate of 3MGD increases this load to 27,760 kg/year, and the overall system load increases correspondingly to 230,182 kg/year.

In order to calculate the estimated overall nitrogen load under the 3 MGD bed disposal scenario proposed, the proportional discharge load was distributed between the subwatersheds as indicated in Table 4 (Unattenuated Mass * 365, to reflect the annual loading convention in the MEP model). Under this configuration, overall loads to the PKD harbor were 219,234 kg/year, an increase in whole-system nitrogen loads of 1.05%, while at the same time allowing for a near-doubling of treatment and discharge volumes. These values are summarized in Table 5 below and specific changes to the MEP nitrogen loading model are provided in Appendix D.

Table 5 Comparison of N Loading to PKD Harbor

Scenario	Overall PKD Load (kg/year)	Change (relative to baseline)
Baseline (1.56 MGD outfall discharge)	216,935	(baseline)
3 MGD at outfall	230,182	+ 6.1%
3 MGD at WWTF sand beds	219,234	+1.1%

It is important to note that these are very conservative estimates of the loading benefits associated with the Project. This net load does not include any additional reduction in nitrogen loading which may result from additional sewer system hookups made possible by the increased discharge capacity. The model used in MEP reports, which date back to 2004, used the most up-to-date attenuation information available at the time. As a result, in the absence of sufficient site-specific data the MEP report model uses an attenuation factor of 50% for ponds, 30% for bordering vegetated wetlands, and 4% for streams as it developed the attenuation factors for each subwatershed.

In 2017 the Horsley Witten Group, Inc. and the Woods Hole Group, Inc. conducted a review of scientific literature to research the mechanisms and relative effectiveness of the nitrogen attenuation of a variety of natural systems. This review found that there are a number of factors influencing nitrogen attenuation, even amongst the same general ecosystem (e.g. ponds). This can be seen even amongst the MEP reports for locations with site-specific data. The 2017 literature review included a summary of site specific nitrogen attenuation rates by feature type, which is duplicated below in Table 6. Other studies reviewed similarly found variability, but with averages exceeding the MEP applied factors noted above.

Table 6 Summary of Available MEP Nitrogen Attenuation Rates

Water Feature	Watershed	Attenuation Rate	Feature Type
Mashapaquit Creek	West Falmouth	48%	stream
Hurley Bog Stream	Rock Harbor	24%	stream
Little Namskaket Stream	Rock Harbor	49%	stream
Hospital Bog Stream	Lewis Bay	43%	stream
Mill Brook	Nantucket	38%	stream
Herring River 2	Herring River	54%	stream
Kirby Brook	Westport	0.20%	stream
Snell Creek	Westport	6%	stream
Adamsville Brook	Westport	18%	stream
Angeline Brook	Westport	3%	stream
Deep	Pleasant Bay	44%	pond
Sarabs	Pleasant Bay	60%	pond
Twinings	Pleasant Bay	71%	pond
Uncle Harvey	Pleasant Bay	73%	pond
Pilgrim	Pleasant Bay	37%	pond
Baker	Pleasant Bay	65%	pond
Crystal	Pleasant Bay	68%	pond
Little Cliff	Pleasant Bay	77%	pond
Higgins	Pleasant Bay	72%	pond
Cliff	Pleasant Bay	73%	pond
Lovers lake	Chatham	52%	pond
Emery	Chatham	39%	pond
Goose	Chatham	90%	pond
Lovers	Chatham	69%	pond
Mill	Chatham	95%	pond
Schoolhouse	Chatham	93%	pond
Stillwater	Chatham	65%	pond
White	Chatham	88%	pond
Trout	Chatham	94%	pond
Newty	Chatham	81%	pond
Mashpee-Wakeby	Popponesset	86%	pond
Peters	Popponesset	80%	pond
Pimlico	Popponesset	89%	pond
Santuit	Popponesset	75%	pond
Snake	Popponesset	51%	pond
Ashumet	Quashnet	41%	pond
Johns	Quashnet	84%	pond
Moody	Quashnet	93%	pond
Snake	Quashnet	51%	pond

Deep	GGB	26%	pond
Flax	GGB	69%	pond
Bog Pond	3 Bays	59%	pond
Eagle Pond	3 Bays	86%	pond
Hamblin Pond	3 Bays	52%	pond
Joshua Pond	3 Bays	97%	pond
Lawrence Pond	3 Bays	91%	pond
Long Pond	3 Bays	81%	pond
Lovell's Pond	3 Bays	46%	pond
Micah Pond	3 Bays	95%	pond
Middle Pond	3 Bays	40%	pond
Muddy Pond	3 Bays	65%	pond
Mystic Lake	3 Bays	87%	pond
Shubael Pond	3 Bays	91%	pond
Spectacle Pond	3 Bays	48%	pond
Triangle Pond	3 Bays	85%	pond
Bumps River	Centerville	22%	pond
Hinckley's	Herring River	31%	pond
Seymour	Herring River	69%	pond
Sheep	Herring River	90%	pond
Long	Herring River	73%	pond

For the purposes of this assessment and consistency with the MEP report and TMDL study, we have continued the basic nitrogen attenuation assumptions methodology used by MEP in their report. But given the results of the 2017 literature review discussed above, we consider these assessments of natural nitrogen presented here for the Eel River system to be the minimum likely. Additional nitrogen attenuation that may occur in the Eel River system in transport through bordering vegetated wetlands and riparian areas and as accumulated attenuation moving downstream from pond segment to pond segment would only improve the comparison of total nitrogen loading to the harbor for the Preferred Alternative versus existing conditions.

It is important to note that the small overall increase in nitrogen load to Plymouth Harbor involves a proportionately more significant increase in nitrogen load to the Eel River subembayment (MEP monitoring station PDH1). The MEP report documented that the nitrogen load at the Eel River subembayment was equivalent to the subembayment's threshold load of 44.15 kg/day (MEP 2017, Table VIII-3). The Project would result in an additional 46.08 kg/day flowing down the Eel River. At this time a draft Total Maximum Daily Load (TMDL) for Plymouth Harbor, Kingston Bay, and Duxbury Bay Estuarine System is under development and is expected in Fall 2025. This TMDL should provide updated target threshold watershed loads for the subembayments, including the Eel River subembayment. Following that evaluation plans for nitrogen mitigation, as described in Section 5.4.4, will commence.

5.2 Impacts to Environmental Resources

Concerns have been raised by commenters on the EENF about the volume of nitrogen being added to the Eel River system and the impact on its environmental resources. As assessed in the EENF the Eel River is a phosphorus limited system, meaning that it is the availability of phosphorus, not nitrogen, that drives algal growth and other impairments. There are several environmental resources along the Eel River worth noting (Table 7). Monitoring and mitigation associated with the proposed Project is intended to minimize or prevent phosphorus from the WWTF from entering the Eel River system, as described below in Section 5.3 and Section 5.4.

Table 7 Simplified Table of Impacts to Environmental Resources

Environmental Resource	Notes	Mitigation
Coldwater Fish Resource	The Eel River is among the waterbodies in Massachusetts that coldwater fish, such as brook trout, use “to meet one or more of their life history requirements.” ¹¹	Phosphorous monitoring and mitigation
Natural Heritage and Endangered Species Program (NHESP)	The WWTF beds are not within NHESP mapped Priority Habitat for Rare Species (PH) or Estimated Habitat for Rare Wildlife (EH). A portion of the Eel River is within the most recent NHESP mapping as part of PH610 and EH486.	
Surface waters	In addition to the Eel River itself there are two ponds along the course of the river: Hayden Pond and Russel Millpond	
Wetland resource areas	There are two Massachusetts Wetlands Protection Act resource areas along the course of the Eel River: Borderig Vegetated Wetlands and Land Under Waterbodies and Waterways.	

5.3 Monitoring

As discussed in Section 3.2, the Town samples numerous groundwater wells either monthly, quarterly, or biannually to monitor any potential impacts to groundwater from the WWTF. This existing monitoring program, initially established under the NMP and the MassDEP Groundwater Discharge Permit, is proposed to expand by 8 monitoring wells as a part of the Project. These wells are proposed to be installed in 4 pairs of approximately equal travel time distance along the primary groundwater flow trajectory from the WWTF beds to Warren Wells Brook, the nearest surface water body and tributary to the Eel River (Figure 11). Sampling of these new wells would follow the same methodology and frequency as for the existing groundwater sampling wells. Nitrogen and phosphorous concentrations will be evaluated at each new well in addition to those wells listed in Table 1 (Section 3.2.1) to determine the extent and level of nutrient migration through time.

In addition to groundwater monitoring, the Town of Plymouth monitors several surface water locations five times per year under the NMP. Each location is monitored for field parameters (e.g. water temperature, dissolved oxygen) and a wide array of analytical parameters including, but not limited to, ortho-phosphate, total phosphate, ammonia, nitrate, nitrite, and total dissolved oxygen. The Town of

¹¹ <https://www.mass.gov/info-details/coldwater-fish-resources>
Plymouth WWTF Treated Effluent Discharge Reprioritization DEIR
Plymouth, MA

Plymouth Department of Marine and Environmental Affairs summarizes the results of both this monitoring and the groundwater monitoring in an annual Nutrient Management Data Report.

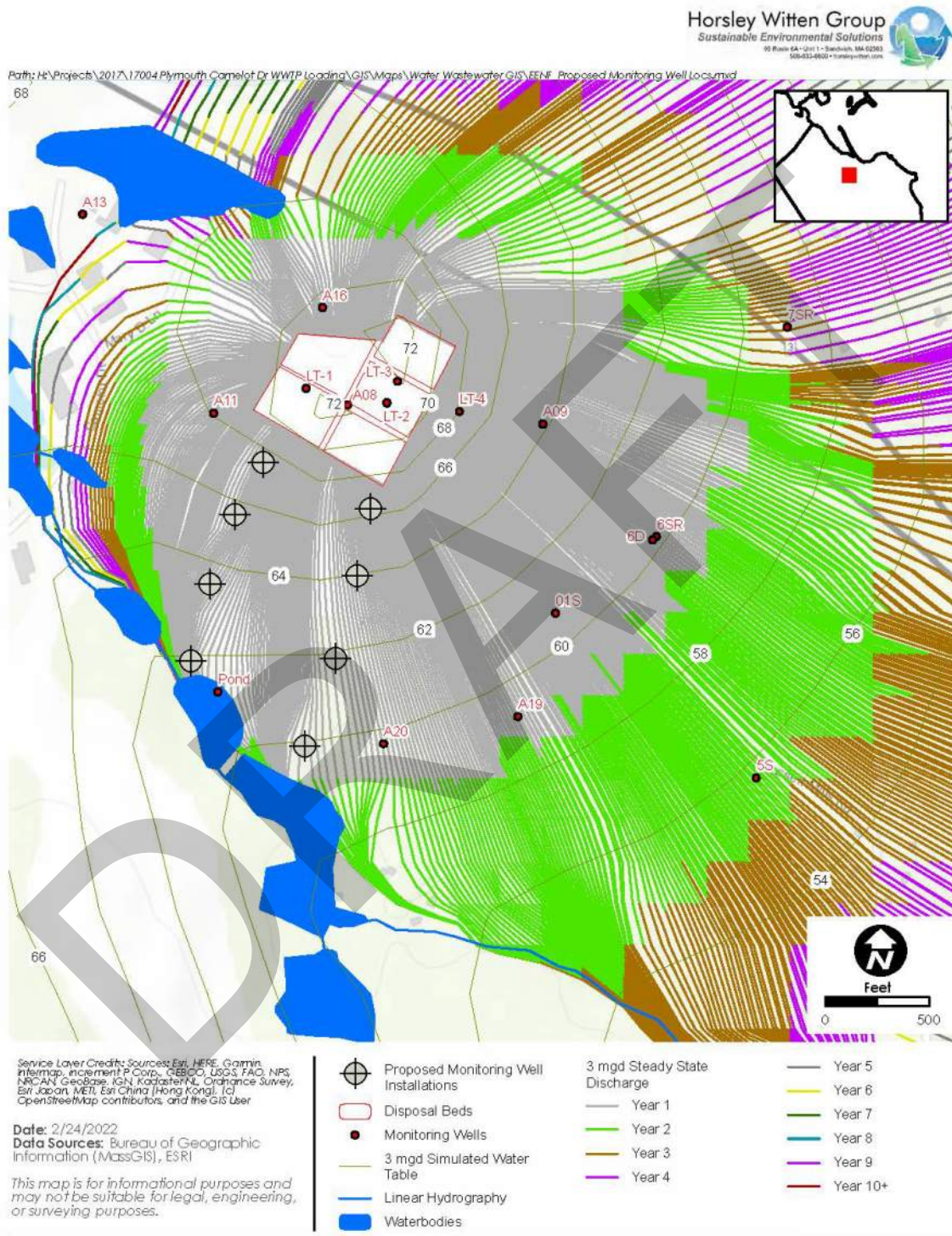


Figure 10 Proposed Monitoring Well Locations

5.4 Mitigation

5.4.1 Phosphorus Mitigation

In order to avoid and minimize the impact of the potential phosphorus transport to the Eel River, the Town has proposed a series of mitigation triggers based upon monitoring results at the 8 new monitoring wells. Given that the leading edge of the phosphorus plume has been modeled to move at approximately 12 feet per year during active wastewater discharge, an assessment discussed at length in the EENF, the first actionable trigger is not expected to be met for decades. While there are specific mitigation measures the Town could commit to at this point to attenuate phosphorus and/or slow the migration of the phosphorus plume innovative technologies and nature-based solutions should significantly improve by the time any actionable triggers are met. The mitigation triggers and their associated responses are described below:

- Pair of monitoring wells closest to the WWTF: No action required for any phosphorus detections
- Pair of monitoring wells 2nd closest to the WWTF: If sampling results in an average dissolved total phosphorus concentration of 2.2 mg/l or higher over 4 consecutive sampling dates – the Town will evaluate and design options for improved phosphorus treatment at the WWTF prior to discharge, applications of post-discharge treatment in the Basin beds, and/or treatment between the WWTF and discharge to the Basin beds.
- Pair of monitoring wells 3rd closest to the WWTF: If sampling results in an average dissolved total phosphorus concentration of 2.2 mg/l or higher over 4 consecutive sampling dates – the Town will increase the monitoring frequency to monthly and, if phosphorus concentrations remain elevated, commit to implementing improved phosphorus treatment at the WWTF prior to discharge, post-discharge treatment in the Basin beds, treatment between the WWTF and discharge to the Basin beds, and/or similar mitigation measures to slow the migration of the phosphorus plume.
- Pair of monitoring wells furthest away from the WWTF: If sampling results in an average dissolved total phosphorus concentration of 2.2 mg/l or higher over 4 consecutive sampling dates – the Town will plan to curtail discharge at the WWTF to a maximum of 1.5 MGD (using the harbor outfall for the remainder) within 5 years and identify other options for wastewater disposal to be implemented within 20 years.

Please note that the Town is open to working with MassDEP during the forthcoming Groundwater Discharge Permit process to modify all aspects of this proposed mitigation plan. This may include charges in the timing of various actions and more specificity for the types of actions to be taken.

5.4.2 Groundwater Mounding Mitigation

The EENF included an analysis, including groundwater modeling, a mounding evaluation, a review of septic system records, and survey work, to assess the risk of groundwater mounding on septic systems. Following this thorough analysis, only one parcel was identified as having less than 5 feet of separation between the bottom of the septic system and the simulated 3.0 MGD mounded groundwater elevation. Assessing septic systems using this separation distance is not arbitrary – 310 CMR 15, also known as Title V, includes a minimum depth to groundwater of “a) four feet in soils with a recorded percolation rate of more than two minutes per inch; or b) five feet in soils with a recorded percolation rate of two minutes

or less per inch.”¹² In the absence of a soil percolation rate test at each potentially affected property, the Project team used the more conservative of the two values (five feet) to assess the potential impact of groundwater mounding. In addition to this analysis the Town will continue to monitor groundwater levels at all wells as part of the groundwater monitoring program, which will help determine the extent to which the modeled groundwater mounding occurs as a result of the Project. In order to mitigate the impact of groundwater mounding on septic systems the Town will relocate or replace those systems, as necessary and as based on the results of the monitoring program.

5.4.3 Mitigation Measures Relative to Environmental Justice Populations

While there is no construction associated with the discharge reprioritization from the harbor outfall to the beds at the WWTF, construction will be required for the eight proposed monitoring wells described in Section 5.3.1. While installation of these wells will not take a significant amount of time, on the magnitude of weeks if not days, there will be a temporary increase in diesel emissions and noise levels due to equipment operation. To minimize the impact on the mapped Environmental Justice population, construction equipment will be shut off when not in use and air and noise quality will be managed in accordance with DEP regulations.

5.4.4 Nitrogen Mitigation

While the Project will yield minimal increase in overall nitrogen load to Plymouth Harbor, as discussed at length in Section 5.1, not all areas of the Harbor are the same from a hydrodynamic perspective. As a result the central area of the Harbor, where the current outfall pipe currently discharges, and the southern end of the Harbor, where the Eel River discharges into the harbor, will have different capacities to handle the same nitrogen load. Of concern in this case is the ability of the southern portion of the Harbor to handle the nitrogen load even with the additional nitrogen attenuation provided by the Eel River. At this time a draft Total Maximum Daily Load (TMDL) for Plymouth Harbor, Kingston Bay, and Duxbury Bay Estuarine System is under development and is expected in Fall 2025. This TMDL should provide target threshold watershed loads for different sections of the Harbor, including the southern end.

In order to mitigate the difference between the additional nitrogen load resulting from the Project and the target threshold load in the to-be-released TMDL, Project proponents will conduct an assessment of the number of homes that will need to be taken off of septic systems and connected to the WWTF in the watersheds to the southern end of the Harbor. Per assumptions within 310 CMR 15 (aka Title 5), MassDEP’s regulations regarding on-site sewage disposal systems, each septic system serving a single-family home discharges nitrogen at a concentration of 35 mg/l.

Every home taken off of a Title 5 septic system and tied into the WWTF, an expansion made possible by the Project’s proposed increase in discharge, will receive double nitrogen treatment. First it will receive treatment at the WWTF itself where, as described in Section 3.1.2, the average nitrogen concentration of effluent is 5.8 mg/l, an approximately 87% improvement over the standard septic system treatment assumption. Following discharge into the beds at the WWTF, effluent will then receive additional treatment via natural attenuation along the Eel River, as described above in Section 5.1.

¹² 310 CMR 15.212

While there are innovative/alternative (I/A) septic systems that have been designed to reduce nitrogen, these are recent innovations that will not be used as mitigation for the Project for a variety of reasons including, but not limited to, the level of treatment achieved. Most I/A systems approved by MassDEP for use have a designed treatment level of 19 mg/l, including all systems approved for general use.¹³ This is a significantly higher nitrogen concentration than the nitrogen treatment currently achieved at the WWTF.

6. Climate Change

6.1 Greenhouse Gas Benefits

The EENF presented an energy usage comparison between discharge via pumping to the existing outfall pipe and discharge at the existing WWTF disposal beds. This analysis found that the total energy consumption of the WWTF would be reduced by approximately 22,572 kilowatt-hours (kWh) monthly on average by changing the discharge location to the WWTF. This is because using the existing outfall pipe requires that the effluent be pumped to the high point on Westerly Road.

As part of the additional project analysis for this EIR this value was entered into the Environmental Protection Agency's (EPA) Greenhouse Gas Equivalencies Calculator, which allows for the conversion of energy data to carbon dioxide emissions.¹⁴ A monthly avoidance of 22,572 kWh is equivalent to a monthly avoidance of an estimated 10 metric tons of carbon dioxide emissions. The EPA's Greenhouse Gas Equivalencies Calculator provides proxies to put this monthly value into context. 10 metric tons of carbon dioxide is equivalent to a year's use of 2.3 gasoline powered passenger vehicles or a year of electricity use for 3.2 homes. It is also equivalent to the amount of carbon sequestered by 10 acres of forest in one year.

In order to discharge at the Cold Spring School site, pumping to the high point on Westerly Road would be required. As a result there would be no energy usage or greenhouse gas benefits as a result of this alternative discharge location.

Discharge at Site 101 would also require pumping to the high point on Westerly Road. As such there would be no energy usage or greenhouse gas benefits as a result of this alternative discharge location. As discussed in the Alternatives Analysis in Section 4, construction at this site would require the clear cutting of 22 acres. This would eliminate the ecosystem service that this site currently provides sequestering 22 metric tons of carbon dioxide emissions each year.

6.2 Climate Resiliency

In 2018, the Horsley Witten Group conducted a loading test at the WWTF in order to ensure that the existing disposal beds have the hydraulic capacity to accept the increased flow proposed as part of the Project (Appendix C). During the loading test 100% of the WWTF effluent was diverted to the disposal beds for approximately two months under carefully controlled conditions with detailed monitoring of groundwater responses conducted. This loading test, conducted with MassDEP approval, found that the hydrogeologic setting underlying and surrounding the WWTF has the capacity to accept discharge of at least 3.0 MGD treated effluent.

¹³ <https://www.mass.gov/info-details/approved-title-5-innovativealternative-technologies#all-technologies-approved-for-use>

¹⁴ <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>
Plymouth WWTF Treated Effluent Discharge Reprioritization DEIR
Plymouth, MA

Climate change projections include more intense storm events in the upcoming decades. However, the proposed increase in discharge at the WWTF is resilient to these potential effects of climate change. The Resilient MA Climate Change Projection Dashboard, a tool developed by a Massachusetts inter-agency working group including the Executive Office of Energy and Environmental Affairs and the Massachusetts Emergency Management Agency, provides 24-hour rainfall volumes for a number of storm durations, intensities, and planning horizons.¹⁵ A subset of these scenarios for the WWTF, as provided by this tool, is reproduced below in Table 8.

Table 8 Resilient MA Climate Change Projection Dashboard Storm Scenarios

Planning Horizon	Storm Duration	25-Year Storm (inches)	50-Year Storm (inches)	100-Year Storm (inches)
2050	24-hour	7.3	8.2	9.1
2070	24-hour	7.8	8.8	9.8
2090	24-hour	8.3	9.4	10.5

Per the United States Geological Survey Rainfall Calculator, one inch of rainfall is equivalent to 27,154 gallons of water per acre.¹⁶ When applied over the approximately 9.3 acres of sand beds at the WWTF, the resulting additional gallons is as follows in Table 9.

Table 9 Gallons of Rainwater to WWTF Beds from Storm Scenarios

Planning Horizon	Storm Duration	25-Year Storm (gallons)	50-Year Storm (gallons)	100-Year Storm (gallons)
2050	24-hour	1,843,485	2,070,764	2,298,043
2070	24-hour	1,969,751	2,222,283	2,474,815
2090	24-hour	2,096,017	2,373,802	2,651,588

Each of the assessed storm events results in gallons to the discharge beds that are below their documented hydraulic capacity. As documented in Section 3.1.1, current wastewater flows rarely exceed 1.75 MGD. This provides at least 1.25 MGD in excess hydraulic capacity for the beds to handle smaller storm events and a significant percentage of the larger storm events. More importantly, the hydraulics of groundwater response to surficial infiltration are a longer-term process occurring over weeks and months. Additional infiltration occurring from short term storm events are relatively minor in the longer-term perspective of the average daily WWTF flows occurring daily (Table 10).

Table 10 100-Year Storms in Context of Longer Term WWTF Discharges

Planning Horizon	100-Year Storm (gallons)	Monthly Discharge to Beds	Annual Discharge to Beds
2050	2,298,043	90,000,000	1,095,000,000
2070	2,474,815	90,000,000	1,095,000,000
2090	2,651,588	90,000,000	1,095,000,000

¹⁵ https://resilient.mass.gov/rmat_home/designstandards/

¹⁶ <https://water.usgs.gov/edu/activity-howmuchrain.php>

Additionally, a key provision of the Project is maintaining the harbor outfall pipe as a potential discharge point in case of emergency, including large storm events such as those assessed above. This is critical to maintaining resiliency to climate change.

An increase in the intensity of storm events is unlikely to impact groundwater mounding and nutrient dispersion already assessed for discharges of 3 MGD. As stated above, the harbor outfall pipe will be maintained as a potential discharge point in case of emergency such as extreme storm events exceeding the hydraulic capacity of the discharge beds. Secondly, storm events are temporary in nature. While the volume of precipitation is expected to increase per storm event due to climate change, the events themselves are predicted to be less frequent with more consecutive dry days between storm events.¹⁷ As a result the primary driver of groundwater mounding and nutrient dispersal at the WWTF will continue to be effluent discharge.

In regards to projected sea level rise and storm surge flooding, the WWTF's location provides the Project's best source of resiliency. The WWTF is approximately 2 miles inland and sits at an elevation of 85 feet (NAVD88). Despite the potential storm surge pathway up the Eel River under no scenario does the Massachusetts Office of Coastal Zone Management Sea Level Rise and Coastal Flooding Viewer show the WWTF at risk of flooding, including sea level rise projections, coastal flooding through 2070, and hurricane storm surge inundation.¹⁸

7. Environmental Justice

The Project is located in Block Group 5, Census Tract 5306, Plymouth County, Massachusetts, which is classified as an Environmental Justice (EJ) population via the minority criteria. Per the Massachusetts Department of Health EJ Mapper, the EJ characteristics of this block group are:

- Minority population: 38.48%,
- Median household income: \$138,929 (164.637% of the Massachusetts median household income),
- Households with language isolation: 0%, and
- Population of 1,710 in 356 households.

To promote public involvement by Environmental Justice (EJ) populations during the remainder of the MEPA review process and subsequent permitting, the Project Team has held a day of meetings and hearings at a variety of times. In order to accommodate a wide variety of work-life balances meetings were staggered throughout the day and both virtual and on-site options were available. To notify EJ populations about the meetings and to encourage participation, the Project team obtained an updated EJ reference list from the Executive Office of Energy and Environmental Affairs EJ Office and provided each listed community based organization with a notification of the meeting, including times, locations,

¹⁷ <https://climateactiontool.org/content/precipitation-changes>

¹⁸

<https://experience.arcgis.com/experience/23d861b79aed450eb8972013dd28579b/page/Introduction?views=2070-Flooding>

formats, and a written project summary. Meetings were held on **DATE** at the following times and locations:

- **INSERT TIMES AND LOCATIONS**

Approximately X people attended these meetings, virtually or in-person.

This approach incorporates the following best practices listed in the MEPA EJ Public Involvement Protocol:

- Ensuring outreach to the public is communicated in clear, understandable language and in a user-friendly format. **DISCUSS**
- Wide dissemination of a written project summary (with translation into relevant languages) with basic project details. **DISCUSS**, including no translations because 0% language isolation
- Holding community meetings during weekend or evening hours, at accessible locations near public transportation, and/or through zoom or other similar web-based service if requested or determined to be more effective for reaching EJ populations. **DISCUSS**

The purpose of these meetings was to present the Project and its timeline, the revised alternatives analysis, updated data on nutrient loading, and the revised monitoring plans as well as to provide an opportunity for members of the public to get questions answered.

7.1 Potential Sources of Pollution within the Project’s Designated Geographic Area

As the Project does not meet or exceed the MEPA review thresholds at 301 CMR 11.03(8)(a) and (b) and will not generate 150 or more new average daily traffic of diesel vehicle traffic over the duration of one year or more, the Project’s Designated Geographic Area is one mile. Created utilizing the Massachusetts Department of Public Health EJ Mapping Tool, Table 10 details the potential sources of pollution were identified within 1 mile of the project:

Table 11 Sources of Pollution within the Designated Geographic Area of the Project

Air Operating Permits	
None identified	
Groundwater Discharge Permit	
Town of Plymouth WWTF	131 Camelot Drive, Plymouth
Hazardous Waste Treatment, Storage/Disposal	
None identified	
Hazardous Waste Recycler	
None identified	
Large Quantity Generators	
Honda of Plymouth	9 Long Pond Road
Frank C Dunlap Inc	20 Holman Road
Plymouth DPW	159 Camelot Drive
Town of Plymouth	South Street
Petro Home Services Dunlap Office	20 Holman Road
Large Quantity Toxic User	

None identified	
MassDEP Tier Classified 21E Sites	
None identified	
MA Tier II Facilities	
First Student, Inc. #11620	19 Natalie Way
Colonial Municipal Group	61 Camelot Road
Dunlap's Propane Inc. Bulk Storage Terminal	81 Long Pond Road
Armstrong Arena	103 Long Pond Road
BJ's Wholesale Club (0113)	105 Shops At 5 Way
TruGreen Limited Partnership	20 Raffaele Road
Plymouth Wastewater Treatment Facility	131 Camelot Drive
MassDEP Sites with Activity and Use Limitation	
	62 Long Pond Road
Draft NPDES points	
None identified	
Underground Storage Tanks	
	20 Long Pond Road
Airports	
None identified	
Freight Rail Yards	
None identified	
Nuclear Power Plants	
None identified	
Power Plants	
Camelot Wind LLC	125 Camelot Drive

8. Public Health

8.1 Drinking Water

Clean drinking water is a critical component of maintaining public health. Massachusetts works to protect clean drinking water in two ways. First and foremost by regulating drinking water itself through 310 CMR 22.00 *The Massachusetts Drinking Water Regulations*, which was established “to promote the public health and general welfare by preventing the pollution and securing the sanitary protection of all such waters used as sources of water supply and ensuring that public water systems in Massachusetts provide to the users thereof water that is safe, fit and pure to drink.”¹⁹ Massachusetts also regulates groundwater discharges through 314 CMR 5.00 *Ground Water Discharge Permit Program*, which established the Massachusetts Department of Environmental Protection’s Groundwater Discharge

¹⁹ 310 CMR 22.01(1)

Program and includes requirements “designed to ensure that ground waters of the Commonwealth are protected for their actual and potential use as a source of potable water.”²⁰

8.1.1 Public Drinking Water Supply

While the WWTF discharge beds are within the Plymouth-Carver Sole Source Aquifer, modeling and GIS analysis show that groundwater from the WWTF does not flow towards any known or potential drinking water supplies. As part of a separate evaluation to identify and compare candidate sites for potential new drinking water wells, HW conducted a desktop GIS analysis. As part of this analysis, for a site to be considered a “candidate” it needed to meet or be able to meet the requirements for Groundwater Supply Protection as written in the Massachusetts Drinking Water Regulations (310 CMR 22.21). These regulations are summarized below:

- For wells withdrawing more than 100,000 gallons per day, a Zone I (400-foot radius) surrounding the proposed well must be owned or controlled by the supplier of water. Current and future land uses within the Zone I are limited to those directly related to the provision of public drinking water.
- The source of water will achieve all applicable water quality standards set forth in 310 CMR 22.00.
- Wellhead protection zoning and nonzoning controls for the Zone II compliant with 310 CMR 22.21(2)(a) and (b).
 - o 310 CMR 22.21(2)(a) prohibits the siting of the following land uses within the Zone II or Zone III: Landfills, automobile junkyards, stockpile areas for snow or ice disposal, petroleum or oil bulk stations or terminals, treatment or disposal works for wastewater (except for POTWs), facilities that generate, treat, store, or dispose of hazardous waste (with some exceptions), and unsealed, unpermitted floor drains from industrial or commercial hazardous material or hazardous waste process or storage areas.
 - o Additionally, 310 CMR 22.21(2)(b) prohibits the siting of the following land uses within the Zone II or Zone III: Storage of sludge or septage not in compliance with 310 CMR 32.30, storage of snow or ice removal chemicals, or fertilizer, or animal manures (unless stored within a structure designed to prevent escape of contaminated runoff). Storage of liquid hazardous materials or petroleum products, the removal of earth materials within four feet of the historical high groundwater table, or any land use which renders impervious more than 15% or 2500 square feet of any lot or parcel.

In addition to the requirements outlined in state regulation, physical characteristics of the aquifer were included in the analysis. Potential candidates must not only satisfy state regulations, but also be able to provide abundant, high-quality drinking water without adverse impacts on the community.

Hydrogeologic factors such as estimated saturated thickness and surficial geology were considered based on available reports. Surface hydrological features such as ponds, wetlands, and streams were considered as well.

Following this analysis, it was determined that there are no candidate public drinking water supply well sites within the modeled flow path of effluent discharge at the WWTF associated with the proposed Project. In addition, the public drinking water supply main goes past each developed parcel within the

²⁰ 314 CMR 5.01

modeled flow path. In other words, each developed parcel has access to public drinking water that would be unaffected by the change in effluent discharge prioritization. Taken together, it is expected that discharge at the WWTF would not have a detrimental impact on the Plymouth public drinking water supply.

8.1.2 Groundwater Discharge Permitting

In order to protect groundwater as an actual or potential source of potable water, all permits issued through the Massachusetts Ground Water Discharge Permit Program include water quality-based effluent limitations. Publicly owned treatment works, commonly referred to as POTWs, that do not treat industrial wastewater are subject to additional technology-based effluent limitations.

Pathogenic organisms are the primary water quality-based effluent limitation within the Massachusetts Ground Water Discharge Program. Per 314 CMR 5.10(3)(a) Effluent Limitations for All Ground Waters “Pathogenic Organisms shall not be present in amounts sufficient to render the ground water detrimental to public health, safety, welfare, or the environment, or impair the use of ground water as an actual or potential source of potable water...Any discharge shall not exceed the maximum contaminant levels set forth in 310 CMR 22.00 *Drinking Water*.” At present, the maximum contaminant level is considered exceeded if there is a) An *E. coli*- positive repeat sample following a total coliform-positive routine sample; or b) A total coliform-positive repeat sample following an *E. coli*-positive routine sample.²¹ As the Project already has a GWDP and will require an amended GWDP, the WWTF has and will continue to comply with all conditions MassDEP imposes in order to protect public health.

9. Mitigation and Draft Section 61 Findings

MGL c.30 § 61 requires that “all authorities of the Commonwealth ... review, evaluate, and determine the impact on the natural environment of all works, projects or activities conducted by them and ... use all practicable means and measures to minimize [their] damage to the environment. ... Any determination made by an agency of the Commonwealth shall include a finding describing the environmental impact, if any, of the Project and a finding that all feasible measures have been taken to minimize said impact.” Each state agency to issue a permit for the Project shall also issue a Section 61 Finding in connection with permit issuance, identifying mitigation that is relied upon to satisfy the Section 61 requirement.

A table of mitigation measures for environmental and related public health impacts is included below in Table 11. All mitigation will be the responsibility of the Project proponent and their contractor(s). Section 9 of this DEIR identifies the agencies that are expected to take agency action on the Project and issue Section 61 Findings, as well as the expected actions and permit issuances anticipated to be required. A draft proposed Section 61 Finding is provided in this section.

Proposed Section 61 Finding

Project Name: Plymouth Wastewater Treatment Facility Treated Effluent Discharge
Project Location: 131 Camelot Drive, Plymouth MA 02630
(41.926606, -70.642249)

²¹ 310 CMR 22.05(8)(a)

EEA Number: 16758
Date Noticed in Monitor: September 25, 2023 (EENF)
Project Proponent: Town of Plymouth

The potential environmental impacts of the proposed Project have been characterized and quantified in the EENF dated September 2023 and Section 9 of this DEIR, which are incorporated by reference into this Section 61 Finding. The Project proponent has striven to develop appropriate mitigation measures to address short-term and long-term impacts. With the mitigation measures proposed and carried out in cooperation with state agencies, [AGENCY] finds that there are no significant unmitigated impacts associated with the Project.

The Project proponent takes ultimate responsibility for both the identification of appropriate mitigation measures, and implementation of said measures throughout the duration of the Project, whether carried out by the Project proponent themselves, or by the proponent’s contractor(s). The proponent has prepared Table 10 of mitigation measures that outline these responsibilities. Having reviewed the MEPA filings for the Project, including the mitigation measures referenced above and described in greater detail in the EENF and this DEIR, [AGENCY] finds pursuant to MGL c.30 § 61, that with the implementation of the aforesaid measures, all practicable and feasible means and measures will have been taken to avoid or minimize potential damage from the Project to the environment.

[Agency]

[By]

[Date]

Table 10 below describes mitigation measures included in the planning and design to avoid, minimize, and mitigate potential damage to the environment resulting from the Project.

Table 12 Summary of Potential Environmental and Related Public Health Impacts and Avoidance, Minimization, and Mitigation Measures

Subject Matter	Potential Impacts	Avoidance, Minimization, and Mitigation Measures	Schedule and Cost	Agency Action or Permit
Land	Minimal land disturbance necessary for the installation of eight monitoring wells	Most of the monitoring wells can be installed without any land disturbance required.	TBD	None
Rare Species	None anticipated	None anticipated	N/A	None
Wetlands, Waterways, and Tidelands	<p>The Project will contribute to a phosphorus plume migrated away from the WWTF towards the Eel River.</p> <p>The Project will result in a marginal increase in nitrogen loading to Plymouth Harbor, an increase that can be offset by connecting existing septic system properties in the watershed to the WWTF for advanced treatment.</p>	<p>When triggered based on phosphorus level in the proposed monitoring wells, mitigation includes the evaluation, design, and implementation of improved phosphorus treatment at the WWTF prior to discharge, application of post-discharge treatment in the discharge beds, and, if necessary, curtailing discharge at the WWTF.</p>	TBD	None
Water Supply	While the Project will result in treated effluent discharge to the Plymouth-Carver Sole Source Aquifer, there are no known or potential public drinking water supplies in the area of impact.	None	N/A	None

Wastewater	Effluent discharge prioritization will shift from 2.5 MGD to the harbor outfall to 3.0 MGD to the discharge beds at the WWTF.	The WWTF will continue to treat wastewater to the levels required in the Town of Plymouth's NPDES Permit and Groundwater Discharge Permit.	N/A	MassDEP Groundwater Discharge Permit Modification
Transportation (Traffic & Roadways)	None anticipated	None anticipated	N/A	None
Energy	None anticipated	None anticipated	N/A	None
Air Quality	Temporary increase in diesel emissions during operation of monitoring well installation equipment.	When not in use, monitoring well installation equipment will be shut off to limit emissions. Management of air and noise quality during monitoring well installation will be done in accordance with DEP regulations.	N/A	None
Solid and Hazardous Waste	None anticipated	None anticipated	N/A	None
Historical and Archaeological Resources	Per the State Register of Historic Places and the Inventory of Historic and Archaeological Assets of the Commonwealth, no part of the Project site is listed as an	None anticipated	N/A	Massachusetts Historical Commission Project Notification Form

	archaeological site or historical site			
Climate Change Adaptation and Resiliency	<p>The Project will result in a reduction of greenhouse gas emissions</p> <p>The Project will maintain the harbor outfall for discharge during emergencies such as extreme precipitation events</p>	None anticipated	N/A	MEPA Certificate
Environmental Justice	<p>There is one EJ population within the Designated Geographic Area of the Project</p> <p>Temporary increase in diesel emissions during operation of monitoring well installation equipment.</p>	<p>When not in use, monitoring well installation equipment will be shut off to limit emissions.</p> <p>Management of air and noise quality during monitoring well installation will be done in accordance with DEP regulations.</p>	N/A	MEPA Certificate

10. Response to Comment

10.1 Comment Letters Received on the EENF

The MEPA office received numerous written comments on the EENF via the MEPA Public Comments Portal and via email. Comments were provided by the individuals, agencies, and organizations listed below. Copies of all comment letters are included with the MEPA Certificate in Appendix A.

- Mary Gatslick
- Community Land and Water Coalition
- Anne and Stephen Franzino
- Mark Withington
- Richard Serkey
- Dwayne Stefano
- Russell Fry IV
- Thomas Fugazzi
- Kerry Stefano
- Francis Mand
- Herring Ponds Watershed Association
- Herring Pond Wampanoag Tribe, Inc. of Patuxet-Plymouth, Eel River Watershed Association, the Jones River Watershed Association, and Community Land & Water Coalition
- Massachusetts Division of Marine Fisheries (DMF)
- Massachusetts Department of Environmental Protection (MassDEP) Southeast Regional Office (SERO)

10.2 Response to Comments on the EENF

The following section provides responses to comments received on the EENF. Per the MEPA Certificate, the directive to respond to comments was not intended to enlarge the scope of the DEIR beyond what was expressly identified in the Certificate. Refer to Appendix A for the MEPA Certificate and comment letters.

Community Land and Water Coalition (CLWC)

CLWC-1

Comment: *What is the status of the Town's compliance with DEP stormwater regulations and the Town stormwater regulations? How much stormwater is fed into the sewer system and hence into the WWTP? What is the total number of gallons.*

Response: Town of Plymouth stormwater discharges are federally permitted through EPA's MS4 program under the Massachusetts Small MS4 General Permit. MS4 stands for "Municipal Separate Storm Sewer System", which is a municipal system designed or used for collecting or conveying stormwater. Plymouth's stormwater system is completely separate from the wastewater system. Stormwater management is outside of the scope of the Project and the MEPA Certificate.

CLWC-2

Comment: *What is the impact of the town's ongoing illegal sand and gravel mining at the WWTP site? This is plainly visible on satellite images. The ongoing removal of sand and gravel at this site and adjacent to it is strip mining that changes the topography, infiltration rates and movement of water above and below ground. The ENF and EIR must take into account these land alterations in all aspects of the environmental assessment of the impacts of the proposal to increase the capacity of the WWTP. Has there been an assessment of the strip mining and earth removal impacts on the non-town lands immediately adjacent to and surrounding the WWTP site in the last 30 years? The baseline has changed. Using this 30 year old data is not accurate to assess the current condition of the site?*

Response: The groundwater nutrient analysis included in the EIR includes data through 2024 and the loading test to determine the hydraulic capacity of the site to handle the increased discharge was performed in 2018. The groundwater modeling conducted during the EENF included this updated data as well as updated hydrogeologic conditions within the vicinity of the site. Any topographic alterations to the uplands surrounding the site do not affect the assessment of discharge locations options that is the subject of this Project and MEPA filing.

CLWC-3

Comment: *Where are the water quality samples for the effluent discharges from the WWTP? The Town should be required to post these on the Town website.*

Response: Results from the analysis of effluent discharge samples are sent to MassDEP.

Mary Gatslick (MG)

MG-1

Comment: *The mitigation measures discussed in the document refer to the Nutrient Management Plan, these mitigation measures are based on the current flow through the WWTP beds – 0.75MGD. Are there updated mitigation plans that address the proposed increased flow through the sand filters? Are they publicly available? What measures will be in place (as required by the Nutrient Management Plan) to continue to reduce the existing nutrient loads specifically Total Phosphorus and Total Nitrogen to the Eel River?*

Response: The Town proposes a series of mitigation triggers based upon monitoring at 8 new monitoring wells as a part of the proposed Project. While there are specific mitigation measures the Town could commit to at this point to attenuate phosphorus and/or slow the migration of the phosphorus plume innovative technologies and nature-based solutions should significantly improve by the time any actionable triggers are met. The mitigation triggers and their associated responses are described below.

- Pair of monitoring wells closest to the WWTF: No action required for any phosphorus detections
- Pair of monitoring wells 2nd closest to the WWTF: If sampling results in an average dissolved total phosphorus concentration of 2.2 mg/l or higher over 4 consecutive sampling dates – the Town will evaluate and design options for improved phosphorus treatment at the WWTF prior to discharge, applications of post-discharge treatment in the Basin beds, and/or treatment between the WWTF and discharge to the Basin beds.

- Pair of monitoring wells 3rd closest to the WWTF: If sampling results in an average dissolved total phosphorus concentration of 2.2 mg/l or higher over 4 consecutive sampling dates – the Town will increase the monitoring frequency to monthly and, if phosphorus concentrations remain elevated, commit to implementing improved phosphorus treatment at the WWTF prior to discharge, post-discharge treatment in the Basin beds, treatment between the WWTF and discharge to the Basin beds, and/or similar mitigation measures to slow the migration of the phosphorus plume.
- Pair of monitoring wells furthest away from the WWTF: If sampling results in an average dissolved total phosphorus concentration of 2.2 mg/l or higher over 4 consecutive sampling dates – the Town will plan to curtail discharge at the WWTF to a maximum of 1.5 MGD (using the harbor outfall for the remainder) within 5 years and identify other options for wastewater disposal to be implemented within 20 years.

MG-2

Comment: *Are the engineered wet lands proposed for the WWTP still under consideration? This would add additional treatment to the WWTP.*

Response: If the second mitigation trigger described above in the answer to MG-1 is exceeded then the Town will evaluate and design options for improved phosphorus treatment. Engineered wetlands may be a part of this evaluation.

Anne and Stephen Franzino (ASF)

ASF-1

Comment: *As a resident of the village of Chiltonville located within the Eel River Watershed in the Town of Plymouth, my husband and I are concerned with the proposed 300% increase of groundwater discharge at town’s Camelot Drive Wastewater Treatment Facility. While we realize the town has conducted a public meeting of the EENF filing on October 4th, 2023, we do not believe that the community has had a chance to fully absorb all of this information, ask questions, and feel comfortable with proceeding with this expansion.*

Response: Following the receipt of the MEPA Certificate on December 22, 2023, the Town of Plymouth Select Board created the Wastewater Groundwater Discharge Citizen Advisory Committee (the Committee). The following is included in the Committee description: “The primary function of the Citizens Advisory Committee will be to provide a platform for citizen input, feedback, and collaboration with town departments, related to wastewater treatment and disposal. By being comprised of citizens directly, the Committee helps to enhance transparency, accountability, and inclusivity in policy development and implementation.”²² The Committee has convened eight times in meetings open to the public with agendas posted for public consumption at least 48-hours in advance in accordance with Massachusetts Open Meeting Law.

ASF-2

²² <https://www.plymouth-ma.gov/1436/Wastewater-Groundwater-Discharge-Citizen-Plymouth-WWTF-Treated-Effluent-Discharge-Reprioritization-DEIR>
Plymouth, MA

Comment: *This was a highly contentious issue for the town when the wastewater facility was sited at the Eel River headwaters back in the 1990s. It would seem imprudent to proceed as fast as this has without full buy-in from the community. Especially in light of the massive construction developments that are ongoing in town. As a community it is very difficult to stay fully informed as the public does not readily receive important information regarding what is happening to our environment. We think we need more time to stay fully informed.*

Response: See response for ASF-1. In addition, testing, modeling, assessment, and discussions with DEP regarding this Project have been ongoing since 2017.

Mark Withington (MW)

MW-1

Comment: *As a resident of the village of Chiltonville located within the Eel River Watershed in the Town of Plymouth, I am concerned with the proposed 300% increase of groundwater discharge at town's Camelot Drive Wastewater Treatment Facility. While I realize the town has conducted a public meeting of the EENF filing on October 4th, 2023, I do not believe that the community has had a chance to fully absorb all of this information, ask questions, and feel comfortable with proceeding with this expansion. This was a highly contentious issue for the town when the wastewater facility was sited at the Eel River headwaters back in the 1990s. It would seem imprudent to proceed as fast as this has without full buy-in from the community.*

Response: See response to ASF-1.

Richard Serkey (RS)

RS-1

Comment: *As a resident of the Town of Plymouth, I am concerned with the proposed 300% increase of groundwater discharge at town's Camelot Drive Wastewater Treatment Facility. While I realize the town has conducted a public meeting of the EENF filing on October 4th, 2023, I do not believe that the community has had a chance to fully absorb all of this information, ask questions, and feel comfortable with proceeding with this expansion. This was a highly contentious issue for the town when the wastewater facility was sited at the Eel River headwaters back in the 1990s. It would seem imprudent to proceed as fast as this has without full buy-in from the community.*

Response: See response to ASF-1.

Dwayne Stefano (DS)

DS-1

Comment: *As a resident of the village of Chiltonville located within the Eel River Watershed in the Town of Plymouth, I am concerned with the proposed 300% increase of groundwater discharge at town's Camelot Drive Wastewater Treatment Facility. While I realize the town has conducted a public meeting of the EENF filing on October 4th, 2023, I do not believe that the community has had a chance to fully absorb all of this information, ask questions, and feel comfortable with proceeding with this expansion. This was a highly contentious issue for the town when the wastewater facility was sited at the*

Eel River headwaters back in the 1990s. It would seem imprudent to proceed as fast as this has without full buy-in from the community.

Response: See response to ASF-1.

Russell Fry IV (RF)

RF-1

Comment: *As a resident and property owner property owner on Hayden Pond (on the Eel River Watershed), I would like to express my concern about the further nutrient enrichment abutting my property. The town's proposal to increase ground discharge by 300% at the Camelot Drive Wastewater Treatment Facility directly affects my family and me. As someone who enjoys canoeing on Hayden Pond, I've noticed increased algae blooms and overgrowth over the past decade. The last three years were severe. This satiation may worsen due to the proposed wastewater facility expansion. Such blooms could affect the ecological balance (fish, birds of prey) on the pond and any hope for the return of herring (alewife) to the Town-installed herring run.*

Response: Comment acknowledged. As assessed in the EENF the Eel River is a phosphorus limited system, meaning that it is the availability of phosphorus, not nitrogen, that drives algal growth and other impairments. No phosphorus has as yet migrated from the WWTF to the Eel River from groundwater discharge and none will for many decades to come, even under the Project's proposed change in discharge prioritization. The fact that anecdotal Eel River water quality changes have been observed in recent years and decades speaks to the fact that there are many sources of nutrient contribution to the river occurring now that are unrelated to the WWTF. This Project is proposed with the intent of improving water quality and habitat conditions for the harbor watershed in general. Extensive assessments conducted in support of this Project have documented the anticipated achievements of that overall water goal while also estimating that potential negative impacts to specific water resources will be minimal. In order to avoid and minimize the potential impacts of phosphorus on the Eel River the Town has proposed a series of mitigation triggers based upon monitoring results at 8 new monitoring wells. Given that the leading edge of the phosphorus plume moves at approximately 12 feet per year during active wastewater discharge, an assessment discussed at length in the EENF, the first actionable trigger is not expected to be met for decades. While there are specific mitigation measures the Town could commit to at this point to attenuate phosphorus and/or slow the migration of the phosphorus plume innovative technologies and nature-based solutions should significantly improve by the time any actionable triggers are met. The mitigation triggers and their associated responses are described below:

- Pair of monitoring wells closest to the WWTF: No action required for any phosphorus detections
- Pair of monitoring wells 2nd closest to the WWTF: If sampling results in an average dissolved total phosphorus concentration of 2.2 mg/l or higher over 4 consecutive sampling dates – the Town will evaluate and design options for improved phosphorus treatment at the WWTF prior to discharge, applications of post-discharge treatment in the Basin beds, and/or treatment between the WWTF and discharge to the Basin beds.
- Pair of monitoring wells 3rd closest to the WWTF: If sampling results in an average dissolved total phosphorus concentration of 2.2 mg/l or higher over 4 consecutive sampling dates – the Town will increase the monitoring frequency to monthly and, if phosphorus concentrations remain

elevated, commit to implementing improved phosphorus treatment at the WWTF prior to discharge, post-discharge treatment in the Basin beds, treatment between the WWTF and discharge to the Basin beds, and/or similar mitigation measures to slow the migration of the phosphorus plume.

- Pair of monitoring wells furthest away from the WWTF: If sampling results in an average dissolved total phosphorus concentration of 2.2 mg/l or higher over 4 consecutive sampling dates – the Town will plan to curtail discharge at the WWTF to a maximum of 1.5 MGD (using the harbor outfall for the remainder) within 5 years and identify other options for wastewater disposal to be implemented within 20 years.

RF-2

Comment: *I appreciate the town's effort to engage the community through the public meeting regarding the EENF filing on October 4th, 2023. However, more time and opportunities are needed for residents, especially property abutters, to grasp and discuss the implications of this expansion in detail. We need to slow down this process. The potential impact on Hayden Pond and the entirety of the Eel River Watershed should be understood and discussed fairly.*

Response: See response to ASF-1.

Thomas Fugazzi (TF)

TF-1

Comment: *As a resident of Plymouth and residing on Clifford Road adjacent to Eel River, I would like to express my concern with the proposed additional ground discharge from the Camelot Drive Wastewater Treatment Plant. As I recall, this issue was hotly debated in the 1990s due to the effects this discharge could have on the water quality and volume of water of the river. From that time until current, the condition of the river has changed considerably for the worst. The flow has decreased considerably causing backup and flooding of low-lying areas. Additionally, the discharge into Plymouth Harbor along the inside of the beach parking lot is a constant problem. On major storms this section of the river is completely blocked to the extent it takes several days to weeks for the Town to dredge and restore the volume of flow. On a lesser storm, smaller amounts of sand restrict the flow, which is neglected to be cleaned out, and over time restricts the flow and raises the water level back as far as the Hayden Pond Dam.*

Response: The Project will increase baseflow of the Eel River, especially important during low flow periods such as droughts. Storm blockages at the mouth of the Eel River occur as a result of coastal processes that are unrelated to current or Project-proposed WWTF conditions. The Town's response to major storms is outside of the scope of the Project and the MEPA Certificate.

TF-2

Comment: *The river needs to be returned to its original path of flow directly into the bay and not along the inside of the beach. The bridge on Warren Avenue is already damaged and in need of repair or replacement. Warren Avenue should be raised to address the rise in sea level. This section is closed during storms.*

Response: The flow path of Eel River is outside of the scope of the proposed Project and the MEPA Certificate.

Kerry Stefano (KS)

KS-1

Comment: *As a resident of the village of Chiltonville located within the Eel River Watershed in the Town of Plymouth, I am concerned with the proposed 300% increase of groundwater discharge at town's Camelot Drive Wastewater Treatment Facility. While I realize the town has conducted a public meeting of the EENF filing on October 4th, 2023, I do not believe that the community has had a chance to fully absorb all of this information, ask questions, and feel comfortable with proceeding with this expansion. This was a highly contentious issue for the town when the wastewater facility was sited at the Eel River headwaters back in the 1990s. It would seem imprudent to proceed as fast as this has without full buy-in from the community.*

Response: See response to ASF-1.

Francis Mand (FM)

FM-1

Comment: *Part of the submission for this project is a list of local community groups contacted during the initial rollout of this project. But the list is devoid of any truly local groups, save for a state-listed tribe – the Herring Pond Wampanoag Tribe. Of the dozens of community organizations actively involved in conservation issues in this town alone, including those dedicated to the preservation of the Town's globally-rare ecoregion – The Massachusetts Coastal Pine Barrens Alliance – and those engaged in a variety of initiatives to preserve and protect the town's sole-source aquifer, none were contacted. Plymouth is well known for its preponderance of rare coastal plain ponds, its wealth of ponds overall (450), its leadership in wetlands restoration science (The Eel River and Tidmarsh Farms restorations) and its leadership in dam removal efforts on historic Town Brook – and yet, no local conservation groups were consulted.*

Response: As required by 301 CMR 11.05(4), the Project team provided advanced notification to a Project-specific EJ Distribution list provided by the MEPA Office. This distribution list, which included community-based organizations, tribes, and indigenous organizations was included, is the list that was included in the EENF. All organizations and individuals are encouraged to provide input to the Project as part of the MEPA process.

FM-2

Comment: *While conservation groups understand the potential benefits of increased recharge that would likely result from this sewerage 're-prioritization,' if they had been consulted those groups would have underlined concern that the ecosystem that the WWTF lies within contains both a vulnerable, EPA-designated sole-source aquifer (largely comprised of sand) and many habitats and species (of flowers, plants, and animals) that are dependent upon the natural fluctuations in groundwater levels and the absence of contaminants in those waters...What is the long-term effect of the alteration and contamination of these waters, however slight, on these habitats, on this increasingly valuable resource? That is not addressed in this proposal.*

Response: While the Project will increase discharge to the Sole Source Aquifer, thorough analysis has demonstrated that there are no known or potential public drinking water supplies within the Project's area of impact. In addition, the public drinking water supply main goes past each developed parcel within the modeled flow path. In other words, each developed parcel has access to public drinking water that would be unaffected by the change in effluent discharge prioritization. Taken together, it is expected that discharge at the WWTF would not have a detrimental impact on the Plymouth public drinking water supply.

As discussed in the EENF in regards to the natural fluctuations in groundwater levels, discharge from the WWTF will provide beneficial groundwater recharge supporting baseflow in the Eel River during lower flows. While periods of lower flows can be naturally occurring, they are expected to occur more often in the future due to the effects of climate change. All discharge from the WWTF has been and will continue to be treated to the levels required by the Town's groundwater discharge permit and NPDES permit.

FM-3

Comment: *At the very least this project should be delayed until a full and fair public hearing process – and additional studies on the potential short and long-term effects of this project – have been conducted.*

Response: See response to ASF-1.

FM-4

Comment: *This project should address PFAS chemicals, which are a bi-product of the wastewater treatment process. Will greater dependence on the inland WWTF, mean a wider dispersion of these chemicals throughout the town's groundwater?*

Response: PFAS treatment is outside of the scope of the Project and the MEPA Certificate. The Town will continue to treat effluent to the levels required in the Groundwater Discharge Permit and NPDES Permit prior to discharge. In addition, analysis has demonstrated that there are no known or potential public drinking water supplies within the Project's area of impact. In addition, the public drinking water supply main goes past each developed parcel within the modeled flow path. In other words, each developed parcel has access to public drinking water that would be unaffected by the change in effluent discharge prioritization. Taken together, it is expected that discharge at the WWTF would not have a detrimental impact on the Plymouth public drinking water supply.

FM-5

Comment: *The town of Plymouth continues to experience rapid development, and has shown little interest in reducing the corresponding need for additional water through implementation of comprehensive water conservation measures. Though no modification of the WWTF itself is anticipated to accomplish the 're-prioritization' sought, increasing the capacity of the WWTF overall will likely result in use of excess capacity, requiring additional infrastructure (pipelines, etc.) and in short order greater water usage. Should the town be required to match any increase in capacity of the WWTF with a reduction in the amount of water usage per capita?*

Response: Town municipal water consumption on a per capita basis is below applicable state permitting requirements. The proposed Project will increase aquifer recharge providing increased baseflow and drought resiliency to the Eel River and other nearby water resources. The proposed expansion of permitted WWTF discharge capacity is intended to allow in part for the servicing of existing developed parcels and will not necessarily result in significant increases in water use. Water usage is outside of the scope of this Project and the MEPA Certificate.

Herring Ponds Watersheds Association (HPWA)

HPWA-1

Comment: *Since 2007 we have learned a lot about our aquifer. It's name, Plymouth-Carver Sole Source Aquifer clearly states that if the aquifer is no longer safe for drinking, there is no recourse. Imagine the economic impact of having no drinking water. The decision to put more (10% of current volume going to 100% of current volume as well as increasing the maximum permitting discharge volume from 2.5 million to 3 million gallons per day) treated wastewater into the aquifer is literally an existential question. It requires more study before implementation, yet no new information has been presented. We owe this to future generations. We should encourage further study prior to implementing the program.*

Response: While the WWTF discharge beds are within the Plymouth-Carver Sole Source Aquifer, modeling and GIS analysis show that groundwater from the WWTF does not flow towards any known or potential drinking water supplies.

As part of a separate evaluation to identify and compare candidate sites for potential new drinking water wells, HW conducted a desktop GIS analysis. As part of this analysis, for a site to be considered a "candidate" it needed to meet or be able to meet the requirements for Groundwater Supply Protection as written in the Massachusetts Drinking Water Regulations (310 CMR 22.21). These regulations are summarized below:

- For wells withdrawing more than 100,000 gallons per day, a Zone I (400-foot radius) surrounding the proposed well must be owned or controlled by the supplier of water. Current and future land uses within the Zone I are limited to those directly related to the provision of public drinking water.
- The source of water will achieve all applicable water quality standards set forth in 310 CMR 22.00.
- Wellhead protection zoning and nonzoning controls for the Zone II compliant with 310 CMR 22.21(2)(a) and (b).
 - o 310 CMR 22.21(2)(a) prohibits the siting of the following land uses within the Zone II or Zone III: Landfills, automobile junkyards, stockpile areas for snow or ice disposal, petroleum or oil bulk stations or terminals, treatment or disposal works for wastewater (except for POTWs), facilities that generate, treat, store, or dispose of hazardous waste (with some exceptions), and unsealed, unpermitted floor drains from industrial or commercial hazardous material or hazardous waste process or storage areas.
 - o Additionally, 310 CMR 22.21(2)(b) prohibits the siting of the following land uses within the Zone II or Zone III: Storage of sludge or septage not in compliance with 310 CMR 32.30, storage of snow or ice removal chemicals, or fertilizer, or animal manures (unless stored within a structure designed to prevent escape of contaminated runoff). Storage of

liquid hazardous materials or petroleum products, the removal of earth materials within four feet of the historical high groundwater table, or any land use which renders impervious more than 15% or 2500 square feet of any lot or parcel.

In addition to the requirements outlined in state regulation, physical characteristics of the aquifer were included in the analysis. Potential candidates must not only satisfy state regulations, but also be able to provide abundant, high-quality drinking water without adverse impacts on the community. Hydrogeologic factors such as estimated saturated thickness and surficial geology were considered based on available reports. Surface hydrological features such as ponds, wetlands, and streams were considered as well.

Following this analysis, it was determined that there are no candidate public drinking water supply well sites within the modeled flow path of effluent discharge at the WWTF associated with the proposed Project. In addition, the public drinking water supply main goes past each developed parcel within the modeled flow path. In other words, each developed parcel has access to public drinking water that would be unaffected by the change in effluent discharge prioritization. Taken together, it is expected that the Project would have no detrimental impact, on the Plymouth public drinking water supply.

Herring Pond Wampanoag Tribe, Inc. of Patuxet-Plymouth, Eel River Watershed Association, the Jones River Watershed Association, and Community Land & Water Coalition (HPWT/ERWA/JRWA/CLWC)

HPWT/ERWA/JRWA/CLWC-1

Comment: *The Town of Plymouth (“Town”) requests a single Environmental Impact Report (EIR) instead of a full Draft EIR followed by a Final EIR. For the reasons stated here, we urge the Secretary to require a full Draft EIR and Final EIR. The Town’s justification for avoiding a full EIR is that a prior EIR for the WWTF in the 1990s, supplemented by the Expanded Environmental Notification Form (EENF) satisfies MEPA. It does not.*

Response: The Project’s request for a single EIR was denied and is currently filing this DEIR as part of the full Draft EIR and Final EIR process.

HPWT/ERWA/JRWA/CLWC-2

Comment: *Further, the alternatives analysis is insufficient. Alternatives proposed in the 1990s EIR have been ignored.*

Response: As a part of this DEIR the Project Team performed additional screening for and analysis of disposal locations outside of the Eel River Watershed. This alternatives analysis included further consideration of Site 101 and the Cold Spring School property as well as other alternatives outside of the Eel River Watershed. In addition to these suggested alternatives the Project Team evaluated the feasibility of a deep rock tunnel outfall and providing additional nutrient treatment at the WWTF while increasing discharge at the existing harbor outfall.

HPWT/ERWA/JRWA/CLWC-3

Comment: *The Project is located on the unceded ancestral lands of the Tribe who used the Eel River system for millenia before first contact with Europeans. The groups’ missions’ include the protection and stewardship of lands and waters and community members in the Plymouth area. This*

includes protecting the drinking water in the Sole Source Aquifer. 55 Federal Register 32137. The Aquifer covers 199 square miles and is the sole drinking water source for about 200,000 people. The Aquifer is designated under the Safe Drinking Water Act, a federal law, due to its sandy soils, high transmissivity, and its vulnerability to contamination. The WWTF and the proposed expansion are in the federally protected Aquifer. The Aquifer is shallow and intercepted by wetlands, streams and ponds that also may be impacted. The commenters support efforts to reduce sewage and wastewater discharges to Plymouth Harbor. Diverting these waste flows from the Harbor to discharge them into on to land where they infiltrate into the Sole Source Drinking Water Aquifer shared by Plymouth with 7 other Towns requires careful and thorough study and alternatives analysis. The EENF does not provide this.

Response: See response to HPWT-1.

HPWT/ERWA/JRWA/CLWC-5

Comment: *In addition to addressing the issues here, the Town and subsequent MEPA documents should provide a thorough, non-technical description of the Plymouth wastewater and drinking water supply system and identify which municipal bodies are responsible for each aspect of these municipal services. Such a description should describe:*

- *The inputs to the WWTF (storm drains, number of industrial, commercial and residential wastewater dischargers) and the contaminants included in the incoming waste;*
- *The pretreatment program applicable to and being used by the industrial users discharging to the WWTF and where to find this information;*
- *How the incoming wastewater is treated and to what standards (secondary? Tertiary?);*
- *The water quality of he wastewater discharged after treatment, and how this information is reported to the public and where to find this information; and*
- *The WWTF practices for the disposal and/or storage of sewage sludge generated by the WWTF.*

Response: Such an assessment is outside of the scope of the proposed Project and the MEPA Certificate.

HPWT/ERWA/JRWA/CLWC-6

Comment: *The 1997 EIR that the Town seeks to rely on included the alternative of wastewater reuse as mitigation for the WWTF nitrogen pollution. The EENF does not consider or analyze this alternative. EENF should analyze the alternative of pumping the wastewater to the Pine Hills golf course and using it to water the golf courses, where it could be discharged to the groundwater there. This would offset the Pine Hills Water Management Act Permit and need for additional withdrawals there. This would avoid impacts to sensitive wetlands, river and streams around the WWTP side. It would also move the project out of an Environmental Justice neighborhood to an area that bears none of the environmental burdens associated with the industrial and commercial uses in the Town such as the WWTF/sewer plant.*

Response: The current EIR includes additional alternatives assessment, including analysis of Site 101, the Cold Spring School, alternative sites outside of the Eel River Watershed, a tunnel outfall, and increasing nitrogen treatment while maintaining discharge at the outfall. Assessment of wastewater reuse was not included in the scope of the MEPA Certificate nor was it among the assessments suggested by DEP in their comments on the EENF. As discussed in this DEIR, the potential conveyance of

wastewater from the WWTF across and out of the Eel River watershed would require miles of piping with crossings of the river and other wetlands resources. In addition, the Pinehills golf courses are not Town property and already have Water Management Act permitting in place for which the Town is not a party.

HPWT/ERWA/JRWA/CLWC-7

Comment: *The EENF does not provide a detailed baseline in relation to which potential environmental and public health impacts and mitigation can be measured. 301 CMR 11.06(8)(b). The data used here is also outdated and incomplete. It relies on a 1997 EIR and provides “Snippets” without a description of how those relate to the current proposal. The Appendix G: Nutrient Management Data Report Operational Monitoring Program Data Report for 2020 does not adequately address topics in the Eel River Technical Advisory Committee Evaluation (Appendix F). Appendix G is outdated and recites the Town’s land conservation activities with vague references to sampling results. None of this is in “non-technical language” as required by 301 CMR 11.07(d). For example, the sampling result tables do not state whether or not the results are within permit limits or whether there are exceedances and violations. The Town has not devoted the financial and professional resources necessary to address the potential environmental and health impacts of the WWTF’s ongoing operation. The current “baseline” after about 25 years of the WWTF’s operation needs to be established with more data and analysis before additional wastewater can be discharged to the Sole Source Aquifer.*

Response: To provide a baseline assessment, the EIR includes updated nutrient monitoring data from groundwater monitoring wells in Section 3.2. There are now over 20 years of baseline data included in the baseline assessment covering a variety of different wastewater discharge configurations. In addition, 301 CMR 11.07(d) states that, in the preparation and filing of the EIR, it must include a summary providing a “brief description in clear, nontechnical language” and lists the components that this summary must provide. This regulation reference does not apply to the preparation and filing of the EENF.

HPWT/ERWA/JRWA/CLWC-8

Comment: *the EENF does not demonstrate that the planning and design of the Project use all feasible means to avoid potential environmental impacts. 301 CMR 11.06(8)(d). The design and planning is based on the 1990’s EIR for a Site and a municipality that bears no resemblance to the town of 30+ years ago. The Site is being clear-cut and mined for sand and gravel, the land around it has been and is being mined, large commercial and residential developments have covered the area with impervious materials and more large projects are planned for the Eel River Watershed, including more dense development at Pine Hills, and an 800 seat mega-church. The once forested “County Woodlot” less than 2,000 feet west of the Project, was forested land as of 2015. The Town allowed 30 acres to be mined and it is now a solar facility not the promised cranberry bog. The Town allowed a commercial sand and gravel mining operation to level one of the Town’s highest hills and leave a 10 acre-50 foot deep open pit mine. Both of these were done with no MEPA review or hydrology assessment. The County Woodlot site is being proposed for uses such as a casino or racetrack.*

Response: While planning and design of the WWTF was performed in the 1990s, additional assessment was performed in advance of the EENF filing in order to assess the potential environmental impact of the proposed discharge reprioritization given updated conditions.

HPWT/ERWA/JRWA/CLWC-9

Comment: *The Town has not undertaken the water use reductions analyzed in the 1997 EIR. The Town's consultant Environmental Partners has issued three water-sewer reports warning that municipal boards should stop approving dense residential developments/apartment/town house complexes because the Town cannot supply sufficient water. The Town's master plan is ignored and its draft water supply management plan is almost 5 years old. The Project does not use all feasible means to avoid environmental impacts, which at a minimum would include reducing water use and enforcing the stormwater regulations.*

Response: Water use reductions and stormwater regulations are outside of the scope of the Project and the MEPA Certificate.

HPWT/ERWA/JRWA/CLWC-10

Comment: *Appendix F, Eel River Technical Advisory Committee Evaluation," is based on outdated data about residential development in the Eel River Watershed. It states, "The MassGIS database was used to calculate the areas of various land uses within the Eel River watershed. Present and future potential house counts were collected from the Town of Plymouth Planning Department. For the Pine Hills Development, the Green Company provided estimates of house counts, recreational areas and other development." This information must be updated.*

Response: Appendix F is one supporting document among many used in the preparation of the EENF and DEIR submittals. Updating that past study is not part of the Scope of this Project. This Project and its EENF and DEIR submittals has also relied on more recent studies as well as site and Project specific testing, modeling, and analyses.

HPWT/ERWA/JRWA/CLWC-11

Comment: *The Town's Environmental Justice Screening identifies 1,710 people within 356 households within 1 mile and about 4,000 people within 5 miles. (The EENF is not clear about the total number of the EJ Population and where they reside in relation to the Site.) The EENF does not state whether the EJ communities have private drinking water wells that could be impacted by the pollution discharged to the groundwater at the Site. The EENF goes not provide a detailed baseline as required by 301 CMR 11.06(8)(d).*

Response: The EJ map viewer developed by the Massachusetts Executive Office of Energy and Environmental Affairs, the tool with which the Environmental Justice Screening was performed, provides information on a census block group level. More specific information, including the location of an EJ population within a particular census block group, is not publicly available. Additionally, as documented in the response to comment HPWA-1, the public drinking water supply main goes past each developed parcel within the modeled flow path. In other words, each developed parcel has access to public drinking water that would be unaffected by the change in effluent discharge prioritization, regardless of EJ status.

HPWT/ERWA/JRWA/CLWC-12

Comment: *Finally, the Town made no efforts to provide "meaningful opportunities for public involvement by Environmental Justice Populations prior to filing the expanded ENF" as was required by 11.06(8)(d). The EENF's list of "Community Based Groups" are located in the Boston area. Not one of*

them is known to have any contact with or do any work in Plymouth or the Plymouth area or with the EJ communities identified in the EENF. The EENF does not state that mailings were done to the EJ communities. The Town's sole Community Based outreach consisted of an Oct. 8, 2023 MEPA on line zoom meeting with the claim that it will be conducting future meetings with no specifics about how people will be contacted, how many meetings will be held, or where they will be held. This is insufficient for MEPA compliance.

Response: As required by 301 CMR 11.05(4), the Project team provided advanced notification to a Project-specific EJ Distribution list provided by the MEPA Office. This distribution list, which included community-based organizations, tribes, and indigenous organizations was included, is the list that was included in the EENF. Following the receipt of the MEPA Certificate on December 22, 2023, the Town of Plymouth Select Board created the Wastewater Groundwater Discharge Citizen Advisory Committee (the Committee). The following is included in the Committee description: "The primary function of the Citizens Advisory Committee will be to provide a platform for citizen input, feedback, and collaboration with town departments, related to wastewater treatment and disposal. By being comprised of citizens directly, the Committee helps to enhance transparency, accountability, and inclusivity in policy development and implementation."²³ The Committee has convened eight times in meetings open to the public with agendas posted for public consumption at least 48-hours in advance in accordance with Massachusetts Open Meeting Law.

HPWT/ERWA/JRWA/CLWC-13

Comment: *The EENF relies on the inaccurate assumption that the Town is properly regulating industrial, commercial and residential development in a manner that protects the Eel River Watershed and the Sole Source Aquifer. The Town's municipal permitting bodies allow industrial and commercial development in and adjacent to its Aquifer Protection Districts and in Zone IIs of well head protection. This includes car dealerships and car washes, sand and gravel mining operations including those that dredge in the Sole Source Aquifer, a largely unregulated concrete asphalt batching facility (T.L. Edwards) and an unknown number of other commercial and industrial facilities. The EENF does not identify the industrial users discharging into the WWTF. Do industrial users such as T.L. Edwards and others discharge to the WWTF? Is there a pretreatment program that includes monitoring, reporting and enforcement for any users discharging to the WWTF. For example, the T.L. Edwards sand and gravel mining and concrete and asphalt batching facility was required by a 1994 municipal permit to have a "fully engineered closed system, involving oil and grit separation and on-site leaching" with monitoring and recordkeeping. The Town has produced no records of compliance at this facility. This raises serious questions about what the Town is allowing to be discharged into the sewer system, the WWTF and/or into the Sole Source Aquifer. This should be explained.*

Response: The manner of development regulation and the identification of users discharging into the WWTF is outside of the scope of the Project and the MEPA Certificate. The Town will continue to treat wastewater to the levels required by the groundwater discharge permit and NPDES permit prior to discharge.

HPWT/ERWA/JRWA/CLWC-14

²³ <https://www.plymouth-ma.gov/1436/Wastewater-Groundwater-Discharge-Citizen-Plymouth-WWTF-Treated-Effluent-Discharge-Reprioritization-DEIR-Plymouth,MA>

Comment: *A new manufacturing facility is being planned in the Industrial Park at the site of a 20-acre sand and gravel mine that is excavating in the groundwater. A convention center is being discussed. The Town continues to approve dense residential development such as the Oasis residential project, Colony Place apartments, town houses and hotels, Red Brook, and Pine Hills. Will these projects be discharging to the WWTF?*

Response: Oasis and Colony Place are connected to the Town sewer system. Red Brook and Pine Hills are not located near Town sewer system infrastructure and are not connected.

HPWT/ERWA/JRWA/CLWC-15

Comment: *The Town claims the WWTF will increase recreational use of the Harbor. This is trading one recreational resource for another with no credible analysis of the tradeoff. The WWTF is located in an aquifer area “contributing areas to significant recreational water bodies.” The EENF does not adequately address the recreational use of the Eel River Watershed and just assumes that the Plymouth Harbor recreation is more important than the Eel River Watershed recreation. The EENF contains generalized statements like, “This project’s goal of improving the water quality of Plymouth Harbor aligns with the plan’s strategy of encouraging health lifestyles and protecting the region’s coastlines, beaches and water resources.” This is inconsistent because the water enters the Bay anyway, only at a different location. It ignores that fact that moving the discharge from the Harbor where people recreate and grow food to discharging it to the Sole Source Drinking Water supply for 200,000 people is a delicate balance requiring robust and thorough study to ensure the tradeoffs are made based on full and complete information.*

Response: As assessed in the EENF the Eel River is a phosphorus limited system, meaning that it is the availability of phosphorus, not nitrogen, that drives algal growth and other impairments. In order to avoid and minimize the impact of the potential phosphorus plume the Town has proposed a series of mitigation triggers based upon monitoring results at the 8 new monitoring wells. Given that the leading edge of the phosphorus plume moves at approximately 12 feet per year during active wastewater discharge, an assessment discussed at length in the EENF, the first actionable trigger is not expected to be met for decades. While there are specific mitigation measures the Town could commit to at this point to attenuate phosphorus and/or slow the migration of the phosphorus plume innovative technologies and nature-based solutions should significantly improve by the time any actionable triggers are met. The mitigation triggers and their associated responses are described below:

- Pair of monitoring wells closest to the WWTF: No action required for any phosphorus detections
- Pair of monitoring wells 2nd closest to the WWTF: If sampling results in an average dissolved total phosphorus concentration of 2.2 mg/l or higher over 4 consecutive sampling dates – the Town will evaluate and design options for improved phosphorus treatment at the WWTF prior to discharge, applications of post-discharge treatment in the Basin beds, and/or treatment between the WWTF and discharge to the Basin beds.
- Pair of monitoring wells 3rd closest to the WWTF: If sampling results in an average dissolved total phosphorus concentration of 2.2 mg/l or higher over 4 consecutive sampling dates – the Town will increase the monitoring frequency to monthly and, if phosphorus concentrations remain elevated, commit to implementing improved phosphorus treatment at the WWTF prior to discharge, post-discharge treatment in the Basin beds, treatment between the WWTF and

discharge to the Basin beds, and/or similar mitigation measures to slow the migration of the phosphorus plume.

- Pair of monitoring wells furthest away from the WWTF: If sampling results in an average dissolved total phosphorus concentration of 2.2 mg/l or higher over 4 consecutive sampling dates – the Town will plan to curtail discharge at the WWTF to a maximum of 1.5 MGD (using the harbor outfall for the remainder) within 5 years and identify other options for wastewater disposal to be implemented within 20 years.

As a result, it is not expected that discharge at the beds will impact the recreational use of Eel River. While the discharge will ultimately enter the Plymouth Harbor at a different location, discharge at the WWTF will allow for nitrogen attenuation along the course of the Eel River.

Lastly, while the Project will increase discharge to the Sole Source Aquifer, thorough analysis has demonstrated that there are no known or potential public drinking water supplies within the Project's area of impact. In addition, the public drinking water supply main goes past each developed parcel within the modeled flow path. In other words, each developed parcel has access to public drinking water that would be unaffected by the change in effluent discharge prioritization. Taken together, it is expected that discharge at the WWTF would not have a detrimental impact on the Plymouth public drinking water supply.

HPWT/ERWA/JRWA/CLWC-16

Comment: *Dilution is not the solution to pollution. The EENF Project Narrative, Section 1.0 page 3 states that "key contaminants of concern (pathogens, phosphorous, and nitrogen)" will all get additional treatment from groundwater discharge vs. direct discharge to the Harbor. While this may be true, there is no description in the EENF of what is going in to the WWTF and what is coming out. The EENF does not identify the before and after contaminant levels in the WWTF effluent. What are the concentrations of pathogens, and what types and concentrations of pathogens, pharmaceuticals, PFAS, endocrine disrupting chemicals, etc. will be discharged to the Sole Source Drinking Water Aquifer at the WWTF? What levels of metals such as manganese are present? (Manganese is not regulated in drinking water and data on water temporally and spatially sparse. <https://www.nature.com/articles/s41370-023-00563-9>) Shallow aquifers are vulnerable to contamination by manganese.) Manganese while naturally occurring can result from human activities such as mining, industrial discharges and landfill leaching. Will the water discharged from the WWTF to the Sole Source Aquifer meet updated recommendations for this contaminant in drinking water? While this information may all be contained in the WWTF testing reports, it is not described in the EENF. This should be described in non-technical language in a full EIR so that the public can be adequately informed.*

Response: The Town has complied and will continue to comply with all testing and treatment requirements set by DEP in the Town's Groundwater Discharge Permit.

HPWT/ERWA/JRWA/CLWC-17

Comment: *The DEIR must contain a complete and non-technical description of the meaning of and results of the FDA Plymouth Harbor Dye Tracer Study of 2018 and letter of January 31, 2020, Appendix I to the EENF and Section 3.3.4. This study appears to raise significant concerns about the fecal coliforms entering the Plymouth sewer system and whether or not they are being adequately treated at*

the WWTF before being discharged to the Bay. Discharging these contaminants to the Plymouth Carver Sole Source Aquifer also raises significant concerns and alarm.

Response: Both the Town's Groundwater Discharge Permit and the Town's NPDES permit includes testing requirements and discharge limitations for fecal coliform.

HPWT/ERWA/JRWA/CLWC-18

Comment: *The EENF Form, page 7(E) states the Site is subject to a "conservation restriction, preservation restriction, agricultural preservation restriction or watershed preservation restriction". This appears to be inaccurate. There is no known restriction on the Site and in fact it is being used for sand and gravel mining and dumping of waste. The EENF Form Attachment C does not show the Site as labeled "Protected and Recreational OpenSpace". If it is preserved or protected land why is the town conducting sand and gravel mining on it and clear-cutting forests, and dumping piles of waste from cleaning storm drains?*

Response: Section 2 Question E in the Land Section on the EENF Form (page 7) answers "No" to "Is any part of the Project site currently subject to a conservation restriction, agricultural preservation restriction or watershed preservation restriction?" The blank for the "Yes" answer is on the previous line of the form.

HPWT/ERWA/JRWA/CLWC-19

Comment: *The Project Narrative, Section 2.0 states that the WWTF as proposed "will allow for connection to the WWTF of existing and future developed parcels that are currently, or would in the future under current permitting and infrastructure, served by on-site septic systems, which were never designed to reduce nitrogen." This ignores the fact that there are currently available, affordable, on-site "IA" septic systems that can address nutrient pollution. See, Herring Ponds Watershed Association, September 20, 2023 informational session here: <https://www.theherringpondswatershed.org/news-events/> The Town of Plymouth just refuses to require them for new construction or for replacements. This points out a failure in the alternatives and mitigation analysis in the EENF.*

Response: While there are innovative/alternative (I/A) septic systems that have been designed to reduce nitrogen, these are recent innovations that are not widely implemented for a variety of reasons including, but not limited to, cost and treatment achieved. Most I/A systems approved by DEP for use have a designed treatment level of 19 mg/l, including all systems approved for general use.²⁴ This is significantly higher than the nitrogen treatment currently achieved at the WWTF. Average nitrogen concentrations of discharge have been below the maximum of 10 mg/L allowed as per the current MassDEP groundwater discharge permit. The overall average concentration of nitrogen in the WWTF effluent is 5.8 mg/L.

HPWT/ERWA/JRWA/CLWC-20

Comment: *The Project proposes to use the WWTF additional capacity for increased future growth in the Town. Section 2.0, page 5. This is segmenting the project from the proposed growth and*

²⁴ <https://www.mass.gov/info-details/approved-title-5-innovativealternative-technologies#all-technologies-approved-for-use>

development. The EENF should include growth projects and describe exactly how many proposed tie-ins are in the master plan. What are the growth projections and how many new users will be tying in?

The EENF states, “The Town of Plymouth is in the process of updating its Comprehensive Wastewater Management Plan. Once complete, if the currently proposed project is approved, **it is the intent of the Town to file a Notice of Project Change to MEPA.** Thus, the Town states it plans to file a Notice of Project Change with MEPA to include the Comprehensive Wastewater Management Plan that is in development. The current EENF is putting the cart before the horse. This wastewater management plan should be complete before the EENF is approved, and the EIR should incorporate the Plan. The Town is improperly segmenting the Project from the comprehensive wastewater management plan and thwarting the purposes of MEPA. This violates MEPA’s anti-segmentation provision, 301 CMR 1.01.c. which states,

*“the Secretary shall consider the entirety of the Project, including any likely future Expansion, and not separate phases or segments thereof. The Proponent may not phase or segment a Project to evade, defer or curtail MEPA review. The Proponent, any Participating Agency, and the Secretary shall consider all circumstances as to whether various work or activities constitute one Project including, but not limited to, whether the work or activities, taken together, comprise a common plan or independent undertakings, regardless of whether there is more than one Proponent; **any time interval between the work or activities;** and whether the environmental impacts caused by the work or activities are separable or cumulative.*

The Town has stated plans to tie future developments into the WWTF. The Town should be required to incorporate this into the entirety of the WWTF Project.

Response: The Project’s request to increase discharge to its original design and intention of 3.0 MGD in conjunction with the change of discharge prioritization is intended to prevent Project segmentation. Planning the number of future tie-ins is not feasible without an understanding of the discharge constraints.

HPWT/ERWA/JRWA/CLWC-21

Comment: There are inaccuracies and omissions in Section 3. First, it ignores significant, ongoing land use alterations on the Site since the 1997 EIR and does not describe the Town’s plans for future uses of the Site. The EENF Form, Land, states that the total Site acreage is 95.79 acres with “other altered areas at 33.04” and “undeveloped areas” are 54.40 acres. The “undeveloped” acreage is actually closer to 44 acres according to MassMapper GIS. Thus, the description of the Site appears to be inaccurate.

Response: The large undeveloped area on the eastern portion of the Project is, by rough estimate, between 44 and 45 acres. There are, however, other smaller portions of the site that are undeveloped to bring the total up to what was included on the EENF form.

HPWT/ERWA/JRWA/CLWC-22

Comment: Section 3 ignores the land use changes on the Site from 1997 to present, that are ongoing. The Town is using and expanding a sand and gravel mine, extracting sand and gravel for unknown purposes. There is no earth removal or mining permit, and the Town does not account for the volume of earth it has removed from the Site since acquiring it by eminent domain in the 1990s. In February 2022, CLWC sent the Town zoning enforcement official a Request for Enforcement of the zoning

bylaw on earth removal with a request that the Town cease and desist removing sand and gravel from the WWTF Site. The Town did not take enforcement action. The activity is clearly visible on Google Earth. This is Construction Sand and Gravel Processing as defined by the federal Clean Water Act, Section 11.19.1. The Site use falls under Sector J. Mineral Mining and Dressing, Subsector J1, SIC Code 1442. and requires an individual NPDES permit. The Town has no such permits. Section 3 appears to be based on the assumption that the Town is stewarding the 97-acre Site in a manner that protects the Eel River, Groundwater and the Sole Source Aquifer. Instead, the Town is actively clearing forested lands, levelling hills, and conducting commercial sand and gravel mining on the 97-acre Site, with no environmental impact study and no accountability.

Recently the Town has allowed land clearing on the WWTF Site for the installation of a cell tower. Is the Town planning to continue the deforestation and sand and gravel mining of the remaining acres until the Site is entirely leveled and brought down to the grade of the WWTF? Is this use of the Site consistent with the protection of the Eel River and the Plymouth Carver Sole Source Aquifer to which the Town now seeks to discharge 3 million gallons a day of residential, commercial and industrial waste?

Response: See response to HPWT/ERWA/JRWA/CLWC-8. Assessments performed as part of the EENF and EIR evaluate the Project under existing conditions. Alterations previously conducted in the vicinity of the Project are outside the scope of the Project and the MEPA Certificate.

HPWT/ERWA/JRWA/CLWC-23

Comment: *The Project Narrative states that the Site has a forested buffer between the WWTF and abutting residences. It states the nearest home is 1,600 feet away, "buffered by woodland. Section 3.0. Does the Town plan to remove this wooded buffer by the expansion of its sand and gravel mining? Does the Town plan to keep clearing the forest and mining the Site so that the forested buffer is eliminated?*

Response: The Town has no plans to remove this woodland buffer.

HPWT/ERWA/JRWA/CLWC-24

Comment: *It is basic, established science that deforestation and sand and gravel mining reduces pollutant attenuation capacity by removing the natural filtration provided by the forests, sand and gravel. The Project Narrative describes the Site's sand soils and hence the vulnerability to contamination and the ability of pollution to travel easily through sand and the Aquifer. Yet, the Town plans to discharge more pollution to the Aquifer with no analysis of the current hydrology and impacts to surface and subsurface water flows resulting from land use changes, eliminating hills, and changing the topography. The Town's sand and gravel mining on the Site is leveling hills and thereby altering water flows above and below ground and removing the filtration protection for the Eel River. This is a part of the Town's use of the Site must be studied in an EIR. The Town's use of the Site for sand and gravel mining and the damage to the environment was not addressed in the 1997 MEPA certificate or EIR. It must be addressed now.*

Response: This Project is limited to an assessment of the discharge of treated wastewater effluent at the WWTF disposal beds. The transport and any chemical changes to that effluent during transport occur in groundwater. The ability of the oxidized iron and aluminum compounds in the soils underlying the WWTF beds to sorb phosphorus during groundwater transport has not been impacted by any surface processes.

HPWT/ERWA/JRWA/CLWC-25

Comment: *Finally, the Town is using the Site to store clean out debris from Town catch basins. For over a year there have been two mountains of clean out debris on the Site, near wetlands. In addition, the Town is composting sewage in the area, according to reports.*

Response: Storage on site is outside of the scope of the Project and the MEPA Certificate.

HPWT/ERWA/JRWA/CLWC-26

Comment: *The Town allows sand and gravel mining operations throughout the Eel River Watershed with no credible environmental impact reports, no groundwater monitoring and no evidence that these commercial mining operations comply with EPA Clean Water Act standards for Sector J. Mineral Mining and Dressing, Subsector J1, SIC Code 1442 or the Massachusetts Clean Waters Act.*

Response: Sand and gravel mining operations are outside of the scope of the Project and the MEPA certificate.

HPWT/ERWA/JRWA/CLWC-27

Comment: *Section 4 does not adequately describe the Project... This Section is vague and not supported by evidence or data. It makes sweeping conclusions about how the Project will “realize multiple environmental benefits” without sufficient data or analysis of alternatives. It relies primarily on Appendix H: Linked Watershed-Embayment Model to Determine the Critical Nitrogen Loading Threshold for the Plymouth Harbor, Kingston Bay, and Duxbury Bay Estuarine System, a draft report dated 2017. Most of the data in the Appendix H report is over 10 years old. Therefore, it does not reflect current conditions including the impact of climate change on water temperatures which impacts pollution levels. The USDA’s recent report shows that ambient temperatures in Massachusetts have increased over the last 10 years.*

Response: The DEIR included additional data assessment regarding the benefits of the Project, additional analyses of alternatives to the Project, and an evaluation of the Project’s resiliency to climate change. Despite this thorough assessment the Project as originally proposed remains the Preferred Alternative, as described below.

Given the constraints of the assessed alternatives to the Project, both in this DEIR and in the EENF, increasing discharge to 3 MGD and reprioritizing discharge from the outfall to the beds at the WWTF remains the Preferred Alternative. This alternative has been studied and explained at length throughout the EENF and the DEIR. It remains the preferred alternative for the following reasons:

- No site clearing is required in order to prepare the beds to receive discharge.
- The only construction associated with the Preferred Alternative is the installation of 8 monitoring wells described in Section 5.3. The infrastructure to bring wastewater to the WWTF for treatment and discharge already exists.
- The groundwater mounding resulting from discharge at the WWTF are relatively minor compared to other alternatives assessed and can be easily mitigated as described in Section 5.4.2.
- Extensive study has been undertaken for the Preferred Alternative.

- There are no known or potential public drinking water sources in the area of impact of the Preferred Alternative (see Section 8.1.1).
- The Preferred Alternative will result in only a slight increase in nitrogen loading (1.1% increase in overall loads relative to baseline) to Plymouth Harbor, even under the conservative MEP modeling assumptions utilized (see Section 5.1). Any increase in nitrogen loading to the harbor can be offset by connecting existing septic system properties in the watershed to the WWTF to receive advanced treatment.
- The Preferred Alternative will result in a decrease in greenhouse gas emissions (see Section 6.1).

HPWT/ERWA/JRWA/CLWC-28

Comment: *The Plymouth Harbor Water Quality section does not give information about water quality other than referring to the Dye Tracer Study, Section 4.1. This was a one time study. There appear to be other sources of pathogens discharging into the Harbor but the EENF does not explain any comprehensive plan by the Town to address all of the sources. Is the Project just a short term fix?*

Response: The Proponents acknowledge that there are other detrimental impacts to water quality in Plymouth Harbor beyond effluent discharge via the harbor outfall pipe. These are outside of the scope of this Project. The Project seeks to improve water quality in Plymouth Harbor by addressing one of the sources.

HPWT/ERWA/JRWA/CLWC-29

Comment: *Plymouth Harbor Water Quality, SubSection 4.1.2 acknowledges that a primary source of nitrogen to the Bay is fertilizers and changes in freshwater hydrology associated with development. Page 13. Plymouth continues to allow rapid deforestation and stripping of land down to bare sand for residential, commercial and industrial development. It allows massive sand and gravel mining operations such as the ongoing operation at 10 Collins Avenue in Pymouth. Municipal bodies and the Planning Department allow variances that override the Aquifer Protection Zoning Bylaw, vegetated buffers around projects, and the Town allows developers to ignore the Natural Features Conservation Bylaw. The Town should be required in an EIR to review the manner and means of the development that is resulting in the changes in freshwater hydrology associated with development and to commit to mitigation measures for this damage to the environment.*

Response: The manner and means of development in the Plymouth Harbor Watershed is outside of the scope of the Project and the MEPA Certificate.

HPWT/ERWA/JRWA/CLWC-30

Comment: *Section 4.1.2 admits that the nitrogen reduction calculation of 2.3% is based on a "simplistic" analysis. It anticipates "further evaluation of nitrogen offsets" from the Project. These must be studied in a full draft EIR, not in a single EIR as proposed.*

Response: Section 5.4.4 of the DEIR includes a more thorough analysis of nitrogen loading resulting from the project based upon updated particle tracking and reassessment of nitrogen attenuation along the Eel River following a transcription error identified by MassDEP in the MEP report.

HPWT/ERWA/JRWA/CLWC-31

Comment: *The EENF does not give a non-technical description for the public about how the Town's WWTF works, what stormwater and sewage is discharged to the WWTF and how it is discharged to the Harbor and groundwater. It does not explain the role of stormwater collection or document how much stormwater goes into the WWTF and how much goes in to the Harbor directly, both before and after the Project.*

Response: The Project is not proposing any changes to treatment at the WWTF.

HPWT/ERWA/JRWA/CLWC-32

Comment: *The Nutrient Management Plan relied on by the EENF was by its nature, limited to only nitrogen and phosphorous. Since that time, additional contaminants in wastewater have become a concern. This includes pharmaceuticals. The Town's sewer system receives wastewater from a greatly expanded hospital, now Beth Israel Deaconess Hospital. Beth Israel Deaconess Hospital is the largest hospital in the Southern region of the South Shore. BID-Plymouth is an acute care, 164-bed, non-profit community hospital serving 12 towns in Plymouth and Barnstable counties. There is no description in the EENF of the types of contaminants discharged to the WWTF, how they are treated before being discharged to the Harbor, and why there are issues that led to the FDA Letter of 2020 and directive to expand the prohibition zone for shellfishing in the Harbor. This should all be explained to the public and the Environmental Justice Communities.*

In October 2023, water quality testing in the Eel River adjacent to the Project Site revealed the presence of insulin and E Coli. The source of these contaminants have not been publicly reported as of this date. This should be addressed in a full EIR.

The issue of PFAS is not addressed. The Town should explain how PFAS is being treated, if at all, at the WWTF and what levels of PFAS are being discharged to the Aquifer and the Harbor now and what is proposed. It is undisputed that PFAS are found in wastewater.

Response: The Town has and will continue to treat all wastewater to the levels required by the Groundwater Discharge Permit and NPDES Permit.

HPWT/ERWA/JRWA/CLWC-33

Comment: *Additional permits may be necessary under the Wetlands Protection Act and Bylaw if the WWTF operators, the DPW, plans to continue to dump storm drain cleanout near the Eel River.*

The Massachusetts Historical Commission should be consulted since the 30 year old consultation is outdated.

Response: Storm drain cleanouts are outside the scope of the Project and the MEPA certificate. As required, the Massachusetts Historical Commission received a copy of the EENF and will receive a copy of the EIR.

HPWT/ERWA/JRWA/CLWC-34

Comment: *A thorough, meaningful opportunity for the Wampanoag people to participate in the MEPA process for this Project is critical. This means funding to retain experts and legal assistance to support efforts at reviewing MEPA documents and the water management act permit and other regulatory filings. The state and town should supply grant funding to support the role of Indigenous*

people in this project. There should be an entirely new MHC archeological survey undertaken and this should include impacts of the Town's sand and gravel mining on the Site on in the Eel River System.

Response: Comment acknowledged.

HPWT/ERWA/JRWA/CLWC-35

Comment: *The Town should explain any obligations under the federal Safe Drinking Water Act regarding its proposal to discharge wastewater to the aquifer.*

Response: In Massachusetts the federal Safe Drinking Water Act is enforced by the standards of MassDEP. The DEIR includes a discussion on MassDEP's Groundwater Discharge Permit program requirements.

HPWT/ERWA/JRWA/CLWC-36

Comment: *There should be a full biological survey. The EENF states there are no MESA protected species, but the 1990's studies showed the presence of the Bridle Shiner, a special concern species.*

The River Herring is now listed as protected under the Federal Endangered Species and the EENF states river herring are in the Eel River. In addition, the American Eel has been present in the Eel River. This is an at-risk species that should be studied. Eels live in and thrive in sediment. Will they be exposed to contaminants from the WWTF that may reach nearby wetlands, streams, and rivers that are eel habitat?

Response: There are no mapped NHESP Priority Habitats of Rare Species or Estimated Habitats of Rare Wildlife at the WWTF. Further downstream along the Eel River, north of Route 3, there is mapped Priority Habitat of Rare Species PH 610 and mapped Estimated Habitat of Rare Wildlife EH 486. The Eel River is a phosphorus limited system. With proposed mitigation thresholds in place the phosphorus plume is not expected to reach Eel River and have detrimental impacts on NHESP mapped species.

HPWT/ERWA/JRWA/CLWC-37

Comment: *The WWTF Pretreatment Program required under its Clean Water Act NPDES permit should be fully described in a full EIR. All records of the sewer users discharging to the WWTF who are governed by the Pretreatment Program and discharge limits should be identified. The Town should be required to provide historic and current data of its enforcement of the WWTF pretreatment standards.*

The Town's Stormwater Management Program – MS4 Permit should be described and outlined in a manner that the public can understand. The Town should be required to document that it is complying with the MS4 Permit and provide all up to date records of enforcement of the Stormwater Management Standards.

Response: The Town has been and will continue to be in compliance with its NPDES permit. The Town of Plymouth is a MS4 community. MS4 stands for "Municipal Separate Storm Sewer System", which is a municipal system designed or used for collecting or conveying stormwater which is not a combined sewer and which is not a part of a publicly owned treatment works. Plymouth's stormwater system is completely separate from the wastewater system. As such, the Town's MS4 Permit is outside the scope of the Project and the MEPA Certificate.

HPWT/ERWA/JRWA/CLWC-38

Comment: *Horsley Whitten Group used the “observed water level responses from the loading test” to run a groundwater model for a steady state discharge of 3.0 MGD. Section 6.1.4. There appear to be several serious flaws in this model which suggests that the model inputs were insufficient leading to an inaccurate model.*

First, the load test was conducted during a dry part of the year, from August 20 to September 28, 2018. Using groundwater response for a low flow, low groundwater elevation period does not give accurate data about year-round variations and how the groundwater and river and pond baseflows fluctuate. Second, the load test was done 5 years ago. Since 2018, there has been additional deforestation and sand mining on the Project Site (see above) and around the Site. More impervious surface has been added.

Response: Three large rain events occurred during the loading period: 0.8 inches on September 6th, 2.0 inches between September 10th and 13th, and 1.53 inches between September 18th and 20th. Additionally, water level loggers associated with the loading test were deployed for much longer than just the loading period. Loggers were in place from August 2nd to November 7th. Observations and data collected during this period were used to calibrate and refine the USGS model of the Plymouth Carver Aquifer (PCA) – a model specifically developed for the USGS to evaluate the impacts of development, discharge, and pumping on groundwater in the region. Moreover, groundwater mounding impacts from long term infiltration conditions occur on a long-term basis. Individual storm events constitute relatively minor contributions to the overall Site water budget relative to the day in and day out influence of treated effluent infiltration.

HPWT/ERWA/JRWA/CLWC-39

Comment: *Third, the Town’s informal Board of Health septic systems records review is only a partial view and not a scientifically credible method for determining “potential impacts to the low elevation parcels.” Section 6.1.6. This ignores the stormwater runoff and detention basins in the large commercial developments surrounding the Site. How will they be impacted? Similarly, the “on-the-ground survey of low properties” is unscientific and inadequate. Section 6.1.7 states that in the future, as a condition of the groundwater discharge permit, “the Town would be willing to work with any documented property owners impacted by changing groundwater levels” resulting from the Project. This is not “mitigation” under MEPA. Is the Town really suggesting that it is going to respond to flooding in a homeowner’s basement by altering the flows to the WWTF? Or what will be the mitigation for the homeowner? This is not an acceptable way to deal with this.*

Response: There is no expectation that basements are going to be flooded as a result of the Project. Following thorough analysis, only one parcel was identified as having less than 5 feet of separation between the bottom of the septic system and the simulated 3.0 MGD mounded groundwater elevation. 5 feet from the bottom of the septic system is deeper than a basement. Assessing septic systems using this separation distance is not arbitrary – 310 CMR 15, also known as Title V, includes a minimum depth to groundwater of “a) four feet in soils with a recorded percolation rate of more than two minutes per inch; or b) five feet in soils with a recorded percolation rate of two minutes or less per inch.”²⁵ In the absence of a soil percolation rate test at each potentially affected property, the Project team used the more conservative of the two values to assess the potential impact of groundwater

²⁵ 310 CMR 15.212

mounding. In addition to this analysis the Town will continue to monitor groundwater levels at all wells as part of the groundwater monitoring program, which will help determine the extent to which the modeled groundwater mounding occurs as a result of the Project. In order to mitigate the impact of groundwater mounding on septic systems the Town will relocate or replace those systems as necessary.

HPWT/ERWA/JRWA/CLWC-40

Comment: *Fourth, the EENF relies on the past 20 years of WWTF operations to claim that since “no impacts have been reported to the Town” from groundwater mounding, this is no problem. This is not credible, is based on the memory, apparently, of DPW officials and town workers, and is random and unscientific. Further, the past 20 years of discharge is a fraction of what is proposed by the Project. Therefore, it is completely irrelevant to future impacts. The conclusion on page 36 is unsupported.*

Response: This statement in the EENF is not meant to be relied upon on its own. The full conclusion on page 36 is as follows: “Therefore, while there have been no periods of groundwater infiltration even close to the proposed maximum of 3.0 MGD and the overall average infiltration volume has been an order of magnitude less than that proposed maximum, there have been two notable extended periods of infiltration at the WWTF where approximately half of the proposed maximum infiltration volume has occurred. The lack of reported mounding impacts to the Town during those two periods bolsters the results of the other analytical approaches discussed above for no or minimal anticipated groundwater mounding impacts.” The statement regarding lack of reported impacts is simply another piece of information supporting the conclusions of the loading test.

HPWT/ERWA/JRWA/CLWC-41

Comment: *Fifth, the Section 6.2 conclusion of “Potential Flow Impacts to Eel River Infrastructure” is also insufficient. It uses the apparently flawed groundwater model described in Part 6.1, that was based on 40 days of testing during the dry season five years ago, to make the conclusion that there will be “no significant hydraulic impacts” at the “two most likely locations for any such potential impact (Russell Mill Pond and Hayden Pond dams)...” Page 46.*

Response: The USGS model of the PCA is a model specifically developed for the USGS to evaluate the impacts of development, discharge, and pumping on groundwater in the region. Observations and data collected during the loading test, including logger deployment from August 2nd to November 7th, was used to calibrate and refine the model.

HPWT/ERWA/JRWA/CLWC-42

Comment: *Sixth, the hydraulic modeling is at odds with climate change predictions for Plymouth. It does not appear to take into account or document the impacts of flooding on groundwater mounding. This is impossible to tell from the description of the groundwater model given in the EENF. The EENF used the EEA “RMAT Climate Resilience Design Standards Tool Project Report” created in December 2021. The Project received a “moderate exposure” for urban flooding, and a “high exposure” for riverine flooding. (And a “high exposure” for Extreme Heat, which is not taken into account in the biological ecological evaluations of the Project as described elsewhere in these comments.) Many of the inputs to this model are questionable. The Project Narrative, 3.2.1 states the project is located in a FEMA Zone X-Area of Minimal Flood Hazard (eff. 7/6/2021)*

The EENF contains the following conflicting statements about flooding in the section **Climate Mitigation and Resiliency**

- “The existing WWTF is not located in an existing flood prone area and is not anticipated to be at increased flood risk under any potential SLR scenarios.”
- “The project does not involve any new construction and therefore the climate parameters analyzed in the RMAF Climate Resilience Design Standards Tool do not apply.”
- “This project is contributing to the Climate-Ready Healthy Plymouth Report (June 2020) by reducing energy usage through eliminating the need for pumping effluent to the harbor and increasing groundwater recharge through on-site infiltration.”

The Woodwell Climate Research Center’s climate risk assessment for Plymouth contradicts the EENF finding that there is no flood risk. <https://www.woodwellclimate.org/climate-riskassessment-plymouth-massachusetts/> This is relevant to the groundwater hydraulic model in the EENF. The Woodwell report highlights “The Grove” commercial development near the WWTF as particularly at risk. Grove at Plymouth Shopping Mall: <https://www.groveatplymouth.com/>

The Woodwell report concludes that the FEMA maps for Plymouth should not be used because they do not accurately show flood prone areas. The Woodwell Center report for Plymouth states in its summary (Emphasis supplied):

*“As a result of climate change, **flood risk is projected to increase for Plymouth.** The probability of the historical 100-year rainfall event, a useful indicator of flood risk, is expected to quadruple by mid-century and be ten times more likely by the end of the century. Sea levels are also projected to rise throughout this century with an increase of 1.31 feet (0.4 meters) by 2050 and 2.66 feet (0.81 meters) by 2080. **Both sea level rise and heavier rainfall will translate into greater flood depths and extent for Plymouth. The vulnerability of Plymouth’s stormwater system** was also evaluated under the present and future 100-year rainfall event. Here we present our findings on extreme precipitation and flooding to help Plymouth in its plans to create a more resilient future for all residents.*

Flooding: Some of the flood studies that make up parts of Plymouth’s FEMA flood map are over 30 years old which use estimates of streamflow based on drainage area and nearby stream gauges and elevation data from that time which has likely changed significantly since then. Finally, FEMA shows no flood risk in areas disconnected from rivers, also known as pluvial flooding, while Woodwell demonstrates extensive inland areas are vulnerable to flooding. This is because FEMA does not account for pluvial flooding.

*Plymouth’s stormwater system has several hot-spots of vulnerability to the 100-year rainfall event. We identified several hotspots of stormwater flooding throughout Plymouth. Taylor Avenue in White Horse Beach, **The Grove at Plymouth shopping mall**, the Plymouth harbor area, and the Cordage Park area in North Plymouth all show a high concentration of flooded manholes and catch basins....”*

Response: The DEIR includes an additional assessment of the Project’s resiliency to climate change. As detailed in Section 6.2, the Project is resilient to climate change for a number of reasons, including the documented hydraulic capacity of the discharge beds to infiltrate the required volume of

treated effluent, maintaining the harbor outfall pipe as a source of emergency overflow, and the WWTF's distance from the coast. Even with the potential storm surge pathway up the Eel River under no scenario does the Massachusetts Office of Coastal Zone Management Sea Level Rise and Coastal Flooding Viewer show the WWTF at risk of flooding.

HPWT/ERWA/JRWA/CLWC-43

Comment: *Seventh, the hydraulic model does not address stormwater impacts. The EENF does not address the Town's stormwater management. The MADEP Stormwater Standards and Stormwater Handbook provide guidance and criteria to ensure that the hydrologic budget of associated wetlands is maintained and protected. Wetlands are dependent upon both surface water and groundwater inputs and are sensitive to hydrologic shifts and alterations (they can be impacted by both increases and decreases of water levels and flow). They are impacted by both short-term runoff events and longer-term groundwater changes in recharge rates that alter baseflow. Recharge is the process of precipitation infiltrating into the ground and replenishing the underlying groundwater. MADEP Stormwater Standard 3 requires that annual groundwater recharge rates be maintained and preserved.*

MADEP Stormwater Standard 3 is designed to maintain the hydrologic balance in wetlands. It requires that post-development recharge is maintained at existing pre-development recharge. MADEP Stormwater Handbook, Volume 2, Chapter 1 provides guidance and clarification regarding this requirement to maintain natural hydrology. Page 6 of this document states, "Standard 3 of the Stormwater Management Standards requires that proponents preserve infiltration at predevelopment levels in order to maintain base flow and groundwater recharge". Recharge provides baseflow to wetlands and contributes to their hydroperiod (the natural cycle of water levels through the seasons). Changes to this hydrologic balance of recharge areas to a wetland constitute "alterations" to the wetland. There should be a full EIR to determine whether the Site's land alterations and increased base flow will result in significant alterations to these recharge rates and to the hydrologic regime of the wetland.

MADEP Stormwater Manual, Volume 3, Chapter 1, page 17 provides guidance on how to evaluate impacts on wetlands associated with proposed infiltration/recharge facilities designed in accordance with Stormwater Standard 3. It states, "Evaluate Where Recharge Is Directed: The infiltration BMP must be evaluated to determine if the proposed recharge location will alter a Wetland Resource Area by causing changes to the hydrologic regime.

Response: Stormwater management is outside of the scope of the Project and the MEPA Certificate.

HPWT/ERWA/JRWA/CLWC-44

Comment: *The Alternatives Analysis in Section 8.0 is insufficient. The Secretary should require a draft EIR that contains a description and analysis of all feasible alternatives that is thorough and complete. 301 CMR 11.07. The two key flaws in the alternatives analysis are:*

- 1. Failure to consider use of reclaimed water, and*

2. Failure and to consider reducing water usage through conservation and efficiency, thus reducing the volume of discharge to the groundwater (see also comments on Nutrient Management Plan, below).

The 1997 MEPA process for the Project evaluated reclaimed water reuse as a means to reduce nutrient loading impacts to the Eel River Watershed from groundwater disposal of treated effluent at the WWTF. It also addressed reducing water usage. Appendix G, p. 16. The EENF ignores both these alternatives. Apparently, at some point after the MEPA Certificate was issued in the 1990s, the Town did not follow through on these two alternatives/mitigation measures. The Appendix G to the Horsley Whitten Group report, the Nutrient Management Plan (NMP) for the WWTF states that due to funding problems, the Town did not pursue reclaimed water use. The NMP states, "the Town is willing to work with potential developers/partnerships to accomplish this goal." Appendix G, page 16-17. The Secretary should require the Town to study this alternative in a full EIR.

The Town should also be required to pursue the 1997 EIR alternative of reducing water usage. The Town Water Study Committee has identified options for reducing water usage by 3 million gallons per day. Town leadership has not followed through on this 2022 recommendation. The Secretary should require the Town to conduct a study of water use reduction and to explain why it has not implemented the recommendations of the Town Water Study Committee. The Town should be required to allocate funding to implement the recommendations and all developments and new developments should be required to comply.

Response: The DEIR includes additional alternatives assessment, including analysis of Site 101, Cold Spring School, alternative sites outside of the Eel River Watershed, a tunnel outfall, and increasing nitrogen treatment while maintaining discharge at the outfall. Assessment of reclaimed water reuse and reducing water usage were not included in the scope of the MEPA Certificate and were not included among the assessments suggested by DEP in their response to the EENF.

HPWT/ERWA/JRWA/CLWC-45

Comment: *The Alternatives Analysis assumptions about the impacts of increasing the base flow of the Eel River is a gross generalization. See, Section 8.0(A) "And the anticipated augmented river flows would actually be beneficial for providing enhanced baseflow to the river under drought and low flow conditions to support fish passage, habitat and recreation." Page 65-66. Additional study is needed to determine how the additional flow, in light of climate change impacts from flooding, combined with the rapid development, creation of impervious surfaces and sand and gravel mining around the Site has actually impacted the baseflow of the river, and how additional flow will impact wetlands. This could result in an alteration of wetlands, requiring an Order of Conditions. The clear-cutting of trees has significantly reduced evapotranspiration (ET) rates which increases groundwater recharge rates, changes groundwater flow directions, and ultimately alters the hydrologic regime of the wetlands (including downstream headwater streams).*

Response: Observations and data collected during recent studies were used to calibrate and refine the USGS model of the Plymouth Carver Aquifer - a model specifically developed for the USGS to evaluate the impacts of development, discharge, and pumping on groundwater in the region. This calibrated model was used to estimate the increase in groundwater contributions to the Eel River, which was discussed at length in Section 6 of the EENF. This extensive study was used as the basis for the

conclusions referenced by the commenter. The Project evaluation of baseflow, and all other impacts for that matter, is limited to the impacts of the Project as compared to existing conditions and Project alternatives. Other factors in the world at large unrelated to the project are not and should not be evaluated here.

HPWT/ERWA/JRWA/CLWC-46

Comment: *What the EENF describes as past “mitigation measures” from the 1997 EIR are not in fact “mitigation” of any substantial nature. The Nutrient Management Plan (NMP) is simply a monitoring program (Appendix G). The Eel River Monitoring Program is just that-monitoring, and the GWDP (DEP Permit) requires monitoring of the WWTF effluent and proximal groundwater wells. This is not mitigation, it is monitoring the impacts of the pollution and operation of the WWTF.*

The Town relies on the most recent Nutrient Management Plan (NMP) report from the Plymouth Department of Marine and Environmental Affairs to show “mitigation” of the increased discharge of up to 3.0 MGD. The NMP is from 2020 and based on the 1997 MEPA Certificate. As noted, the Town has not followed through on the “Use of Reclaimed Water. Appendix G, page 11.

Response: The Town is proposing phosphorus mitigation based on monitoring results at 8 new monitoring wells. The mitigation triggers and their associated responses, as stated in Section 5.4.1 of this DEIR and as described in response to comment RF-1.

HPWT/ERWA/JRWA/CLWC-47

Comment: *In addition, the Town has not gotten a “Plymouth Harbor Watershed By-law” in place as required by the 1990s MEPA mitigation. The NMP states,*

“A draft by-law was created by the Division and an article reserved for 2007 Town Meeting. However, preliminary discussions with DEP indicated it would be beneficial to implement the by-law following the release of the TMDL model. The model will specify which areas and what projects would most benefit the reduction in nutrients. Once the Plymouth Harbor Embayment Study is complete the Town will review the best options for the implementation of the watershed by-law.” (Page 15 of NMP).

According to the NMP, this has not been done. This is another aspect of past mitigation that the Town has not completed.

Response: Town bylaws are unrelated to this Project.

HPWT/ERWA/JRWA/CLWC-48

Comment: *The 1997 mitigation relies on the Town keeping 3-acre rural residential zoning in order to protect groundwater quality. While the Town has maintained the 3-acre lot size for rural residential development, it has allowed ever increasingly dense residential development throughout the Town. This includes thousands of new apartments and “cluster developments” including at the Makepeace Red Brook project, and within the Eel River Watershed at Summers Reach, Oasis/The Grove, and Pine Hills. The mitigation purports to rely on local zoning and the wetlands bylaw as measures of protection for the groundwater and the environment. In fact, the Conservation Commission routinely fails to enforce the Wetlands Protection Act. The NMP states the Commission “has increased “the no-touch buffer zone from 25ft to 35ft in the Town’s Wetlands Protection Act Bylaw”. While this may be true, it is*

meaningless because the Conservation Commission routinely grants variances from the “no touch” zone limits. (Examples of violations and illegal variances available on request.) The NMP itself describes some wetlands violations in the Watershed, and the failure of the Town to require mitigation or correction of the violations. Appendix G, page 25. This is a pervasive longstanding issue in Plymouth and many wetlands are being illegal altered as a result.

Response: Zoning and enforcement of wetlands violations are not part of this Project.

HPWT/ERWA/JRWA/CLWC-49

Comment: *The NMP states the Town secured “a substantial amount of open space” to prevent future nutrient loading into the watershed” the area in the Watershed has also been clear-cut and covered with hundreds of acres of impervious surfaces. Examples of improperly designed stormwater systems that are not adequately maintained abound. This includes the situation at “The Grove” a nearby mall. For every acre of open space saved, there is an equal or greater area that has been developed. Whether the protection of open space has offset the development in the Watershed should be addressed in the EIR.*

Response: The comparison of protected open space to developed land is outside of the scope of this Project and the MEPA Certificate.

HPWT/ERWA/JRWA/CLWC-50

Comment: *The NMP is 3 years old and current data should be provided.*

Response: Data through 2024 is included in the DEIR.

HPWT/ERWA/JRWA/CLWC-51

Comment: *The EENF is incomplete because it does not provide the public with a full explanation of the history of the MEPA process for the WWTF, providing only “Snippets” and does not explain what the WWTF is, what it does, and how it serves the municipal needs of the Town. A full DEIR should:*

- *Include the 1990s MEPA Certificate*
- *Explain the Town bodies responsible for overseeing and operating the WWTF*
- *Describe what the WWTF does, how it operates, what water quality testing is done before and after pretreatment of the wastewater,*
- *Provide a copy of the Town’s pretreatment program under the NPDES permit and describe what will be done with the switch to discharging 3.0 MGD to the Aquifer*

Response: The MEPA Certificate from the 1990s was included in the EENF as Appendix A. The Project is proposing to change the discharge location and to increase discharge to 3 MGD. The oversight, operations of, and pretreatment program at the WWTF are outside of the scope of the Project and the MEPA Certificate.

HPWT/ERWA/JRWA/CLWC-52

Comment: *The “Community Based Organizations” given notice from a list provided by the MEPA Environmental Justice Office (Cover Letter page 3), are not located in Plymouth or even Plymouth County. The EENF’s list of “Community Based Groups” are located in the Boston area. Not one of them is known*

to have any contact with or do any work in Plymouth or the Plymouth area or with the EJ communities identified in the EENF. The Town failed to provide local groups such as Southeastern Massachusetts Pine Barrens Alliance, Community Land & Water Coalition, Sustainable Plymouth, and other local groups working on water quality and community well being in the Town.

Response: The Town provided advanced notice to the list of Community Based Organizations provided to the Town by the MEPA Environmental Justice Office as required.

HPWT/ERWA/JRWA/CLWC-53

Comment: *The EENF does not identify all private well users who may be impacted. It does not identify whether EJ community members use private wells.*

Response: The EJ map viewer developed by the Massachusetts Executive Office of Energy and Environmental Affairs, the tool with which the Environmental Justice Screening was performed, provides information on a census block group level. More specific information, including the location of an EJ population within a particular census block group, is not publicly available. Additionally, as documented in the response to comment HPWA-1, the public drinking water supply main goes past each developed parcel within the modeled flow path. In other words, each developed parcel has access to public drinking water that would be unaffected by the change in effluent discharge prioritization, regardless of EJ status.

HPWT/ERWA/JRWA/CLWC-54

Comment: *The Secretary should schedule a site visit and public consultation session under 301 CMR 11.06(2). "The Secretary shall ordinarily schedule with the Proponent a site visit and public consultation session to review the Project and discuss its alternatives, its potential environmental impacts and mitigation measures. The Proponent shall be required to provide accompanied public access to the Project site during the site visit and public consultation session, unless such access is infeasible for public safety reasons or protection of proprietary information."*

Response: Comment acknowledged.

HPWT/ERWA/JRWA/CLWC-55

Comment: *The goal of ending the discharge of sewage and wastewater to Plymouth Harbor is a laudable one. It requires a full draft EIR and final EIR that reflects current conditions, including the impacts of climate change and the rapidly heating planet. This is a complex decision with long term irreversible impacts and the public should have the opportunity for full engagement.*

Response: The Project's request for a Single EIR was denied. This DEIR is part of the draft EIR and final EIR process.

Massachusetts Division of Marine Fisheries (DMF)

DMF-1

Comment: *This would improve water quality in the Harbor to support recreational and commercial shellfishing, aquaculture, eelgrass, and recreational interests.*

Response: Comment acknowledged.

DMF-2

Comment: *The project includes a monitoring plan to track the progress of phosphorous dispersion through the aquifer to implement mitigation measures before significant phosphorus loading impacts the river. We recommend that the WWTF expand the monitoring to include measuring nitrogen dispersal and concentrations as well.*

Response: Monitoring at all groundwater monitoring wells, including the new wells proposed, will include sampling for nitrogen.

Massachusetts Department of Environmental Protection Southeast Regional Office (DEP SERO)

DEP SERO-1

Comment: *Sections 1 and 2 The Town of Plymouth holds Groundwater Discharge Permit (GWDP) 1-677.*

The Permit is currently expired, and it has been Administratively Continued. The Proponent has identified the requirement to submit a Groundwater Discharge Permit Renewal (BRP WP11) and a Hydrogeologic Evaluation Report (BRP WP83) to achieve the goals contained in the EENF.

Response: Comment acknowledged.

DEP SERO-2

Comment: *In addition to Russell Mill Pond (MA941320), Plymouth Bay (MA94-17 (Fecal Coliform)) and Plymouth Harbor (MA94-16 (Estuarine Bioassessments and Fecal Coliform)) are also listed as Impaired in the 2022 Integrated List of Waters (Category 5; The 303(d) List – “Waters requiring a TMDL”).*

Based upon the available data that meets acceptable data quality assurance standards, the current discharge of the Plymouth Publicly Owned Treatment Works (POTW) is not violating surface water quality standards. This data includes but is not limited to the 2017 Draft Massachusetts Estuary Report and the 2022 Integrated List of Waters which is required by the Federal Clean Water Act.

This does not necessarily mean that the waters have not been impacted, it demonstrates that the available data either does not meet the data quality standards required for quantifying impairment and/or the data does not show an impairment. The lack of listing as impaired does not indicate that there are no negative impacts, simply that the impacts are not of a severity to be impaired. For example, in the 2022 Integrated List of Waters, Russell Mill Pond is not listed as impaired for phosphorus but does indicate some of its negative impacts. Based upon MassDEP’s experience, most freshwater impoundments that have received Irrigation Return Flows from the agricultural industry have shown some degradation in water quality due to phosphorus.

Response: Comment acknowledged. The Project includes groundwater monitoring and specific mitigation thresholds to ensure that the phosphorus plume from the WWTF does not impact these waterbodies.

DEP SERO-3

Comment: *Plymouth Harbor (PH 797, EH 486) and the Eel River (PH 610, EH 486) are listed as Priority and Estimated Habitats for Rare and Endangered Species by the Natural Heritage Endangered Species Program*

A portion of the Eel River (9458000) is listed as a Coldwater Fish Resource by the Massachusetts Division of Fisheries and Wildlife.

MassDEP recommends that a simplified table be created to show the potential impacts, including but not limited to, the above listed resources and the potential mitigations that can occur to reduce the impact to the resource.

Response: A short summary and a simplified table regarding the impacts to environmental resources is included in Section 5.2. Environmental resources include Coldwater Fish Resource, NHESP mapped habitat, surface waters, and wetland resource areas, and repeated here.

Table 13 Simplified Table of Impacts to Environmental Resources

Environmental Resource	Notes	Mitigation
Coldwater Fish Resource	The Eel River is among the waterbodies in Massachusetts that coldwater fish, such as brook trout, use “to meet one or more of their life history requirements.” ²⁶	Phosphorous monitoring and mitigation
Natural Heritage and Endangered Species Program (NHESP)	The WWTF beds are not within NHESP mapped Priority Habitat for Rare Species (PH) or Estimated Habitat for Rare Wildlife (EH). A portion of the Eel River is within the most recent NHESP mapping as part of PH610 and EH486.	
Surface waters	In addition to the Eel River itself there are two ponds along the course of the river: Hayden Pond and Russel Millpond	
Wetland resource areas	There are two Massachusetts Wetlands Protection Act resource areas along the course of the Eel River: Borderig Vegetated Wetlands and Land Under Waterbodies and Waterways.	

As the Eel River is a phosphorus limited system, the potential effects of increased phosphorus will be mitigated by the planned phosphorus monitoring and mitigation, described in Section 5.3, 5.4, and response to comment RF-1.

DEP SERO-4

Comment: *MassDEP disagrees with the conclusion concerning the significance of the reduced nitrogen loads entering into the Plymouth Harbor, Kingston Bay, Duxbury Bay (PKD) system by moving the discharge location to the upland watershed location. This conclusion is based primarily by the*

²⁶ <https://www.mass.gov/info-details/coldwater-fish-resources>
Plymouth WWTF Treated Effluent Discharge Reprioritization DEIR
Plymouth, MA

discovery of a transcription error in the MEP report (see attachment). Also note, that all of the discharge is not subject to a high percentage of attenuation because the attenuation is dependent on where the discharge flow enters the Eel River system and where it does/ does not flow through the impoundments.

The Proponent is cautioned on using portions of the MEP report to draw its conclusions as to the net benefit or harm to the estuary system of implementing the Project. The MEP report uses multiple lines of evidence to determine nitrogen impacts to the estuary system. The data is analyzed using a "Weight of Evidence" approach to determine the Target concentration and the approximate nitrogen reduction in sub watersheds that would bring the estuary system to a thriving, biodiverse resource.

Ultimately, there will be disagreement over the importance of any one parameter or the process for determining the nitrogen Target concentration for the estuary. However, the data gathered and the process to analyze the data has been endorsed as a valid estimate of the causes of impairment and its pathways for rehabilitation for use for an approved TMDL by the U.S. EPA - in compliance with the Federal Clean Water Act.

However, Section VIII.3 DEVELOPMENT OF TARGET NITROGEN LOADS in the MEP Report states: "The load reductions presented below represent only one of a suite of potential reduction approaches." This statement recognizes that there are other valid pathways to meet a future TMDL.

Response: The nitrogen loading impact associated with the Project has been reassessed in light of DEP's identification of this transcription error following standard MEP methodology. This reassessment can be found in Section 5.1 In summary, the resultant nitrogen load ultimately delivered to Plymouth Harbor, following attenuation through the subwatersheds as calculated in Table 4 of Section 5.1, is 47.21 kg N/day under the 3 MGD discharge scenario. This load is 62.3% of the nitrogen discharged to the disposal beds, reflecting a total attenuation of 28.57 kg N/day through natural processes (37.7%).

HW utilized the original MEP spreadsheet model of the PKD watershed system to estimate the change in overall nitrogen loading under the proposed configuration compared to overall baseline nitrogen loads (Attachment X). The MEP report estimated the load to the PKD harbor is 216,935 kg/year from all sources (MEP 2017, Table IV-5). The current discharge from the harbor outfall is reflected in this model as a 14,412 kg/year source input directly to the total. The total value included in the model reflects an average outfall discharge of 1.56 MGD at a nitrogen concentration of 25.26 kg/million gallons. Increasing the outfall discharge to the desired rate of 3MGD increases this load to 27,760 kg/year, and the overall system load increases correspondingly to 230,182 kg/year.

In order to calculate the estimated overall nitrogen load under the 3 MGD bed disposal scenario proposed, the proportional discharge load was distributed between the subwatersheds as indicated in Table 4 (Unattenuated Mass * 365, to reflect the annual loading convention in the MEP model). Under this configuration, overall loads to the PKD harbor were 219,234 kg/year, an increase of 1.1% compared to current loads while at the same time allowing for a near-doubling of treatment and discharge volumes. These values are summarized in Table 5 below.

Table 14 Comparison of N Loading to PKD Harbor

Scenario	Overall PKD Load	Change
Baseline (1.56 MGD outfall discharge)	216,935	(baseline)
3 MGD at outfall	230,182	+ 6.1%
3 MGD at WWTF sand beds	219,234	+1.1%

DEP SERO-5

Comment: *Although reduction of the nitrogen load in the PDK system is an overall goal, the spatial importance of the reductions cannot be overlooked as it could if there were instantaneous mixing within the estuary at three critical locations within the estuary - the northern Duxbury marsh area, the central Jones River estuary area and the Town Brook/Eel River discharge area at the southern end of the estuary.*

It should be noted that the “build out” analysis (MEP Section VI.2.6.1 Build-Out) and the “alternative scenario” analysis (MEP Section IX. ALTERNATIVE WATER QUALITY MODEL SCENARIOS) consider reasonable future scenarios and the effect on the nitrogen concentrations at the primary Monitoring Stations (MS). Table VI-6 shows that MS PDH1 (closest to the Eel River) will exceed the Target Concentration and MS PDH2 just under the Threshold Concentration. Table VI-6 shows that MS PDH1 (closest to the Eel River) will exceed the Target Concentration and MS PDH2 (closest to Town Brook) just under the Threshold Concentration. Table IX-1 shows that MS PDH1 will exceed the Target Concentration in all three scenarios that are consistent with the planned discharge. Therefore, the EIR must consider mitigation that will occur to reduce the future nitrogen impact in the southern portion of the PDK estuary.

Response: While the Project will yield minimal increase in overall nitrogen load to Plymouth Harbor, as discussed at length in Section 5.1, not all areas of the Harbor are the same from a hydrodynamic perspective. As a result the central area of the Harbor, where the current outfall pipe currently discharges, and the southern end of the Harbor, where the Eel River discharges into the harbor, will have different capacities to handle the same nitrogen load. Of concern in this case is the ability of the southern portion of the Harbor to handle the nitrogen load even with the additional nitrogen attenuation provided by the Eel River. At this time a draft Total Maximum Daily Load (TMDL) for Plymouth Harbor, Kingston Bay, and Duxbury Bay Estuarine System is under development and is expected in Fall 2025. This TMDL should provide target threshold watershed loads for different sections of the Harbor, including the southern end.

In order to mitigate the difference between the additional nitrogen load resulting from the Project and the target threshold load in the to-be-released TMDL, as part of the Groundwater Discharge Permit process Project proponents will conduct an assessment of the number of homes that will need to be taken off of septic in the watersheds contributing to the southern end of the Harbor. Per assumptions

within 310 CMR 15 (aka Title 5), MassDEP's regulations regarding on-site sewage disposal systems, each septic system serving a single-family home discharges nitrogen at a concentration of 35 mg/l.

Every home taken off of a Title 5 septic system and tied into the WWTF, an expansion made possible by the Project's proposed increase in discharge, will receive double nitrogen treatment. First it will receive treatment at the WWTF itself where, as described in Section 3.1.2, the average nitrogen concentration of effluent is 5.8 mg/l. Following discharge into the beds at the WWTF, effluent will then receive additional treatment via natural attenuation along the Eel River as described in Section 5.1.

DEP SERO-6

Comment: *The Alternative disposal sites should be considered through the lens that either (or both) future hydraulic and nutrient loading of the Eel River Watershed may or may not assimilate those loads and that additional locations should be considered for disposal of some of the treated effluent to meet surface water quality standards.*

These criteria eliminate Sites DD and MM which are estimated to be within the Eel River watershed or discharge close to Monitoring Station PDH1. Site 101 is outside the Eel River Watershed (likely on the Town Brook watershed would discharge close to Monitoring Station PDH2). and would facilitate more mixing in the PKD system. Another Town owned property outside the Eel River watershed is the Cold Spring School. This property abuts the surface water discharge line and would need little construction with the exception of a subsurface disposal system. The subsurface disposal system could be funded by the sale of Site 101.

Response: Additional assessment of Site 101 and the Cold Spring School, in addition to other alternatives, was conducted during DEIR development. Additional alternatives analysis eliminate both of these as feasible alternatives as detailed in Section 4 of this DEIR. Site 101 would result in detrimental hydraulic impacts due to mounding, would require the clearing of approximately 22 acres of currently undeveloped, forested land, would require the construction of at least 1,400 feet of discharge line, and is located near existing developments.

The most significant hurdles of the Cold Spring Elementary School site for its use as an effluent disposal site are its small useable area and the obvious conflict with its current use as an elementary school. Even if the school were eliminated and the entire 7.3 acres were used for discharge, the site would only be able to receive a maximum of 1 MGD of discharge at a design loading rate of 3 gpd/ft², even before consideration of potential mounding impacts. Due to the need for setbacks and other constraints on development, the actual useful area of the site for discharge (and thus the final design loading capacity) is likely even smaller. Not to mention that replacement school facilities would need to be provided at significant cost and effort.

DEP SERO-7

Comment: *Pursuant to MEPA Regulations 301 CMR 11.12(5)(d), the Proponent will prepare Proposed Section 61 Findings to be included in the EIR in a separate chapter updating and summarizing proposed mitigation measures. In accordance with 301 CMR 11.07(6)(k), this chapter should also include separate updated draft Section 61 Findings for each State agency that will issue permits for the Project. The draft Section 61 Findings should contain clear commitments to implement mitigation measures,*

estimate the individual costs of each proposed measure, identify the parties responsible for implementation, and contain a schedule for implementation.

Response: Comment acknowledged. The DEIR includes a table to summarize the proposed mitigation measures and to include draft Section 61 Findings for each State agency that will issue permits for the Project.

DRAFT

EIR Appendices

Appendix A: MEPA EENF Certificate

Appendix B: DEIR Distribution List

Appendix C: Town of Plymouth Camelot Drive Wastewater Treatment Facility
Hydraulic Loading Test Study

Appendix D: MEP Nitrogen Loading Calculation Spreadsheet

Appendix A: MEPA EENF Certificate

DRAFT



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December 22, 2023

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS
ON THE
EXPANDED ENVIRONMENTAL NOTIFICATION FORM

PROJECT NAME : Plymouth Wastewater Treatment Facility Treated Effluent
Discharge
PROJECT MUNICIPALITY : Plymouth
PROJECT WATERSHED : South Coastal
EEA NUMBER : 16758
PROJECT PROPONENT : Town of Plymouth Department of Public Works
DATE NOTICED IN MONITOR : September 25, 2023

Pursuant to the Massachusetts Environmental Policy Act (MEPA; M.G.L. c. 30, ss. 61-62L) and Section 11.06 of the MEPA Regulations (301 CMR 11.00), I have reviewed the Expanded Environmental Notification Form (EENF), and hereby determine that this project **requires** the submission of an Environmental Impact Report (EIR). In accordance with Section 11.06(8) of the MEPA regulations, the Proponent requested that I allow a Single EIR to be submitted in lieu of the usual two-stage Draft and Final EIR process. As discussed below, while I acknowledge the water quality benefits that the project is intended to offer to Plymouth Harbor, comments submitted by Agencies and the public raise concerns about potential impacts to groundwater and nearby surface waters due to nutrient loading, as well as potential impacts to the Plymouth-Carver Sole Source Aquifer, which provides drinking water to Plymouth and six other municipalities. In addition, MassDEP requests consideration of additional alternatives for disposal locations in light of nutrient loading concerns for the Eel River Watershed; MassDEP also requests identification of additional mitigation measures. A robust and complete alternative analysis is a key component of the MEPA review process. Accordingly, I am denying the Single EIR request; the Proponent should submit a DEIR in accordance with the Scope included in this Certificate.

Project Background

The Camelot Drive Wastewater Treatment Facility (WWTF) has a long MEPA review history (EEA#8228 Plymouth Wastewater Treatment Plan) beginning with the filing of an Environmental Notification Form (ENF) in April 1990 and the development of a Special Review Procedure (SRP) for the project and designating it a "Major and Complicated Project." Subsequently, the Town of Plymouth (the Proponent) submitted several EIRs (including a Phase I EIR, Phase II EIR, Phase IIIA EIR, and Phase IIIB EIR) and a Notice of Project Change (NPC) prior to the final selection of the Preferred Alternative, which proposed the construction of a new WWTF at the Camelot Drive Industrial Park with primary disposal of treated effluent through an outfall into Plymouth Harbor and secondary disposal to groundwater via disposal beds located at the WWTF. A Final Supplemental EIR was submitted for review in May 1997 (the 1997 SFEIR), with a cumulative evaluation of the potential environmental impacts of the Preferred Alternative. The Certificate on the FSEIR, issued on June 16, 1997, found that the filing adequately and properly complied with MEPA and its implementing regulations and closed review of the project. The WWTF has been in operation since 2002.

Project Description

As described in the EENF, the Proponent is seeking to increase the total average annual discharge of treated effluent from the WWTF from 2.5 to 3.0 million gallons per day (MGD). The WWTF is currently authorized to treat up to 5.2 MGD with a lesser volume (total of 2.5 MGD calculated as annual average) of treated effluent to be discharged at two locations. An annual average of 1.75 MGD of treated effluent from the WWTF is permitted for primary discharge via a surface water outfall into Plymouth Harbor. Daily effluent flows in excess of 1.75 MGD (max daily) can be conveyed for secondary discharge to the groundwater infiltration beds adjacent to the WWTF; however, such discharges are limited to an annual average of 0.75 MGD. Due to the negative water quality impacts to the harbor and increasing energy costs associated with the pumping and discharge of treated effluent to Plymouth Harbor, the Proponent is seeking to change the prioritization of disposal locations such that the primary disposal would be via groundwater discharge at the WWTF disposal beds, and the secondary disposal would be via the outfall into Plymouth Harbor. The proposed change would allow up to the total 3.0 MGD (average annual) of treated effluent to be disposed of via groundwater disposal at the WWTF, while the maximum disposal through the outfall would remain at 1.75 MGD (average annual) and would only be utilized for time periods of disposal bed repairs, emergencies, or other operational considerations.

According to the EENF, the primary goals of the project are to improve water quality within Plymouth Harbor and Plymouth/Kingston/Duxbury Bay to support recreational and commercial shell fishing, aquaculture, aquatic habitat, and recreational activities; increase the recharge of groundwater to offset public drinking water withdrawals and support baseflow to the Eel River and Wellingsley Brook; and reduce energy usage and costs required to pump treated effluent from the WWTF to the harbor outfall.

Project Site

The project site is located at the Camelot Drive WWTF, a 96-acre property within the Camelot Drive Industrial Park. The WWTF maintains dual 30-inch diameter wastewater mains, approximately 4.5-miles in length, that pump wastewater from the existing pump station on Water Street to the WWTF for treatment. The treated effluent is then conveyed back to the Water Street pump station and out approximately 1,900 feet (ft) into Plymouth Harbor via a buried 30-inch diameter outfall. The WWTF also maintains five, on-site, open-sand disposal beds for discharging treated effluent to groundwater. Four of the beds are rectangular (measuring approximately 340 ft by 240 ft) with the fifth bed forming an irregular quadrilateral, for a total surface area of 9.3 acres.

The WWTF is located atop the Plymouth-Carver Sole Source Aquifer, which provides drinking water to Plymouth residents and six surrounding towns. The WWTF is bounded by State Route 3 to the north, Camelot Drive to the west, Russell Mill Road to the east, and Warren Wells Brook to the south. The WWTF is also approximately 1.3 miles from Plymouth Harbor, one mile from the Eel River, and 0.75 miles from Russell Mill Pond. In addition, the nearest residential property is located 1,600 ft from the WWTF and buffered by woodland.

There are no state or local wetland resource areas located within or immediately adjacent to the project site. According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) (Panel No. 25023C0367K, effective July 6, 2021), the project site is not located within a mapped floodplain. According to the Massachusetts Natural Heritage and Endangered Species Program (NHESP) Atlas (15th Edition), the site is not located within Estimated or Priority Habitats of Rare Species. The site does not contain any structures listed in the State Register of Historic Places or the Massachusetts Historical Commission's (MHC) Inventory of Historic and Archaeological Assets of the Commonwealth. In addition, the project is not located in an Area of Critical Environmental Concern (ACEC).

The project site is located within an Environmental Justice (EJ) Population characterized by Minority. The site is located within five miles of five additional EJ Populations characterized by Income.¹ As described below, the EENF identified the "Designated Geographic Area" (DGA) for the project as one mile around EJ Populations, included a review of potential impacts and benefits to the EJ Populations within this DGA, and described public involvement efforts undertaken to date.

Environmental Impacts and Mitigation

Potential environmental impacts associated with the project include the average annual discharge of up to 3.0 MGD of treated effluent to groundwater (increase of 2.25 MGD from the 0.75 MGD currently permitted) and 1.75 MGD of treated effluent to Plymouth Harbor (which remains unchanged from currently permitting, but is proposed as a secondary, not primary discharge).

Measures to avoid, minimize, and mitigate environmental impacts include the continued implementation of the Nutrient Management Plan (NMP) and Eel River Watershed Monitoring Program; the installation of eight additional groundwater monitoring wells between the WWTF and Warren Wells Brook; the implementation of additional monitoring to track the progress of phosphorous

¹ The EEA EJ Mapper is available at: <https://www.mass.gov/info-details/environmental-justice-populations-in-massachusetts>

dispersion through the groundwater; and the future design and implementation of measures to further improve phosphorus treatment at the WWTF and slow the migration of the phosphorus from the WWTF to nearby surface waters. Additional measures should be identified in the DEIR, as indicated below.

Jurisdiction and Permitting

This project is subject to MEPA review because it requires Agency Action and meets/exceeds the MEPA review threshold at 301 CMR 11.03(5)(b)(4)(c)(ii) for a New discharge or Expansion in discharge to groundwater of 50,000 or more gpd of sewage within any other area. The project requires Agency Action in the form a Groundwater Discharge Permit (GWDP) from the Massachusetts Department of Environmental Protection (MassDEP).² The EENF also states that the Proponent is in the process of updating its Comprehensive Wastewater Management Plan and intends on filing a Notice of Project Change, once it is complete.

The project received a National Pollutant Discharge Elimination System (NPDES) Wastewater Treatment Facility General Permit (General Permit No. MAG590000) from the U.S. Environmental Protection Agency (EPA) for the harbor outfall, with an effective date of April 1, 2023.

The project is not seeking Financial Assistance from an Agency. Therefore, MEPA jurisdiction is limited to those aspects of the project that are within the subject matter of any required or potentially required Agency Actions and that may cause Damage to the Environment, as defined in the MEPA regulations.

Request for a Single EIR

The MEPA regulations at 301 CMR 11.06(8) indicate that a Single EIR may be allowed provided I find that the EENF:

- a. describes and analyzes all aspects of the project and all feasible alternatives, regardless of any jurisdictional or other limitation that may apply to the Scope;
- b. provides a detailed baseline in relation to which potential environmental impacts and mitigation measures can be assessed; and,
- c. demonstrates that the planning and design of the project use all feasible means to avoid potential environmental impacts.

To support a Single EIR request for any Project for which an EIR is required in accordance with 301 CMR 11.06(7)(b), I must also find that the EENF:

- d. describes and analyzes all aspects of the Project that may affect Environmental Justice Populations located in whole or in part within the Designated Geographic Area around the Project; describes measures taken to provide meaningful opportunities for public involvement by Environmental Justice Populations prior to filing the expanded ENF, including any changes made to the Project to address concerns raised by or on behalf of Environmental Justice Populations; and provides a detailed baseline in relation to any

² Comments provided by MassDEP state that the existing GWDP has expired and has been Administratively Continued.

existing unfair or inequitable Environmental Burden and related public health consequences impacting Environmental Justice Populations in accordance with 301 CMR 11.07(6)(n)1.

Consistent with this request, the EENF was subject to an extended comment period under 301 CMR 11.05(9).

Review of the EENF

The EENF included a project description, alternatives analysis, existing and proposed conditions plans, estimates of project-related impacts, the results of several studies and reports (including the Camelot Drive WWTF Loading Test Report, Eel River Technical Advisory Committee Evaluation of Nutrient Inputs and the Health of the Eel River System, Nutrient Management Data Report for 2020, and Plymouth Harbor Dye Tracer Study), nutrient loading and dispersal modeling results, and an identification of measures to avoid, minimize and mitigate environmental impacts. It included a description of measures taken to enhance public involvement by EJ Populations and baseline assessment of any existing unfair or inequitable Environmental Burden and related public health consequences impacting EJ Populations in accordance with 301 CMR 11.07(6)(n)1.). Consistent with the MEPA Interim Protocol on Climate Change Adaptation and Resiliency, the ENF contained an output report from the Climate Resilience Design Standards Tool prepared by the Resilient Massachusetts Action Team (RMAT) (the “MA Resilience Design Standards Tool”).³

Alternatives Analysis

As described below, the EENF evaluated four alternative locations, which were previously evaluated in the 1997 EIR, for groundwater disposal (Alternative 1, Alternative 2, Alternative 3, and the Preferred Alternative) based on their ability to achieve the project’s goal while minimizing environmental impacts. The EENF indicates that the No-Action alternative was evaluated; however, treated effluent would continue to be discharged to Plymouth Harbor up to the existing authorized volumes, thereby not achieving the project’s goals of improving water quality, habitat, commercial aquaculture, and recreational benefits in Plymouth Harbor. In addition, the Proponent conducted a GIS analysis to identify any additional, potential groundwater disposal sites that were not included in the 1997 EIR but might be suitable. However, the EENF notes that no new undeveloped parcels beyond those identified in the 1997 EIR were retained as potential alternatives due to their distance from the existing discharge line, proximity to surface waters, proximity to drinking water wells, or a combination of these factors.

Alternative 1 would involve the construction of a new discharge facility at 183 Samoset Street (identified as Site 101 in the 1997 EIR), which consists of an undeveloped, forested site owned by the Proponent and is immediately adjacent to surface waters, wetlands, and a Plymouth Municipal drinking water well. This alternative would require the clearing of at least 10.5 acres and the construction of a new 1,400-ft discharge pipe, which would result in greater land impacts and increased costs compared to the Preferred Alternative. In addition, the site is not large enough to handle the proposed increase to three MGD in treated effluent disposal and would need to be utilized in conjunction with another disposal location. Therefore, this alternative was dismissed.

³ Available at: https://resilientma.mass.gov/rmat_home/designstandards/

Alternative 2 would involve the construction of a new discharge facility at Site DD (as identified in the 1997 EIR), which consists of a farm field owned by Plymouth County and subject to a Conservation Restriction. This alternative would require the construction of a new 600-ft discharge pipe, which would result in greater land impacts and increased costs compared to the Preferred Alternative. While this alternative would achieve the project's goals and the site is not located in proximity to surface waters or wetlands, the purchase and redevelopment of the site by the Proponent is likely cost prohibitive and would be subject to the terms of the Conservation Restriction. Therefore, this alternative was dismissed.

Alternative 3 would involve the construction of a new discharge facility at Site MM (as identified in the 1997 EIR), which consists of a partially developed site with ground-mounted solar array owned by Plymouth County and a private entity (Plymouth Sand & Gravel LLC). This alternative would require the clearing of at least 10.5 acres and the construction of a new 1,700-ft discharge pipe, which would result in greater land impacts and increased costs compared to the Preferred Alternative. While this alternative would achieve the project's goals, the site is approximately 600 ft closer to Warren Wells Brook than the Preferred Alternative; therefore, groundwater nutrient contributions to Russell Mill Pond and the Eel River system would likely be greater than those anticipated under the Preferred Alternative. In addition, the purchase and redevelopment of the site by the Proponent is likely cost prohibitive. Therefore, this alternative was dismissed.

The Preferred Alternative (as described herein) would involve changing the prioritization of treated effluent discharge locations such that the existing WWTF disposal beds would be the primary discharge location. The Preferred Alternative would also authorize discharging up to 3.0 MGD (increase from 0.75 MGD currently permitted) of treated effluent to the disposal beds. The existing discharge line and outfall to Plymouth Harbor would be retained for use as a secondary backup, for periods of maintenance on the disposal beds, emergencies, or other operational considerations. The Preferred Alternative would achieve the project's goals by eliminating regular direct discharge to Plymouth Harbor, and improving water quality, habitat, commercial aquaculture interests, and recreational opportunities.

As detailed below, comments provided by MassDEP, incorporated herein by reference, state that additional alternative locations should be considered for disposal of some of the treated effluent in order to meet surface water quality standards, as the future hydraulic and nutrient loading of the Eel River watershed may not be able to assimilate the additional loads from the WWTF prior to entering the PKD embayment system. In particular, alternative locations outside the of the Eel River Watershed should be evaluated. The alternatives analysis should be supplemented in accordance with the Scope.

Environmental Justice (EJ) / Public Health

The project site is located within an Environmental Justice (EJ) Population characterized by Minority. The site is located within five miles of five additional EJ Populations characterized by Income. No languages were identified as being spoken by 5% or more of Limited English Proficiency ("LEP") residents within one mile of the project site.

The EENF described public involvement activities conducted prior to filing, including advanced notification to a list of CBOs and tribes/indigenous organizations (the “EJ Reference List”) provided by the MEPA Office. The Proponent circulated an EJ Screening Form with an overview of the project to these entities and information on ways to request a community meeting. According to the EENF, future public involvement activities are planned, including holding a day of public meetings, anticipated to be both in-person and remote, on a date to be determined. Notice of these meetings will be posted on the Proponent’s website and in high traffic areas of throughout the Town of Plymouth. In addition, a public meeting with the Town of Plymouth Select Board, regarding the proposed project and EENF, was held on December 12, 2023. A copy of the EENF and supporting documentation were distributed to the EJ Reference List.

The EENF contains a baseline assessment of any existing unfair or inequitable Environmental Burden and related public health consequences impacting EJ Populations in accordance with 301 CMR 11.07(6)(n)1. and the MEPA Interim Protocol for Analysis of EJ Impacts. According to the EENF, the data surveyed show some indication of an existing “unfair or inequitable” burden impacting the identified EJ Populations. The DPH EJ Tool identifies one municipality (Plymouth) within the one mile DGA in which the EJ Populations are located as exhibiting “vulnerable health EJ criteria”; this term is defined in the DPH EJ Tool to include any one of four environmentally related health indicators that are measured to be 110% above statewide rates based on a five-year rolling average.⁴ Specifically, Plymouth meets the “vulnerable health EJ criteria” for the following parameter:

- Heart attack hospitalization

In addition, the EENF indicates that the following sources of potential pollution exist within the one mile DGA, based on the mapping layers available in the DPH EJ Tool:

- Major air and waste facilities: 4
- “Tier II” toxics use reporting facilities: 2
- MassDEP sites with AULs: 1
- MassDEP groundwater discharge permits: 1
- Wastewater treatment plants: 1
- Underground storage tanks: 5

Based on an independent review by the MEPA Office of the mapping layers available in the DPH EJ Tool, several other potential sources of pollution appear to exist within the DGA, including road infrastructure, other transportation infrastructure, regional transit agencies, and energy generation and supply. This information should be supplemented in accordance with the Scope.

The EENF states that while the EJ Population within the DGA may exhibit some existing unfair or inequitable environmental burden, the project is not expected to materially exacerbate such existing conditions. Rather, the proposed project is anticipated to have beneficial effects for both EJ and non-EJ Populations by improving water quality and recreational opportunities (including swimming and shell

⁴ See <https://matracking.ehs.state.ma.us/Environmental-Data/ej-vulnerable-health/environmental-justice.html>. Four vulnerable health EJ criteria are tracked in the DPH EJ Viewer by municipality (heart attack hospitalization, childhood asthma, childhood blood lead, and low birth weight), and two (childhood blood lead, and low birth weight) are also available on a census tract level.

fishing) within Plymouth Harbor. The EENF also states that the proposed project will not require any construction activities, generate vehicle trips, or negatively impact air quality. In addition, modeling conducted by the Proponent indicates that that inputs to groundwater will generally flow to the east, away from the EJ Population where the WWTF is located. I note, however, that Agency concerns about the project involve potential impacts to groundwater, surface water, and drinking water resources, which could impact public health of the surrounding communities including the identified EJ Population. These issues should be addressed in accordance with the Scope.

Wastewater

As stated above, the Proponent is seeking to increase the total average annual discharge of treated effluent from the WWTF from 2.5 to 3.0 MGD and to change the prioritization of disposal locations such that the primary disposal would be via groundwater discharge at the WWTF disposal beds, and the secondary disposal would be via the outfall into Plymouth Harbor. The proposed change would allow up to the total 3.0 MGD of treated effluent to be disposed of via groundwater disposal at the WWTF, while the maximum disposal through the outfall would remain at 1.75 MGD and would only be used on an as needed basis. According to the EENF, discharge via the outfall has negative water quality impacts to Plymouth Harbor, which is an important recreational and commercial aquaculture resource for Plymouth, Duxbury, and Kingston; reduces the recharge and availability of groundwater in the Plymouth-Carver Aquifer to support baseflow to streams and other water resources; and requires extensive pumping at considerable energy expenditure and cost. In addition, the EENF states that key contaminants of concern (pathogens, phosphorus, and nitrogen) would all receive varying degrees of increased treatment and/or retention via groundwater discharge compared to that which currently occurs under direct harbor discharge.

Groundwater Mounding and Recharge

According to the EENF, a hydraulic loading test of the WWTF disposal beds was conducted from August 4 to November 7, 2018, to directly measure the change in groundwater from the infiltration of the maximum effluent discharge of 1.5 MGD. Based on the results of the test, the greatest mounding was detected where wastewater was discharged, and decreased with distance. Observed water level responses from the loading test were used to inform and calibrate a numerical groundwater model using the USGS-MODFLOW model to further study the effects of loading at the WWTF. Under steady state loading conditions, peak mounding under the disposal beds grew to approximately 6 ft above baseline conditions for the 1.5 MGD scenario, and 12 ft for the 3.0 MGD scenario; however, groundwater mounding increases more substantially to the north than to the south due to the location of Warren Wells Brook. The EENF states that the underlying geology of the area surrounding the WWTF has the capacity to accept the groundwater discharge of at least 3.0 MGD of treated effluent without impacting most existing infrastructure; however, the Proponent did identify a single property with a septic system with less than five ft of separation between the bottom of the septic system and the modeled groundwater elevation. The EENF notes that the Proponent will work with any property owners impacted to resolve those issues; solutions could include the replacement or relocation of private septic systems.

The EENF states that as a part of the groundwater mounding analysis, a particle tracking analysis was undertaken to simulate how groundwater is anticipated to migrate away from the WWTF under

different discharge scenarios. Based on that assessment, most of the water discharged to the beds will eventually enter the Eel River system either at Warren Wells Brook, Russell Mill Pond, or further downstream in the Eel River; however, approximate groundwater travel times range from one year to more than ten years before discharge to these surface waters. The greatest flow increase is anticipated to occur in the vicinity of Russell Mill Pond, where 3.4 cubic feet per second (cfs) of additional flow is expected. Therefore, the EENF states that the proposed change of discharge location prioritization will provide consistent and reliable groundwater recharge that persists in the Plymouth-Carver Aquifer for a considerable amount of time. This would also support increased base flow for Warren Wells Brook and the Eel River during drought periods. In addition, increasing base flows in Russell Mill Pond would reduce stagnation and increase oxygen in the pond, thereby improving water quality.

Nutrient Loading and Dispersal

According to the EENF, the Eel River has two primary branches with several smaller tributary streams contributing to each. The western branch is anticipated to be the recipient of the majority of groundwater recharge infiltrated at the WWTF and is approximately 3.9 miles in length with a watershed of approximately 11 square miles. As a part of the MassDEP approval of the existing WWTF GWDP, a Nutrient Management Plan (NMP) was implemented to monitor water quality changes in the Eel River system by collecting and analyzing groundwater and surface water sampling data. Although the 2020 Nutrient Management Data Report indicated that there was no negative impact to Eel River from WWTF operations in 2020 or prior years, slight increases in nitrogen values were shown as a result of the sewer main breaks that occurred in 2016. An increase in phosphorus was shown in Well A8 (located directly below the sand beds) but no phosphorus increases have been identified in wells further downgradient from the disposal beds. In addition, the Massachusetts Estuary Program (MEP) conducted a study in 2017 to evaluate the nitrogen sensitivity, nitrogen threshold loading levels, and response to changes in the nitrogen loading rate of the Plymouth/ Kingston/ Duxbury (PKD) embayment system, which receives contributory inputs from freshwater systems including the Eel River. The study found that the primary sources of nitrogen to the PKD system is wastewater disposal, fertilizers, and changes in the freshwater hydrology associated with development.

The EENF states that nitrogen and phosphorus concentrations in the treated effluent were evaluated from May 2002 to August 2021. The overall average concentration of nitrogen is 6 milligrams per liter (mg/L) and the overall average concentration of phosphorus 4.4 mg/L. NMP sampling and reporting indicate there have been no obvious water quality impacts observed within the Eel River or its tributaries from WWTF operations; however, a considerable quantity of nitrogen has been transported through groundwater to the Eel River from the WWTF since operations began in 2002. According to the EENF, the Eel River and its tributaries are predominantly phosphorus limited, whereas Plymouth Harbor is nitrogen limited; given that the project seeks to shift wastewater discharge away from Plymouth Harbor, the EENF focuses on potential water quality impacts to the Eel River from the potential increase in phosphorus associated with the discharge of treated effluent to groundwater.⁵ Utilizing the results from a U.S. Geological Survey (USGS) report, which investigated phosphorus dynamics in aquifers related to WWTF discharges, the EENF states that the WWTF would be expected to develop a total phosphorus plume length of approximately 600 ft during the anticipated 50-year period of active

⁵ Nutrient limited waterbodies or waterways contain specific nutrients in limited quantities and are therefore more susceptible to water quality impacts from said nutrients.

infiltration, based on a migration rate of 12 ft per year.⁶ After infiltration activities cease, following the end of WWTF operations and decommissioning, the influx of clean water would flush through the system and accelerate plume migration to approximately 34 ft per year for approximately 20 years (for a total phosphorus plume length of 1,300 ft approximately 70 years after infiltration activities commence). The EENF concludes that there will be a significant time lag of approximately seven decades before a phosphorus plume would be expected to contact Warren Wells Brook at its closest point to the WWTF and begin to contribute significant phosphorus to the Eel River system. Although approximate groundwater travel times only range from one year to more than ten years before reaching adjacent surface waters, phosphorus migration is slowed due to geochemical processes within the soil. Once the retention capacity of a given area is reached, the phosphorus plume will advance further from the WWTF. In order to better assess the potential for phosphorus migration to the nearest point on Warren Wells Brook, the Proponent proposes installing eight additional monitoring wells as a condition of the permitting for the proposed change of effluent discharge location. The EENF states that other mitigation measures to reduce the concentration of phosphorus in the treated effluent or to slow the migration of the phosphorus plume would be evaluated in the future based on the monitoring well data. In addition, comments raise concerns about the discharge of treated effluent into the Plymouth Sole-Source Aquifer and the potential impact it may have on the drinking water supply. Additional information should be provided in accordance with the Scope.

Comments provided by MassDEP note a transcription error in the underlying MEP report for the PKD embayment that appears to have overinflated the nitrogen attenuation rate of the Eel River watershed. This transcription error has the effect of underrepresenting the total nitrogen load contributed to the PKD embayment system from the Eel River watershed; in turn, the addition of more nitrogen by the project may cause the overall load in the embayment to exceed the Target Concentration for this embayment. Comments also note that the Proponent relied on portions of the MEP report to draw conclusions as to the net benefit or harm to the estuary system of implementing the project, whereas the MEP report uses multiple lines of evidence to determine nitrogen impacts to the estuary system. MassDEP comments suggest that the Proponent should consider additional mitigation to reduce the future nitrogen impact in the southern portion of the PDK estuary. An alternative discharge site could also be considered to reduce nitrogen loading to this embayment system. These future options should be discussed in accordance with the Scope.

Fisheries

According to the EENF, the U.S. Food and Drug Administration (FDA) and the Massachusetts Department of Marine Fisheries (DMF) conducted a collaborative dye tracer study in June 2018 of the WWTF treated effluent discharged to Plymouth Harbor, which is listed on the Final Massachusetts 2018/2020 Integrated List of Waters for estuarine bioassessments and fecal coliform impairments. The results of the study showed that the treated effluent was at a higher concentration throughout the Plymouth Harbor shellfish growing area than what is typically recommended. In addition, the higher than recommended concentrations extended approximately one mile beyond the harbor outfall and 0.4 miles beyond the current “Prohibited” for shell fishing area. Kingston Bay and Duxbury Bay were less impacted; however, the concentrations remained in Duxbury Bay for a longer period of time. Based on these results, the FDA and DMF recommended that the “Prohibited” area for the shellfish growing be

⁶ According to the Proponent, the anticipated remaining lifespan of the WWTF is approximately 50 years.

expanded, and for Kingston Bay and Duxbury Bay to be reclassified as “Conditionally Approved” for shell fishing.

As noted above, the WWTF is located approximately 1.3 miles from Plymouth Harbor, one mile from the Eel River, and 0.75 miles from Russel Mill Pond, with groundwater flow from the WWTF generally flowing towards Russell Mill Pond and the Eel River. According to the EENF, Russell Mill Pond is a listed impaired waterbody for algae and dissolved oxygen. As stated in comments provided by DMF, the Eel River provides diadromous fish passage and habitat for river herring (*Alosa spp.*), Atlantic tomcod (*Microgadus tomcod*), rainbow smelt (*Osmerus mordax*), white perch (*Morone americana*), and American eels (*Anguilla rostrata*). The Eel River also provides spawning and nursery habitat for rainbow smelt and Russel Mill Pond provides spawning and nursery habitat for river herring. As stated above, the proposed reprioritization of the groundwater beds to infiltrated treated effluent raises concerns about potential nutrient loading that could affect groundwater and surface waters in proximity to the WWTF, portions of which are considered a coldwater fishery resource. Comments provided by DMF state that while the project proposes a monitoring plan to track the progress of phosphorous dispersion through the Plymouth-Carver Aquifer and to implement mitigation measures before significant phosphorous loading impacts the Eel River, the project does not propose similar measures with respect to nitrogen. DMF recommends that the monitoring plan be expanded to include measuring nitrogen dispersal and concentrations in addition to phosphorus.

Climate Change

Adaptation and Resiliency

Effective October 1, 2021, all MEPA projects are required to submit an output report from the MA Resilience Design Tool to assess the climate risks of the project. Based on the output report attached to the ENF, the project has a “High” exposure rating based on the project’s location for the extreme precipitation (riverine flooding) and extreme heat climate parameters. The project also has a “Moderate” exposure rating based on the project’s location for the extreme precipitation (urban flooding) climate parameter. In addition, the project also scores “Low” in ecosystem benefits. Based on the 50-year useful life and the self-assessed criticality identified for the change in disposal location, the MA Resilience Design Tool recommends a planning horizon of 2070 and a return period associated with a 50-year (2%) storm event for extreme precipitation. It also recommends planning for the 50th percentile for applicable extreme heat parameters.

The MA Resilience Design Tool output indicates that there is a projected increase in rainfall within project's useful life. This factor is indicated in the Tool as contributing to the “Moderate” exposure rating for the extreme precipitation (urban flooding) climate parameter. The EENF states that since the project does not involve any new construction, the climate parameters analyzed in the Tool do not apply. However, as noted above, the USGS report found that an influx of freshwater, after infiltration activities cease in the future, following the end of WWTF operations and decommissioning, resulted in an acceleration of nutrient plume migration. The EENF does not appear to evaluate the contribution of increased precipitation volumes, anticipated with climate change, into the groundwater mounding or nutrient dispersion assessments. In addition, the EENF does not discuss the capacity of the groundwater beds to manage both the proposed average annual discharge and the anticipated precipitation volumes. This analysis should be provided in the DEIR.

Greenhouse Gas Emissions

The EENF states that the proposed change of discharge location to the on-site groundwater beds will reduce energy usage by eliminating the need to actively pump treated effluent from the WWTF to the Plymouth Harbor outfall. Comparatively, the existing infiltration system relies on gravity to transport the treated effluent from the WWTF to the groundwater infiltration beds adjacent to the facility. This would reduce the total energy consumption of the WWTF by approximately 22,572 kilowatt-hours (kWh) monthly on average. The EENF did not calculate the greenhouse gas (GHG) emissions benefits associated with this reduction in energy use.

Construction Period

According to the EENF, no additional infrastructure, construction, land disturbance, or capital cost expenditure would be required to implement the project as all of the necessary infrastructure is already in place. However, the EENF also proposes the installation of eight additional groundwater monitoring wells between the WWTF and Warren Wells Brook as part of the project's mitigation commitments. In addition, as noted above, comments request additional alternative disposal locations be considered. To the extent an alternative location is advanced as the Preferred Alternative, the DEIR should fully describe construction impacts associated with the project.

SCOPE

General

The DEIR should follow Section 11.07 of the MEPA regulations for outline and content and provide the information and analyses required in this Scope. It should clearly demonstrate that the Proponent will avoid, minimize, and mitigate Damage to the Environment to the maximum extent practicable through project alternatives and design.

Project Description and Permitting

The DEIR should describe any changes to the project since the filing of the EENF. The DEIR should identify, describe, and assess the environmental impacts of any changes to the project that have occurred between the preparation of the EENF and DEIR. The DEIR should also include an updated list of required Permits, Financial Assistance, and other state, local and federal approvals and provide an update on the status of each of these pending actions. The DEIR should include a description and analysis of applicable statutory and regulatory standards and requirements, and a discussion of the project's consistency with those standards.

The information and analyses identified in this Scope should be addressed within the main body of the DEIR and not in appendices. In general, appendices should be used only to provide raw data, such as hydraulic calculations and nutrient loading data, that is otherwise adequately summarized with text, tables, and figures within the main body of the DEIR. Information provided in appendices should be

indexed with page numbers and separated by tabs, or, if provided in electronic format, include links to individual sections. Any references in the DEIR to materials provided in an appendix should include specific page numbers to facilitate review.

Alternatives Analysis

The DEIR should provide a supplemental alternatives analysis that evaluates alternative disposal locations outside the of the Eel River Watershed. Alternatives should be considered through the lens that future hydraulic and nutrient loading of the Eel River Watershed may not be able to assimilate the loads associated with the proposed average annual discharge of 3.0 MGD. In particular, MassDEP recommends a reconsideration of Site 101 (Alternative 1 above) and additional consideration of the Cold Spring School property, which abuts the harbor outfall discharge line and would need little construction with the exception of a subsurface disposal system. The DEIR should quantify and compare the environmental impacts of each of the alternatives considered; redefine the Preferred Alternative as appropriate; and describe the reason(s) that the ultimate Preferred Alternative was chosen. For each new alternative, the DEIR should present full analysis and modeling, including groundwater mounding and nutrient dispersal analysis to show how the conclusions about the time period, rates, or distance of nutrient dispersal would differ based on the new locations studied. The alternatives analysis should support the selection of the Preferred Alternative that includes all feasible measures to avoid Damage to the Environment, or to the extent Damage to the Environment cannot be avoided, to minimize and mitigate Damage to the Environment to the maximum extent practicable. The Proponent should coordinate with MassDEP to develop the revised alternatives analysis.

Environmental Justice (EJ) / Public Health

The DEIR should include a separate section on “Environmental Justice,” and contain a description of measures the Proponent has taken, and intends to undertake, to promote public involvement by EJ Populations during the remainder of the MEPA review process and subsequent permitting, including a discussion of any of the best practices listed in the MEPA EJ Public Involvement Protocol that the project intends to employ or has employed by the time of the DEIR filing. The DEIR, or a summary thereof, should be distributed to the EJ Reference List, and an updated list should be obtained from the MEPA Office prior to filing the DEIR so as to ensure that organizational contacts are up to date. The Proponent should hold at least one public meeting prior to filing the DEIR, and should specifically present at the meeting, in addition to overall project details and timeline, the Proponent’s revised alternatives analysis, any updated data on nutrient loading for phosphorus and nitrogen, and revised monitoring plans.

The DEIR should supplement the EJ analysis presented in the EENF. Specifically, it should include a revised description of the potential sources of pollution within the DGA, based on mapping layers available through the DPH EJ Tool. To the extent further design changes are made, the DEIR should update its analysis of the project’s impacts to determine whether the project may result in disproportionate adverse effects, or increase the risks of climate change, on the identified EJ Population, in accordance with 301 CMR 11.07(6)(n)2. and the MEPA Interim Protocol for Analysis of EJ Impacts.

The DEIR should discuss any known or reasonably foreseeable public health consequences that may result from the environmental impacts of the project. Particular focus should be given to any

impacts that could affect the Plymouth-Carver Sole Source Aquifer and public drinking water supply. As noted above, the DEIR should study additional alternatives to the disposal location, and should compare the potential impacts of each alternative to groundwater and drinking water supply. The DEIR should contain specific discussion of performance standards for groundwater discharge permitting, how such standards will protect public health, and whether the project will meet or exceed such standards.

Wastewater

The DEIR should include a narrative and simplified table describing potential impacts to environmental resources (including but not limited to groundwater and surface waters, drinking water supply, fisheries, state-listed species, etc.) resulting from the proposed project (including but not limited to nutrient loading, groundwater mounding, hydraulics, etc.) and mitigation that can be implemented to reduce potential impacts. The DEIR should include an analysis of the potential mitigation measures to reduce the concentration of phosphorus in the treated effluent or to slow the migration of the phosphorus plume. The analysis should describe what each mitigation measure would entail, the amount of phosphorus attenuation provided, and how each mitigation measure would be implemented.

In light of the identified transcription error, the DEIR should reassess the nitrogen attenuation provided by the project and any conclusions drawn from the MEP report in relation to the proposed project. The DEIR should propose additional mitigation measures to reduce the future nitrogen impact in the southern portion of the PDK estuary. It should also present a revised monitoring plan to track the progress of both nitrogen and phosphorous dispersion through the Plymouth-Carver Aquifer and to implement mitigation measures before significant nutrient loading impacts the Eel River. As stated above, the DEIR should provide revised modeling and analysis regarding groundwater mounding and nutrient loading based on any alternative disposal locations studied for the project. The DEIR should discuss what mitigation will be provided in the event groundwater mounding analysis shows that wastewater flows would impact any nearby septic systems.

Climate Change

The DEIR should include a comprehensive discussion of the potential effects of climate change on the WWTF and describe features incorporated into the project design that will increase the resiliency of the site to these changes. The DEIR should document the capacity of the groundwater infiltration beds and discuss their ability to manage both the proposed average annual discharge of 3.0 MGD and any increased anticipated precipitation volumes resulting from climate change. The DEIR should also evaluate the effect of increased precipitation volumes in the groundwater mounding and nutrient dispersion analyses, and should provide quantitative analysis or modeling to assess the extent to which increased precipitation volumes would affect the conclusions regarding the time horizon or distance over which nutrients are anticipated to disperse. The Resilient MA Climate Change Projections Dashboard now provides 24-hour rainfall volumes for a wide variety of storm scenarios and planning horizons, so comparison of other storm scenarios is possible through the dashboard without re-running the Tool. Information available through the Resilient MA Climate Change Projections Dashboard could be used as a resource in estimating future precipitation volumes.⁷

The DEIR should provide calculations of the GHG benefits associated with the reduction in

⁷ Available at <https://resilientma-mapcenter-mass-eoceea.hub.arcgis.com/>.

energy use associated with moving the discharge location inland. The DEIR should compare the GHG impacts associated with the additional alternative locations studied for the project.

Construction Period

To the extent an alternative location is advanced as the Preferred Alternative, the DEIR should fully describe construction impacts associated with the project. The DEIR should describe how construction activities will be managed in accordance with applicable MassDEP regulations regarding Air Pollution Control (310 CMR 7.01, 7.09-7.10), and Solid Waste Facilities (310 CMR 16.00 and 310 CMR 19.00, including the waste ban provision at 310 CMR 19.017). Construction equipment should use engines meeting Tier 4 federal emissions standards, or if unavailable, confirm that the project will require its construction contractors to use Ultra Low Sulfur Diesel fuel, and discuss the use of after-engine emissions controls, such as oxidation catalysts or diesel particulate filters. The DEIR should describe how the project will comply with all said applicable requirements.

Mitigation and Draft Section 61 Findings

The DEIR should include a separate chapter summarizing all proposed mitigation measures including construction-period measures. This chapter should also include a comprehensive list of all commitments made by the Proponent to avoid, minimize and mitigate the environmental and related public health impacts of the project, and should include a separate section outlining mitigation commitments relative to EJ Populations. The filing should contain clear commitments to implement these mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsible for implementation, and contain a schedule for implementation. The list of commitments should be provided in a tabular format organized by subject matter (traffic, water/wastewater, GHG, environmental justice, etc.) and identify the Agency Action or Permit associated with each category of impact. Draft Section 61 Findings should be separately included for each Agency Action to be taken on the project. The filing should clearly indicate which mitigation measures will be constructed or implemented based upon project phasing to ensure that adequate measures are in place to mitigate impacts associated with each development phase.

Responses to Comments


The DEIR should contain a copy of this Certificate and a copy of each comment letter received. In order to ensure that the issues raised by commenters are addressed, the DEIR should include a comprehensive response to comments that specifically address each issue raised in the comment letter; references to a chapter or sections of the DEIR alone are not adequate and should only be used, with reference to specific page numbers, to support a direct response. This directive is not intended, and shall not be construed, to enlarge the scope of the DEIR beyond what has been expressly identified in this certificate.

Circulation

In accordance with 301 CMR 11.16(3), the Proponent should circulate the DEIR to each Person or Agency who commented on the EENF, each Agency from which the Project will seek Permits, Land Transfers or Financial Assistance, and to any other Agency or Person identified in the Scope. Pursuant

to 301 CMR 11.16(5), the Proponent may circulate copies of the DEIR to commenters in in a digital format (e.g., CD-ROM, USB drive), by directing commenters to a project website address, or electronically. However, the Proponent must make a reasonable number of hard copies available to accommodate those without convenient access to a computer and distribute these upon request on a first-come, first-served basis. A copy of the DEIR should be made available for review in the Plymouth Public Library.

December 22, 2023
Date



Rebecca L. Tepper

Comments received:

Comments submitted on the MEPA Public Comments Portal

- 11/3/2023 Mary Gatslick
- 11/24/2023 Mark Withington
- 11/25/2023 Richard Serkey
- 11/28/2023 Russell Fry IV
- 11/28/2023 Thomas Fugazzi
- 11/28/2023 Dwayne Stefano
- 11/29/2023 Kerry Stefano
- 11/30/2023 Francis Mand

Comments submitted by email

- 10/2/2023 Community Land and Water Coalition
- 11/24/2023 Anne and Stephen Franzino
- 11/30/2023 Herring Ponds Watershed Association
- 12/1/2023 Herring Pond Wampanoag Tribe, Inc. of Patuxet-Plymouth, Eel River Watershed Association, the Jones River Watershed Association, and Community Land & Water Coalition
- 12/12/2023 Massachusetts Division of Marine Fisheries (DMF)
- 12/15/2023 Massachusetts Department of Environmental Protection (MassDEP) Southeast Regional Office (SERO)

RLT/NJM/njm

EEA 16758 - Plymouth WWTP ENF for expansion

Coordinator <environmentwatchesoutheasternma@gmail.com>

Mon 10/2/2023 8:02 AM

To: Neal Price <nprice@horsleywitten.com>; Moreno, Nicholas (EEA) <Nicholas.Moreno@mass.gov>

Cc: Katherine Harrelson <katherine.clwc@gmail.com>; Jones River Watershed Association <pine@jonesriver.org>; Mettie Whipple <mettie@eelriverwatershed.org>; Mettie Whipple <mettiesartbags@gmail.com>

CAUTION: This email originated from a sender outside of the Commonwealth of Massachusetts mail system. Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Hello Mr. Price and Mr. Moreno,

Please add our group to the list of interested stakeholders to receive MEPA filings and related information on the proposal by Plymouth to expand the WWTP to 3 m gpd.

Please add these to the comments on this project:

1. What is the status of the Town's compliance with DEP stormwater regulations and the Town stormwater regulations? How much stormwater is fed into the sewer system and hence into the WWTP? What is the total number of gallons?

It is our experience that the Town does not enforce its stormwater regulations, that the local planning board and zoning board of appeals ignore these regulations when permitting large commercial and residential developments. Recently the Planning Board "amended" the stormwater regulations illegally in order to accommodate at 348 unit development in Colony Place.

Does the Town have a testing and monitoring program for effluent that enters the WWTP to ensure that entities discharging to the WWTP are in compliance with pre-treatment regulations, etc? As you may know the Town has manufacturing facilities and at least one asphalt batching plant and concrete/cement facility. Are these facilities discharging to the WWTP?

2. What is the impact of the town's ongoing illegal sand and gravel mining at the WWTP site? This is plainly visible on satellite images. The ongoing removal of sand and gravel at this site and adjacent to it is strip mining that changes the topography, infiltration rates and movement of water above and below ground. The ENF and EIR must take into account these land alterations in all aspects of the environmental assessment of the impacts of the proposal to increase the capacity of the WWTP.

3. Has there been an assessment of the strip mining and earth removal impacts on the non-town lands immediately adjacent to and surrounding the WWTP site in the

last 30 years? The baseline has changed. Using this 30 year old data is not accurate to assess the current condition of the site?

4. Where are the water quality samples for the effluent discharges from the WWTP? The Town should be required to post these on the Town website.

Thank you.
Meg Sheehan
Attorney
Community Land and Water Coalition
Plymouth

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Community Land & Water Coalition
environmentwatchesoutheasternma@gmail.com

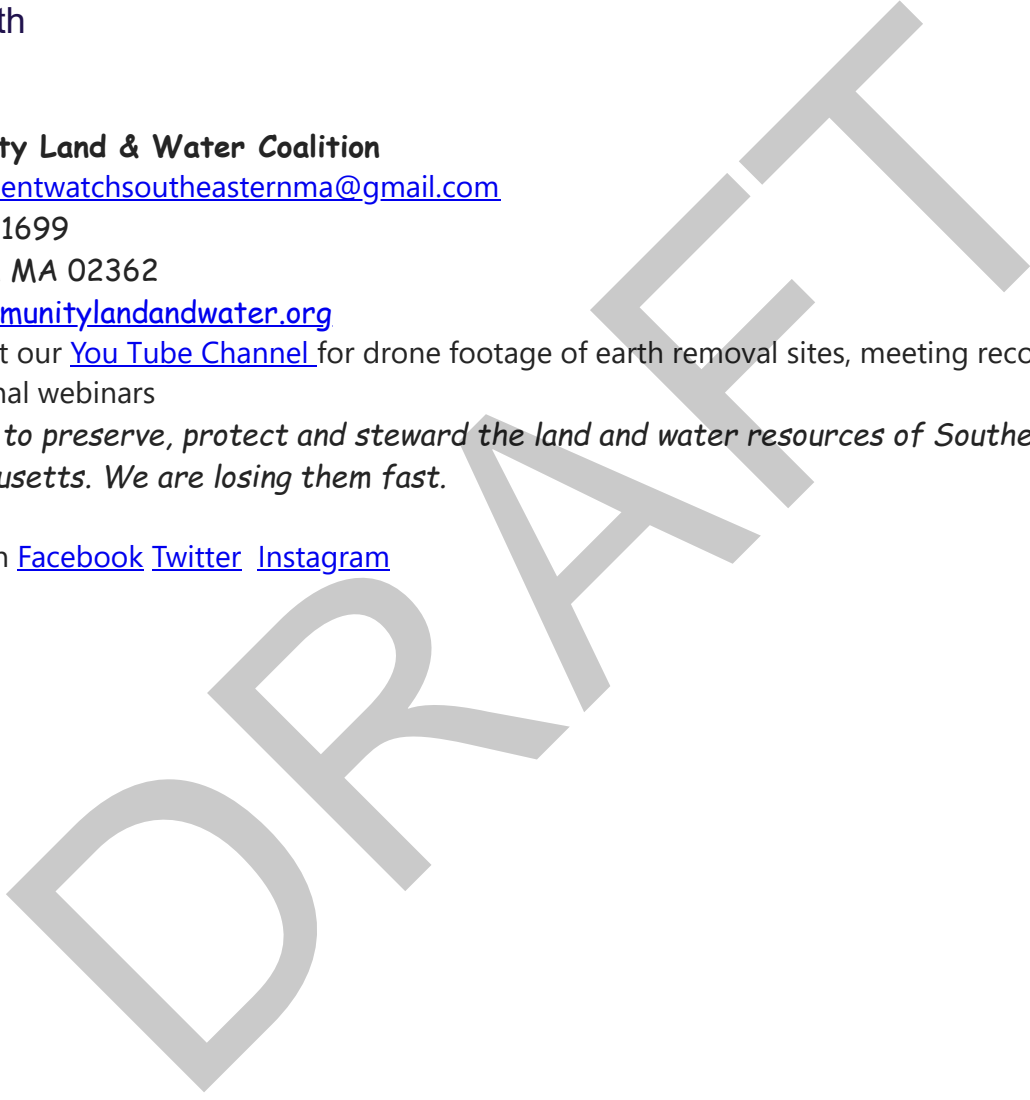
P.O. Box 1699
Plymouth MA 02362

www.communitylandandwater.org

Check out our [You Tube Channel](#) for drone footage of earth removal sites, meeting recordings and educational webinars

Working to preserve, protect and steward the land and water resources of Southeastern Massachusetts. We are losing them fast.

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View Comment

Comment Details

EEA #/MEPA ID

16758

Comments Submit Date

11-3-2023

Certificate Action Date

12-1-2023

Reviewer

Nicholas Moreno, (617)699-4254, Nicholas.Moreno@mass.gov

First Name

Mary

Last Name

Gatslick

Phone

--

Email

mjgatslick@mac.com

Address Line 1

188 Jordan Road

Address Line 2

--

State

MASSACHUSETTS

Zip Code

02360

Organization

--

Affiliation Description

Individual

Status

Opened

Comment Title or Subject

Topic: Plymouth Wastewater Treatment Facility Treated Effluent Discharge Comment - EPA Number16758

Comments

Rich text editor toolbar: Undo, Redo, Bold, Italic, Underline, Link, Font Face (Segoe UI), Font Size (10 pt), Text Color, Background Color, Subscript, Superscript, Bulleted List, Numbered List, Indent, Outdent, Link, Print.

1. The mitigation measures discussed in the document refer to the Nutrient Management Plan, these mitigation methods are based on the current flow through the WWTP filtration beds - 0.75MGD. Are there updated mitigation plans that address the proposed increased flow through the sand filters? Are they publicly available?
2. What measures will be in place (as required by the Nutrient Management Plan) to continue to reduce existing nutrient loads specifically Total Phosphorus and Total Nitrogen to the Eel River?
3. Are the engineered wet lands proposed for the WWTP still under consideration? This would add additional treatment to the WWTP.

Attachments

Update Status

Status

Accepted ▼

SUBMIT

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DRAFT

EEA # 16758

Anne Franzino <annefranzino@icloud.com>

Fri 11/24/2023 9:24 AM

To: Moreno, Nicholas (EEA) <Nicholas.Moreno@mass.gov>

Cc: STEPHEN FRANZINO <franzino@mac.com>

CAUTION: This email originated from a sender outside of the Commonwealth of Massachusetts mail system. Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Dear Mr. Moreno:

We tried to go to the website and click on the comment section but it did not work, I am therefore writing to you as you are listed as the MEPA analyst. I would appreciate if you could forward this email to anyone else involved.

As a resident of the village of Chiltonville located within the Eel River Watershed in the Town of Plymouth, my husband and I are concerned with the proposed 300% increase of ground discharge at town's Camelot Drive Wastewater Treatment Facility.

While we realize the town has conducted a public meeting of the EENF filing on October 4th, 2023, we do not believe the community has had a chance to fully absorb all of this information, ask questions, and feel comfortable with proceeding with this expansion.

This was a highly contentious issue for the town when the wastewater facility was sited at the Eel River headwaters back in the 1990s. It would seem imprudent to proceed as fast as this has without full buy-in from the community. Especially in light of the massive construction developments that are ongoing in town.

As a community it is very difficult to stay fully informed as the public does not readily receive important information regarding what is happening to our environment. We think we need more time to stay fully informed.

Thank you,

Anne and Stephen Franzino

253 Jordan Road

Plymouth Ma 02360

Sent from my iPad

View Comment

Comment Details

EEA #/MEPA ID

16758

Comments Submit Date

11-24-2023

Certificate Action Date

12-1-2023

Reviewer

Nicholas Moreno, (617)699-4254, Nicholas.Moreno@mass.gov

First Name

Mark

Last Name

Withington

Phone

--

Email

mark.withington@gmail.com

Address Line 1

120 Old Sandwich Road

Address Line 2

--

State

MASSACHUSETTS

Zip Code

02360

Organization

--

Affiliation Description

Individual

Status

Opened

Comment Title or Subject

Topic: Time to pump the brakes.

Comments

Rich text editor toolbar with icons for undo, redo, bold, italic, underline, link, font face (Segoe UI), font size (10 pt), text color, background color, subscript, superscript, bulleted list, numbered list, indent, outdent, link, and a dropdown menu.

As a resident of the village of Chiltonville located within the Eel River Watershed in the Town of Plymouth, I am concerned with the proposed 300% increase of ground discharge at town's Camelot Drive Wastewater Treatment Facility.

While I realize the town has conducted a public meeting of the EENF filing on October 4th, 2023, I do not believe the community has had a chance to fully absorb all of this information, ask questions, and feel comfortable with proceeding with this expansion.

This was a highly contentious issue for the town when the wastewater facility was sited at the Eel River headwaters back in the 1990s. It would seem imprudent to proceed as fast as this has without full buy-in from the community.

Attachments

Update Status

Status

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DRAFT

View Comment

Comment Details

EEA #/MEPA ID

16758

Comments Submit Date

11-25-2023

Certificate Action Date

12-1-2023

Reviewer

Nicholas Moreno, (617)699-4254, Nicholas.Moreno@mass.gov

First Name

Richard

Last Name

Serkey

Phone

--

Email

richardmserkey@outlook.com

Address Line 1

60 Allerton Street

Address Line 2

--

State

MASSACHUSETTS

Zip Code

02360

Organization

Retired

Affiliation Description

--


Status

Opened

Comment Title or Subject

Topic: 16758

Comments



As a resident of the Town of Plymouth, I am concerned with the proposed 300% increase of ground discharge at town's Camelot Drive Wastewater Treatment Facility.

While I realize the town has conducted a public meeting of the EENF filing on October 4th, 2023, I do not believe the community has had a chance to fully absorb all of this information, ask questions, and feel comfortable with proceeding with this expansion.

This was a highly contentious issue for the town when the wastewater facility was sited at the Eel River headwaters back in the 1990s. It would seem imprudent to proceed as fast as this has without full buy-in from the community.

Attachments

Update Status

Status

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Comment Details

EEA #/MEPA ID

16758

Comments Submit Date

11-28-2023

Certificate Action Date

12-15-2023

Reviewer

Nicholas Moreno, (617)699-4254, Nicholas.Moreno@mass.gov

First Name

Dwayne

Last Name

Stefano

Phone

--

Email

dwaynestefano@comcast.net

Address Line 1

46 Kingfisher Lane

Address Line 2

--

State

MASSACHUSETTS

Zip Code

02360

Organization

Chiltonville Resident

Affiliation Description

Individual

Status

Opened

Comment Title or Subject

Topic: Wastewater flowing into Eel River

Comments

As a resident of the village of Chiltonville located within the Eel River Watershed in the Town of Plymouth, I am concerned with the proposed 300% increase of ground discharge at town's Camelot Drive Wastewater Treatment Facility.

While I realize the town has conducted a public meeting of the EENF filing on October 4th, 2023, I do not believe the community has had a chance to fully absorb all of this information, ask questions, and feel comfortable with proceeding with this expansion. I live on Russell Mills Pond.

This was a highly contentious issue for the town when the wastewater facility was sited at the Eel River headwaters back in the 1990s. It would seem imprudent to proceed as fast as this has without full buy-in from the community."

Respectfully,
Dwayne and Kerry Stefano
46 Kingfisher Lane Chiltonville
Plymouth MA 02360



Attachments

Update Status

Status

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Comment Details

EEA #/MEPA ID

16758

Comments Submit Date

11-28-2023

Certificate Action Date

12-1-2023

Reviewer

Nicholas Moreno, (617)699-4254, Nicholas.Moreno@mass.gov

First Name

Russell

Last Name

Fry IV

Phone

--

Email

rtfry4@yahoo.com

Address Line 1

222 Jordan Road

Address Line 2

--

State

MASSACHUSETTS

Zip Code

02360

Organization

--

Affiliation Description

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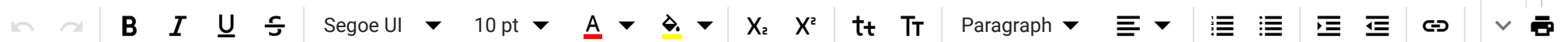
Status

Opened

Comment Title or Subject

Topic: Owner, Resident on Haden Pond

Comments



To whom it may concern,

As a resident and property owner property owner on Hayden Pond (on the Eel River Watershed), I would like to express my concern about the further nutrient enrichment abutting my property. The town's proposal to increase ground discharge by 300% at the Camelot Drive Wastewater Treatment Facility directly affects my family and me.

As someone who enjoys canoeing on Hayden Pond, I've noticed increased algae blooms and overgrowth over the past decade. The last three years were severe. This situation may worsen due to the proposed wastewater facility expansion. Such blooms could affect the ecological balance (fish, birds of prey) on the pond and any hope for the return of the herring (alewife) to the Town-installed herring run.

I appreciate the town's effort to engage the community through the public meeting regarding the EENF filing on October 4th, 2023. However, more time and opportunities are needed for residents, especially property abutters, to grasp and discuss the implications of this expansion in detail.

We need to slow down this process. The potential impact on Hayden Pond and the entirety of the Eel River Watershed should be understood and discussed fairly.

Thank you for your consideration. Be well.

Russell T Fry IV, Stephanie G Fry and family

Attachments

Update Status

Status

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Comment Details

EEA #/MEPA ID

16758

Comments Submit Date

11-28-2023

Certificate Action Date

12-1-2023

Reviewer

Nicholas Moreno, (617)699-4254, Nicholas.Moreno@mass.gov

First Name

Thomas

Last Name

Fugazzi

Phone

--

Email

TSFugazzi@aol.com

Address Line 1

24 Clifford Road

Address Line 2

--

State

MASSACHUSETTS

Zip Code

02360

Organization

--

Affiliation Description

Individual

Status

Opened

Comment Title or Subject

Topic: Plymouth Wastewater Treatment Facility treated effluent discharge-- EEH# 16758

Comments

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As a resident of Plymouth and residing on Clifford Road adjacent to Eel River, I would like to express my concern with the proposed additional ground discharge from the Camelot Drive Wastewater Treatment Plant.

As I recall, this issue was hotly debated in the 1990's due to the effects this discharge could have on the water quality and volume of water of the river.

From that time until current, the condition of the river has changed considerably for the worst. The flow has decreased considerably causing backup and flooding of low-lying areas.

Additionally, the discharge into Plymouth Harbor along the inside of the beach parking lot is a constant problem.

On major storms, this section of the river is completely blocked to the extent it takes several days to weeks for the Town to dredge and restore the volume of flow.

On a lesser storm, smaller amounts of sand restrict the flow, which is neglected to be cleaned out, and over time restricts the flow and raises the water level back as far as the Hayden Pond Dam.

As a resident of this area for all of my life, 76 years, believe a very serious consideration needs to be given to this river. As I see it, this area is responsible for the total restricted water flow and water quality.

The river needs to be returned to its original path of flow directly into the bay and not along the inside of the beach. The bridge on Warren Avenue is already damaged and in need of repair or replacement. Warren Avenue should be raised to address the rise in sea level. This section is closed during storms.

Thomas Fugazzi

Attachments

Update Status

Status

Accepted

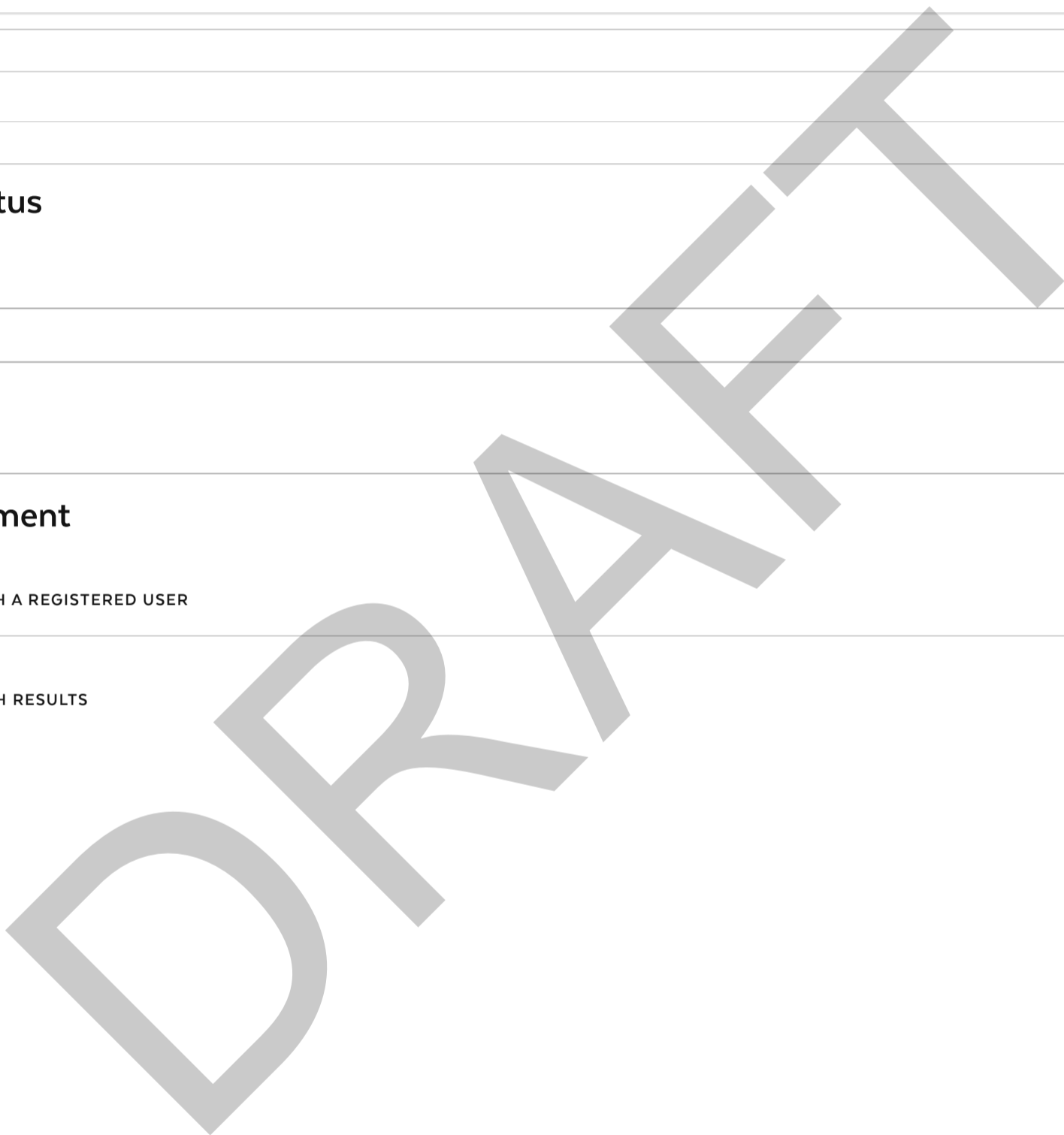


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Comment Details

EEA #/MEPA ID

16758

Comments Submit Date

11-29-2023

Certificate Action Date

12-15-2023

Reviewer

Nicholas Moreno, (617)699-4254, Nicholas.Moreno@mass.gov

First Name

Kerry

Last Name

Stefano

Phone

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Email

kstefano@me.com

Address Line 1

46 Kingfisher Lane

Address Line 2

--

State

--

Zip Code

02330

Organization

--

Affiliation Description

--


Status

Opened

Comment Title or Subject

Topic: Protect the Eel River Watershed

Comments



As a resident of the village of Chiltonville located within the Eel River Watershed in the town of Plymouth, I am concerned with the proposed 300% increase of ground discharge at towns Camelot Drive Wastewater Treatment Facility.

While I realize the town has conducted a public meeting of the EENF filing on October 4th, 2023, I do not believe the community has had a chance to fully absorb all of this information, ask questions, and feel comfortable with proceeding with this expansion.

This was a highly contentious issue for the town when the wastewater facility was sited at the Eel River headwaters back in the 1990s. It would seem imprudent to proceed as fast as this has without full buy-in from the community.

Attachments

Update Status

Status

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DRAFT

View Comment

Comment Details

EEA #/MEPA ID

16758

Comments Submit Date

11-30-2023

Certificate Action Date

12-15-2023

Reviewer

Nicholas Moreno, (617)699-4254, Nicholas.Moreno@mass.gov

First Name

Francis

Last Name

Mand

Phone

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Email

dogd@aol.com

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Address Line 2

158 Center Hill Road

State

MASSACHUSETTS

Zip Code

02360

Organization

Southeastern Mass Pine Barrens Alliance

Affiliation Description

Individual

Status

Opened

Comment Title or Subject

Topic: Pre-mature

Comments

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Part of the submission for this project is a list of local community groups contacted during the initial rollout of this project.

But the list submitted is devoid of any truly local groups, save for a state-listed tribe – the Herring Pond Wampanoag Tribe.

Of the dozens of community organizations actively involved in conservation issues in this town alone, including those dedicated to the preservation of the town’s globally-rare ecoregion -*The Massachusetts Coastal Pine Barrens Alliance* - and those engaged in a variety of initiatives to preserve and protect the town’s sole-source aquifer, none were contacted.

Plymouth is well-known for its preponderance of rare coastal plain ponds, its wealth of ponds overall (450), its leadership in wetlands restoration science (The Eel River and Tidmarsh Farms restorations) and its leadership in dam removal efforts on historic Town Brook – and yet, no local conservation groups were consulted.

On a simple level, the benefits of this project seem obvious. But these are benefits as seen from a single perspective – that of the municipality, whose priority is to increase the volume of sewage that can be treated at the WWTF while maintaining the costs associated with treatment.

While conservation groups understand the potential benefits of increased recharge that would likely result from this sewerage ‘re-prioritization,’ if they had been consulted those groups would have underlined concern that the ecosystem that the WWTF lies within contains both a vulnerable, uncontained, EPA-designated sole-source aquifer (largely comprised of sand) and many habitats and species (of flowers, plants and animals) that are dependent upon the natural fluctuations in groundwater levels and the absence of contaminants in those waters.

Many of the town’s 450 ponds are already compromised by anthropogenic activity.

What is the long-term effect of the alteration and contamination of these waters, however slight, on these habitats, on this increasingly valuable resource? That is not addressed in this proposal.

At the very least this should project should be delayed until a full and fair public hearing process – and additional studies on the potential short and long-term effects of this project – have been conducted.

This project should address PFAS chemicals, which are a bi-product of the wastewater treatment process. Will greater dependence on the inland WWTF, mean a wider dispersion of these chemicals throughout the town’s groundwater?

The town of Plymouth continues to experience rapid development, and has shown little interest in reducing the corresponding need for additional water through implementation of comprehensive water conservation measures.

Though no modification of the WWTF itself is anticipated to accomplish the ‘re-prioritization’ sought, increasing the capacity of the WWTF overall will likely result in use of excess capacity, requiring additional infrastructure (pipelines, etc.), and in short order greater water usage. Should the town be required to match any increase in the capacity of the WWTF with a reduction in the amount of water usage per capita?

Consideration of this proposal my MEPA is premature, at best.

Attachments

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Status

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Rel: MEPA EEA No. 16758: EENF Plymouth Wastewater Treatment Plant Expansion

Don Williams <donald_r_williams2003@yahoo.com>

Thu 11/30/2023 6:29 PM

To: Moreno, Nicholas (EEA) <Nicholas.Moreno@mass.gov>

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November 30, 2023

Rebecca Tepper

Secretary of Energy and Environmental Affairs

Commonwealth of Massachusetts

Boston, MA 02108

c/o Nicholas Moreno (nicholas.moreno@mass.gov)

re: MEPA EEA no. 16758 EENF Plymouth Wastewater Treatment Plant Expansion

Dear Rebecca,

I am Don Williams, president, and water quality committee co-chair of the Herring Ponds Watershed Association with a distribution list of 475 households in Plymouth. Great Herring Pond, which is part of our watershed and a State-Designated ACEC, is, at 376 acres, the largest pond in Plymouth. Our watershed association has been the steward of this watershed since 2007.

Many other groups have raised concerns about going forward with the plan to discharge treated water into the Eel River watershed and we are concerned for all watersheds and ACEC's in Massachusetts, especially in Plymouth. Since 2007 we have learned a lot about our aquifer. Its name, Plymouth-Carver Sole Source Aquifer clearly states that if the aquifer is no longer safe for drinking, there is no recourse. Imagine the economic impact of having no drinking water.

The decision to put more (10% of current volume going to 100% of current volume as well as increasing the maximum permitted discharge volume from 2.5 million to 3 million gallons per day) treated wastewater into the aquifer is literally an existential question. It requires more study before implementation, yet no new information has been presented. We owe this to future generations. We would encourage further study prior to implementing the program.

For the Herring Ponds Watershed Association,

Don Williams

President

Water Quality Committee Co-Chair

Herring Pond Wampanoag Tribe, Inc.

Eel River Watershed Association

Jones River Watershed Association

Community Land & Water Coalition

December 1, 2023

Rebecca Tepper
Secretary, Energy and Environmental Affairs
Commonwealth of Massachusetts
Boston MA 02108

c/o MEPA Analyst, Nicholas Moreno, nicholas.moreno@mass.gov

Re: MEPA EEA No. 16758: EENF Plymouth Wastewater Treatment Plant Expansion

Dear Secretary Tepper,

Thank you for the opportunity to comment on MEPA EEA #16758 for the expansion of the Plymouth Wastewater Treatment Facility (WWTF) located in Camelot Park. The Town seeks to divert the 90% of the wastewater currently discharged to Plymouth Harbor to discharge into the Plymouth Carver Sole Source Aquifer by increasing the volume at the WWTF Site to a total of 3 million gallons per day. The Project Site is located in Camelot Park, Plymouth, adjacent to the Eel River, wetlands and brooks (“the Site”). The Site is in the South Coastal Watershed in the Eel River Watershed.

The Town of Plymouth (“Town”) requests a single Environmental Impact Report (EIR) instead of a full Draft EIR followed by a Final EIR. For the reasons stated here, we urge the Secretary to require a full Draft EIR and Final EIR. The Town’s justification for avoiding a full EIR is that a prior EIR for the WWTF in the 1990s, supplemented by the Expanded Environmental Notification Form (EENF) satisfies MEPA. It does not. Further, the alternatives analysis is insufficient. Alternatives proposed in the 1990s EIR have been ignored.

These comments are submitted by the Herring Pond Wampanoag Tribe, Inc. of Patuxet-Plymouth (Tribe), Eel River Watershed Association (ERWA), the Jones River Watershed Association (JRWA), and Community Land & Water Coalition (a project of Save the Pine

Barrens, Inc.) (CLWC). The Tribe and each non-profit community groups has members that live, work and/or recreate in the Plymouth area and who are impacted by the Project. The Project is located on the unceded ancestral lands of the Tribe who used the Eel River system for millenia before first contact with Europeans. The groups' missions' include the protection and stewardship of lands and waters and community members in the Plymouth area. This includes protecting the drinking water in the Sole Source Aquifer. *55 Federal Register 32137*. The Aquifer covers 199 square miles and is the sole drinking water source for about 200,000 people. The Aquifer is designated under the Safe Drinking Water Act, a federal law, due to its sandy soils, high transmissivity, and its vulnerability to contamination. The WWTF and the proposed expansion are in the federally protected Aquifer. The Aquifer is shallow and intercepted by wetlands, streams and ponds that also may be impacted.

The commenters support efforts to reduce sewage and wastewater discharges to Plymouth Harbor. Diverting these waste flows from the Harbor to discharge them into on to land where they infiltrate into the Sole Source Drinking Water Aquifer shared by Plymouth with 7 other Towns requires careful and thorough study and alternatives analysis. The EENF does not provide this.

In addition to addressing the issues here, the Town and subsequent MEPA documents should provide a thorough, non-technical description of the Plymouth wastewater and drinking water supply system and identify which municipal bodies are responsible for each aspect of these municipal services. Such a description should describe:

- The inputs to the WWTF (storm drains, number of industrial, commercial and residential wastewater dischargers) and the contaminants included in the incoming waste;
- The pretreatment program applicable to and being used by the industrial users discharging to the WWTF and where to find this information;
- How the incoming wastewater is treated and to what standards (secondary? tertiary?);
- The water quality of the wastewater discharged after treatment, and how this information is reported to the public and where to find this information; and
- The WWTF practices for the disposal and/or storage of sewage sludge generated by the WWTF.

This Project as currently proposed is another poorly planned, false, short-term solution to the Town's growth problems. A further alternatives analysis is required that includes water conservation and reuse of the wastewater, as described below.

I. MEPA Regulations require a Draft and Full EIR, not a Single EIR

The MEPA Regulations require a full EIR, not merely an EENF and single EIR as the Town requests. See, 301 CMR 11.06(8)(a) through (d). The MEPA regulations, 301 CMR 11.06(8) allows a Single EIR only if four criteria are met. (“When issuing a scope in accordance with 301 CMR 11.06(7), the Secretary shall ordinarily require a final and draft EIR, but may allow a single EIR, provided that the Secretary finds that the expanded ENF requesting a single EIR in accordance with 301 CMR 11.05(8)...meets four criteria in subsections (a) through (d). The EENF meets none of the four criteria.

First, the EENF does not describe and analyze all aspects of the Project, as shown below. 301 CMR 11.06(8)(a). The data used in the EENF and appendices is incomplete and outdated. The Site description and Town’s activities on the Site do not reflect the current conditions on the Site and in the surrounding Watershed. The EENF does not contain a sufficient alternatives analysis. (EENF Section 8). The 1997 EIR that the Town seeks to rely on included the alternative of wastewater reuse as mitigation for the WWTF nitrogen pollution. The EENF does not consider or analyze this alternative. EENF should analyze the alternative of pumping the wastewater to the Pine Hills golf course and using it to water the golf courses, where it could be discharged to the groundwater there. This would offset the Pine Hills Water Management Act Permit and need for additional withdrawals there. This would avoid impacts to sensitive wetlands, rivers and streams around the WWTP site. It would also move the project out of an Environmental Justice neighborhood to an area that bears none of the environmental burdens associated with the industrial and commercial uses in the Town such as the WWTF/sewer plant.

Second, the EENF does not provide a detailed baseline in relation to which potential environmental and public health impacts and mitigation can be measured. 301 CMR 11.06(8)(b). The data used here is also outdated and incomplete. It relies on a 1997 EIR and provides “Snippets” without a description of how those relate to the current proposal. The *Appendix G: Nutrient Management Data Report Operational Monitoring Program Data Report for 2020* does not adequately address topics in the *Eel River Technical Advisory Committee Evaluation* (Appendix F). Appendix G is outdated and recites the Town’s land conservation activities with vague references to sampling results. None of this is in “non-technical language” as required by 301 CMR 11.07(d). For example, the sampling result tables do not state whether or not the results are within permit limits or whether there are exceedances and violations. The Town has not devoted the financial and professional resources necessary to address the potential environmental and health impacts of the WWTF’s ongoing operation. The current “baseline” after about 25 years of the WWTF’s operation needs to be established with more data and analysis before additional wastewater can be discharged to the Sole Source Aquifer.

Third, the EENF does not demonstrate that the planning and design of the Project use all feasible means to avoid potential environmental impacts. 301 CMR 11.06(8)(d). The design and planning is based on the 1990’s EIR for a Site and a municipality that bears no resemblance to the town of 30+ years ago. The Site is being clear-cut and mined for sand and gravel, the land around it has been and is being mined, large commercial and residential developments have covered the area with impervious materials and more large projects are planned for the Eel River Watershed, including more dense development at Pine Hills, and an 800 seat mega-church. The

once forested “County Woodlot” less than 2,000 feet west of the Project, was forested land as of 2015. The Town allowed 30 acres to be mined and it is now a solar facility not the promised cranberry bog. The Town allowed a commercial sand and gravel mining operation to level one of the Town’s highest hills and leave a 10 acre-50 foot deep open pit mine. Both of these were done with no MEPA review or hydrology assessment. The County Woodlot site is being proposed for uses such as a casino or racetrack.

Photo below:

Left: 10-acre open pit mine on the County Woodlot

Right: 30-acre solar facility on open pit mine



The Town has not undertaken the water use reductions analyzed in the 1997 EIR. The Town’s consultant Environmental Partners has issued three water-sewer reports warning that municipal boards should stop approving dense residential developments/apartment/town house complexes because the Town cannot supply sufficient water. The Town’s master plan is ignored and its draft water supply management plan is almost 5 years old.

The Project does not use all feasible means to avoid environmental impacts, which at a minimum would include reducing water use and enforcing the stormwater regulations.

Appendix F, *Eel River Technical Advisory Committee Evaluation*,” is based on outdated data about residential development in the Eel River Watershed. It states, “The MassGIS database was used to calculate the areas of various land uses within the Eel River watershed. Present and future potential house counts were collected from the Town of Plymouth Planning Department. For the Pine Hills Development, the Green Company provided estimates of house counts, recreational areas and other development.” This information must be updated.

An EIR is required under 301 CMR 11.06(7)(d) because the Project is located within a Designated Geographic Area around an Environmental Justice Area. The MEPA Regulations state this clearly,

“The Secretary **shall require** an EIR for any Project that is located within a Designated Geographic Area around an Environmental Justice Population.” 301 CMR 11.06(7)(b).

The Regulations do not authorize the Secretary to waive an EIR for the Project. The EENF does not meet the criteria of 301 CMR 11.06(8)(d) because it does not describe and analyze all aspects of the Project that may affect Environmental Justice Populations located in whole or in part with the Designated Geographic Area around the Project. This includes Air Quality and Odor impacts which were identified in the 1997 EIR, Section 10.2.1.11. It states, “Sensitive receptors may include private residences beyond Route 3 and Jordan Hospital...and private residences along Russell Mill Pond and near Warren Wells Brook to the south.” Since 1997, a correctional facility has been located proximate to the Site with over 1,000 residents. The Town’s Environmental Justice Screening identifies 1,710 people within 356 households within 1 mile and about 4,000 people within 5 miles. (The EENF is not clear about the total number of the EJ Population and where they reside in relation to the Site.)

The EENF does not state whether the EJ communities have private drinking water wells that could be impacted by the pollution discharged to the groundwater at the Site. The EENF goes not provide a detailed baseline as required by 301 CMR 11.06(8)(d). Finally, the Town made no efforts to provide “meaningful opportunities for public involvement by Environmental Justice Populations **prior to filing** the expanded ENF” as was required by 11.06(8)(d). The EENF’s list of “Community Based Groups” are located in the Boston area. Not one of them is known to have any contact with or do any work in Plymouth or the Plymouth area or with the EJ communities identified in the EENF. The EENF does not state that mailings were done to the EJ communities. The Town’s sole Community Based outreach consisted of an Oct. 8, 2023 MEPA on line zoom meeting with the claim that it will be conducting future meetings with no specifics about how people will be contacted, how many meetings will be held, or where they will be held. This is insufficient for MEPA compliance.

II. Comments on the EENF

This Section II is organized to track the Horsley Whitten Group June 2023 “Expanded Environmental Notification Form” Part IV, Project Narrative.

A. Project Narrative, Section 1.0, Introduction

The Town seeks to rely on the EIR done in 1997 - about 27 years ago years ago. The EENF states,

“The relatively recent completion of a full EIR for the original WWTF approval in June 1997 creates a situation where another full EIR submittal would be superfluous to address only the specific requested change of discharge location prioritization, and the previously permit-recognized increase to 3.0 MGD of total average discharge volume, with no other requested changes.”

Since 1997, major environmental conditions have changed that show a “full EIR” is not “superfluous” but absolutely mandatory for many reasons, including,

- Since 1997, Plymouth has experienced rapid extreme, uncontrolled growth and is one of the fastest growing municipalities in the Commonwealth with the one of the highest losses of open space according to the Mass Audubon *Losing Ground* report (2020).
- According to the July, 2023 *Climate risk assessment for Plymouth, Massachusetts* by the Woodwell Climate Research Center in Woods Hole, “**Both sea level rise and heavier rainfall will translate into greater flood depths and extent for Plymouth.**” The **Plymouth’s stormwater system** is also vulnerable. These factors impact the groundwater levels and contamination transport rates and routes at the Site.
- Conditions at the WWTF Site and around it have been altered by major changes in topography from sand and gravel mining and development that changes water flows above and below ground.

The EENF does not adequately describe the damage to the environment as defined by 301 CMR 11.02 and a full EIR is required. The 1997 EIR and MEPA Certificate were for a Project designed to allow degradation of the River from the groundwater discharge of wastewater from the WWTF. Appendix Appendix F, *Eel River Technical Advisory Committee Evaluation of Nutrient Inputs and the Health of the Eel River System, Plymouth, MA*, from the 1990s states,

“The projected increases in nitrogen are very large, more than doubling nitrogen loads system-wide. The relative increases are greatest in the Eastern Branch (2.7 to 5.6 times present), as that part of the Eel River is currently receiving only low watershed loadings from its predominantly undeveloped watershed. To the extent that nitrogen is limiting plant production within the Eel River watershed, these large increases in nitrogen availability will cause increased growth.”

The EENF relies on the inaccurate assumption that the Town is properly regulating industrial, commercial and residential development in a manner that protects the Eel River Watershed and the Sole Source Aquifer. The Town’s municipal permitting bodies allow industrial and commercial development in and adjacent to its Aquifer Protection Districts and in

Zone IIs of well head protection. This includes car dealerships and car washes, sand and gravel mining operations including those that dredge in the Sole Source Aquifer, a largely unregulated concrete asphalt batching facility (T.L. Edwards) and an unknown number of other commercial and industrial facilities. The EENF does not identify the industrial users discharging into the WWTF. Do industrial users such as T.L. Edwards and others discharge to the WWTF? Is there a pretreatment program that includes monitoring, reporting and enforcement for any users discharging to the WWTF. For example, the T.L. Edwards sand and gravel mining and concrete and asphalt batching facility was required by a 1994 municipal permit to have a “fully engineered closed system, involving oil and grit separation and on-site leaching” with monitoring and recordkeeping. The Town has produced no records of compliance at this facility. This raises serious questions about what the Town is allowing to be discharged into the sewer system, the WWTF and/or into the Sole Source Aquifer. This should be explained.

A new manufacturing facility is being planned in the Industrial Park at the site of a 20-acre sand and gravel mine that is excavating in the groundwater. A convention center is being discussed. The Town continues to approve dense residential development such as the Oasis residential project, Colony Place apartments, town houses and hotels, Red Brook, and Pine Hills. Will these projects be discharging to the WWTF?

The Town claims the WWTF will increase recreational use of the Harbor. This is trading one recreational resource for another with no credible analysis of the tradeoff. The WWTF is located in an aquifer area “contributing areas to significant recreational water bodies.” The EENF does not adequately address the recreational use of the Eel River Watershed and just assumes that the Plymouth Harbor recreation is more important than the Eel River Watershed recreation. The EENF contains generalized statements like, “This project’s goal of improving the water quality of Plymouth Harbor aligns with the plan’s strategy of encouraging health lifestyles and protecting the region’s coastlines, beaches and water resources.” This is inconsistent because the water enters the Bay anyway, only at a different location. It ignores that fact that moving the discharge from the Harbor where people recreate and grow food to discharging it to the Sole Source Drinking Water supply for 200,000 people is a delicate balance requiring robust and thorough study to ensure the tradeoffs are made based on full and complete information.

Dilution is not the solution to pollution. The EENF Project Narrative, Section 1.0 page 3 states that “key contaminants of concern (pathogens, phosphorous, and nitrogen)” will all get additional treatment from groundwater discharge vs. direct discharge to the Harbor. While this may be true, there is no description in the EENF of what is going in to the WWTF and what is coming out. The EENF does not identify the before and after contaminant levels in the WWTF effluent. What are the concentrations of pathogens, and what types and concentrations of pathogens, pharmaceuticals, PFAS, endocrine disrupting chemicals, etc. will be discharged to the Sole Source Drinking Water Aquifer at the WWTF? What levels of metals such as manganese are present? (Manganese is not regulated in drinking water and data on water temporally and spatially sparse. <https://www.nature.com/articles/s41370-023-00563-9>) Shallow aquifers are vulnerable to contamination by manganese.) Manganese while naturally occurring can result from human activities such as mining, industrial discharges and landfill leaching. Will the water discharged from the WWTF to the Sole Source Aquifer meet updated recommendations for this

contaminant in drinking water? While this information may all be contained in the WWTF testing reports, it is not described in the EENF. This should be described in non-technical language in a full EIR so that the public can be adequately informed.

The DEIR must contain a complete and non-technical description of the meaning of and results of the FDA Plymouth Harbor Dye Tracer Study of 2018 and letter of January 31, 2020, Appendix I to the EENF and Section 3.3.4. This study appears to raise significant concerns about the fecal coliforms entering the Plymouth sewer system and whether or not they are being adequately treated at the WWTF before being discharged to the Bay. Discharging these contaminants to the Plymouth Carver Sole Source Aquifer also raises significant concerns and alarm.

The EENF Form, page 7(E) states the Site is subject to a “conservation restriction, preservation restriction, agricultural preservation restriction or watershed preservation restriction”. This appears to be inaccurate. There is no known restriction on the Site and in fact it is being used for sand and gravel mining and dumping of waste. The EENF Form Attachment C **does not** show the Site as labeled “Protected and Recreational OpenSpace”. If it is preserved or protected land why is the town conducting sand and gravel mining on it and clear-cutting forests, and dumping piles of waste from cleaning storm drains?

B. Project Narrative, Section 2.0, Anticipated MEPA Permitting Process

The Project Narrative, Section 2.0 states that the WWTF as proposed “will allow for connection to the WWTF of existing and future developed parcels that are currently, or would in the future under current permitting and infrastructure, served by on-site septic systems, which were never designed to reduce nitrogen.” This ignores the fact that there are currently available, affordable, on-site “IA” septic systems that can address nutrient pollution. See, Herring Ponds Watershed Association, September 20, 2023 informational session here: <https://www.theherringpondswatershed.org/news-events/> The Town of Plymouth just refuses to require them for new construction or for replacements. This points out a failure in the alternatives and mitigation analysis in the EENF.

The Project proposes to use the WWTF additional capacity for increased future growth in the Town. Section 2.0, page 5. This is segmenting the project from the proposed growth and development. The EENF should include growth projects and describe exactly how many proposed tie-ins are in the master plan. What are the growth projections and how many new users will be tying in?

The EENF states, “The Town of Plymouth is in the process of updating its Comprehensive Wastewater Management Plan. Once complete, if the currently proposed project is approved, **it is the intent of the Town to file a Notice of Project Change to MEPA.** Thus, the Town states it plans to file a Notice of Project Change with MEPA to include the Comprehensive Wastewater Management Plan that is in development. The current EENF is putting the cart before the horse. This wastewater management plan should be complete before the EENF is approved, and the EIR should incorporate the Plan. The Town is improperly segmenting the Project from the comprehensive wastewater management plan and thwarting the

purposes of MEPA. This violates MEPA’s anti-segmentation provision, 301 CMR 1.01.c. which states,

“the Secretary **shall consider the entirety of the Project**, including any likely future Expansion, and not separate phases or segments thereof. The Proponent may not phase or segment a Project to evade, defer or curtail MEPA review. The Proponent, any Participating Agency, and the Secretary shall consider all circumstances as to whether various work or activities constitute one Project including, but not limited to, whether the work or activities, taken together, comprise a common plan or independent undertakings, regardless of whether there is more than one Proponent; **any time interval between the work or activities**; and whether the environmental impacts caused by the work or activities are separable or cumulative.

The Town has stated plans to tie future developments into the WWTF. The Town should be required to incorporate this into the entirety of the WWTF Project.

C. Project Narrative, Section 3, Existing Conditions and Background

The EENF does not accurately describe the existing or future Site conditions.

1. Land Use Changes on the Site

There are inaccuracies and omissions in Section 3. First, it ignores significant, ongoing land use alterations on the Site since the 1997 EIR and does not describe the Town’s plans for future uses of the Site. The EENF Form, Land, states that the total Site acreage is 95.79 acres with “other altered areas at 33.04” and “undeveloped areas” are 54.40 acres. The “undeveloped” acreage is actually closer to 44 acres according to MassMapper GIS. Thus, the description of the Site appears to be inaccurate.

Second, Section 3 ignores the land use changes on the Site from 1997 to present, that are ongoing. The Town is using and expanding a sand and gravel mine, extracting sand and gravel for unknown purposes. There is no earth removal or mining permit, and the Town does not account for the volume of earth it has removed from the Site since acquiring it by eminent domain in the 1990s. In February 2022, CLWC sent the Town zoning enforcement official a Request for Enforcement of the zoning bylaw on earth removal with a request that the Town cease and desist removing sand and gravel from the WWTF Site. The Town did not take enforcement action. The activity is clearly visible on Google Earth. This is Construction Sand and Gravel Processing as defined by the federal Clean Water Act, Section 11.19.1. The Site use falls under Sector J. Mineral Mining and Dressing, Subsector J1, SIC Code 1442. and requires an individual NPDES permit. The Town has no such permits. Section 3 appears to be based on the assumption that the Town is stewarding the 97-acre Site in a manner that protects the Eel River, groundwater and the Sole Source Aquifer. Instead, the Town is actively clearing forested lands, levelling hills, and conducting commercial sand and gravel mining on the 97-acre Site, with no environmental impact study and no accountability.

Recently the Town has allowed land clearing on the WWTF Site for the installation of a cell tower. Is the Town planning to continue the deforestation and sand and gravel mining of the remaining acres until the Site is entirely leveled and brought down to the grade of the WWTF? Is this use of the Site consistent with the protection of the Eel River and the Plymouth Carver Sole Source Aquifer to which the Town now seeks to discharge 3 million gallons a day of residential, commercial and industrial waste?

The Project Narrative states that the Site has a forested buffer between the WWTF and abutting residences. It states the nearest home is 1,600 feet away, “buffered by woodland. Section 3.0. Does the Town plan to remove this wooded buffer by the expansion of its sand and gravel mining? Does the Town plan to keep clearing the forest and mining the Site so that the forested buffer is eliminated?

It is basic, established science that deforestation and sand and gravel mining reduces pollutant attenuation capacity by removing the natural filtration provided by the forests, sand and gravel. The Project Narrative describes the Site’s sand soils and hence the vulnerability to contamination and the ability of pollution to travel easily through sand and the Aquifer. Yet, the Town plans to discharge more pollution to the Aquifer with no analysis of the current hydrology and impacts to surface and subsurface water flows resulting from land use changes, eliminating hills, and changing the topography.

The Town’s sand and gravel mining on the Site is leveling hills and thereby altering water flows above and below ground and removing the filtration protection for the Eel River. This is a part of the Town’s use of the Site must be studied in an EIR. The Town’s use of the Site for sand and gravel mining and the damage to the environment was not addressed in the 1997 MEPA certificate or EIR. It must be addressed now.

Finally, the Town is using the Site to store clean out debris from Town catch basins. For over a year, there have been two mountains of clean out debris on the Site, near wetlands. In addition, the Town is composting sewage in the area, according to reports.

2. Land use changes in the Eel River Watershed around the Site

The Town allows sand and gravel mining operations throughout the Eel River Watershed with no credible environmental impact reports, no groundwater monitoring and no evidence that these commercial mining operations comply with EPA Clean Water Act standards for Sector J. Mineral Mining and Dressing, Subsector J1, SIC Code 1442 or the Massachusetts Clean Waters Act.

The Community Land & Water Coalition report *Sand Wars in Cranberry Country* documents the historic and active sand and gravel mining operations in the Eel River Watershed including several immediately adjacent to and within a few miles of the Project Site. None of these operations were covered by a MEPA review. The interactive map on the Sand Wars site shows details on each site surrounding the WWTF. See, www.sandwarssoutheasternma.org

The commercial sand and gravel operations include:

- Abutting the Site: Kingstown Trucking a massive mining operation under the ruse of cranberry agriculture that is now an industrial solar facility. Abutting that is the County Commissioners-Kingstown Trucking mining operation on the County Woodlot that leveled one of the Town's highest hills and created a large hole in the ground. The County has proposed a racetrack-casino and other commercial uses are being considered. A portion of the County Woodlot is used by the County for industrial purposes. See more on www.savethecountywoodlot.org

Within about a mile:

- Sand and gravel mining at the location that is now the Oasis residential apartment
- Sand and gravel mining by Sheava Development at the Site of the proposed New Hope Church, a megachurch with about 400 parking spaces and 800 seats.

D. Project Narrative, Section 4, Project Description

Section 4 does not adequately describe the Project. The summary states,

“The Town is requesting to change the primary discharge point of treated effluent from the WWTF from the harbor outfall to the existing on site, open sand disposal beds. The Town is also requesting that the total, average annual discharge volume from the WWTF be increased from the current 2.5 MGD to 3.0 MGD. This requested volume increase was foreseen in the EIR certificate (1997) for the WWTF with an allowance for this potential increase pending MassDEP approval. The Town requests approval to discharge up to 3.0 MGD average of treated effluent at be discharged the WWTF disposal beds. The Town also requests that the currently approved discharge of and up to 1.75 MGD to the harbor outfall be maintained for use at the Town's discretion as circumstances warrant (as allowed by the NPDES permit). The harbor outfall would be retained as a backup for times when the beds may be receiving maintenance, other operational considerations, or in case of unforeseen emergency conditions. This proposal is based on a previously foreseen increase in authorized disposal volume and a change of priority discharge location.”

This Section is vague and not supported by evidence or data. It makes sweeping conclusions about how the Project will “realize multiple environmental benefits” without sufficient data or analysis of alternatives. It relies primarily on Appendix H: Linked Watershed-Embayment Model to Determine the Critical Nitrogen Loading Threshold for the Plymouth Harbor, Kingston Bay, and Duxbury Bay Estuarine System, a draft report dated 2017. Most of the data in the Appendix H report is over 10 years old. Therefore, it does not reflect current conditions including the impact of climate change on water temperatures which impacts pollution levels. The USDA's recent report shows that ambient temperatures in Massachusetts have increased over the last 10 years.

The Plymouth Harbor Water Quality section does not give information about water quality other than referring to the Dye Tracer Study, Section 4.1. This was a one time study. There appear to be other sources of pathogens discharging into the Harbor but the EENF does not explain any comprehensive plan by the Town to address all of the sources. Is the Project just a short term fix?

Plymouth Harbor Water Quality, SubSection 4.1.2 acknowledges that a primary source of nitrogen to the Bay is fertilizers and changes in freshwater hydrology associated with development. Page 13. Plymouth continues to allow rapid deforestation and stripping of land down to bare sand for residential, commercial and industrial development. It allows massive sand and gravel mining operations such as the ongoing operation at 10 Collins Avenue in Plymouth. Municipal bodies and the Planning Department allow variances that override the Aquifer Protection Zoning Bylaw, vegetated buffers around projects, and the Town allows developers to ignore the Natural Features Conservation Bylaw. The Town should be required in an EIR to review the manner and means of the development that is resulting in the changes in freshwater hydrology associated with development and to commit to mitigation measures for this damage to the environment.

Section 4.1.2 admits that the nitrogen reduction calculation of 2.3% is based on a “simplistic” analysis. It anticipates ‘further evaluation of nitrogen offsets’ from the Project. These must be studied in a full draft EIR, not in a single EIR as proposed.

The EENF does not give a non-technical description for the public about how the Town’s WWTF works, what stormwater and sewage is discharged to the WWTF and how it is discharged to the Harbor and groundwater. It does not explain the role of stormwater collection or document how much stormwater goes into the WWTF and how much goes in to the Harbor directly, both before and after the Project.

The Nutrient Management Plan relied on by the EENF was by its nature, limited to only nitrogen and phosphorous. Since that time, additional contaminants in wastewater have become a concern. This includes pharmaceuticals. The Town’s sewer system receives wastewater from a greatly expanded hospital, now Beth Israel Deaconess Hospital. Beth Israel Deaconess Hospital is the largest hospital in the Southern region of the South Shore. BID-Plymouth is an acute care, 164-bed, non-profit community hospital serving 12 towns in Plymouth and Barnstable counties. There is no description in the EENF of the types of contaminants discharged to the WWTF, how they are treated before being discharged to the Harbor, and why there are issues that led to the FDA Letter of 2020 and directive to expand the prohibition zone for shellfishing in the Harbor. This should all be explained to the public and the Environmental Justice Communities.

In October 2023, water quality testing in the Eel River adjacent to the Project Site revealed the presence of insulin and E Coli. The source of these contaminants have not been publicly reported as of this date. This should be addressed in a full EIR.

The issue of PFAS is not addressed. The Town should explain how PFAS is being treated, if at all, at the WWTF and what levels of PFAS are being discharged to the Aquifer and the Harbor now and what is proposed. It is undisputed that PFAS are found in wastewater.

“Poly- and perfluoroalkyl substances (PFAS) are ubiquitous in municipal wastewater and biosolids. Major point sources include PFAS-producing or -using industrial sites, such as papermaking, textile mills, and electroplating. However, PFAS have been detected in wastewater even without direct industrial sources, such as in septic tanks and office buildings. **Similarly, PFAS have been detected in the biosolids of small municipal wastewater treatment plants (WWTPs) without known direct industrial sources.** (PFAS detected in wastewater and biosolids include not only the two most studied PFAS, perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA), but also short-chain PFAS and polyfluorinated compounds. It is suspected that PFAS in non-industrial wastewater may occur in part due to environmental degradation of polyfluorinated microfibers released by water-resistant clothing during laundry. Another plausible non-industrial source of PFAS in municipal wastewater is human excretion after oral exposure. Often, a portion of the PFAS in wastewater effluent can be ascribed to PFAS in the community’s tap water.” Poly- and Perfluoroalkyl Substances in Municipal Wastewater Treatment Plants in the United States: Seasonal Patterns and Meta-Analysis of Long-Term Trends and Average Concentrations Kyle A. Thompson **et al.** <https://pubs.acs.org/doi/10.1021/acsestwater.1c00377>, American Chemical Society

E. Project Narrative, Section 5, Permits

Additional permits may be necessary under the Wetlands Protection Act and Bylaw if the WWTF operators, the DPW, plans to continue to dump storm drain cleanout near the Eel River.

The Massachusetts Historical Commission should be consulted since the 30 year old consultation is outdated. The Wampanoag people have sovereign rights to fish and use the Eel River and those rights may be impacted by the Project. According to the EENF, Appendix F, *Eel River Technical Advisory Committee Evaluation of Nutrient Inputs and the Health of the Eel River System, Plymouth, MA*, Section 1.5, Land Use History, states,

“Proper ecological management of any complex system, like the Eel River, is best undertaken within the context of both present and past ecological conditions. Most of the coastal regions of Massachusetts have undergone changes resulting to both natural processes (storms, sea-level rise, etc.) and human activities (dams, dikes, filling of wetlands, etc.). What follows is a brief description of some of the changes which have helped to protect and structure the Eel River System, creating the environment which exists today.

Human modifications to the Eel River System have been occurring for hundreds of years. **Wampanoag Indians made the river valley their home availing themselves of the abundant fish, shellfish and game in the area.”** (Emphasis supplied)

A thorough, meaningful opportunity for the Wampanoag people to participate in the MEPA process for this Project is critical. This means funding to retain experts and legal assistance to support efforts at reviewing MEPA documents and the water management act permit and other regulatory filings. The state and town should supply grant funding to support the role of Indigenous people in this project. There should be an entirely new MHC archeological

survey undertaken and this should include impacts of the Town's sand and gravel mining on the Site on in the Eel River System.

The Town should explain any obligations under the federal Safe Drinking Water Act regarding its proposal to discharge wastewater to the aquifer.

There should be a full biological survey. The EENF states there are no MESA protected species, but the 1990's studies showed the presence of the Bridle Shiner, a special concern species.

The River Herring is now listed as protected under the Federal Endangered Species and the EENF states river herring are in the Eel River. In addition, the American Eel has been present in the Eel River. This is an at-risk species that should be studied. Eels live in and thrive in sediment. Will they be exposed to contaminants from the WWTF that may reach nearby wetlands, streams, and rivers that are eel habitat?

According to the EENF, Appendix F, *Eel River Technical Advisory Committee Evaluation of Nutrient Inputs and the Health of the Eel River System, Plymouth, MA*, biomonitoring was implemented in the Eel River System, that identified the bridle shiner. The Town should devote additional resources to a more robust and transparent monitoring systems than is in the Nutrient Management Plan.

The WWTF Pretreatment Program required under its Clean Water Act NPDES permit should be fully described in a full EIR. All records of the sewer users discharging to the WWTF who are governed by the Pretreatment Program and discharge limits should be identified. The Town should be required to provide historic and current data of its enforcement of the WWTF pretreatment standards.

The Town's Stormwater Management Program – MS4 Permit should be described and outlined in a manner that the public can understand. The Town should be required to document that it is complying with the MS4 Permit and provide all up to date records of enforcement of the Stormwater Management Standards.

F. Project Narrative, Section 6, Potential Hydraulic Impacts

The hydraulic impact assessment is insufficient. Section 6.1.5 concludes that a loading test and modeling “**suggest** that the hydrogeologic setting underlying and surrounding the WWTF has the capacity to accept the groundwater discharge of at least 3.0 MGD of treated effluent.” Page 33. A “suggestion” that an increase in groundwater discharge at this location will not negatively impact surrounding ecosystems, homes, and businesses is not a sufficient study. As a result, the EENF does not adequately “address all aspects of the Project that are likely, directly or indirectly, to cause Damage to the Environment.” 301 CMR 11.06(7).

6.1.1 Groundwater mounding.

The EENF hydraulic modeling is based on a 40-day loading test conducted in 2018. Page 21. “The loading test consisted of the discharge of treated effluent to Bed #4 and concurrent

monitoring of water table response in the wells surrounding the WWTF.” Page 24. The flow averaged 1.62 MGD, about half of what is proposed to be added – 3.0 MGD. Then, Horsely Whitten Group used the “observed water level responses from the loading test” to run a groundwater model for a steady state discharge of 3.0 MGD. Section 6.1.4. There appear to be several serious flaws in this model which suggests that the model inputs were insufficient leading to an inaccurate model.

First, the load test was conducted during a dry part of the year, from August 20 to September 28, 2018. Using groundwater response for a low flow, low groundwater elevation period does not give accurate data about year-round variations and how the groundwater and river and pond baseflows fluctuate. Second, the load test was done 5 years ago. Since 2018, there has been additional deforestation and sand mining on the Project Site (see above) and around the Site. More impervious surface has been added.

Third, the Town’s informal Board of Health septic systems records review is only a partial view and not a scientifically credible method for determining “potential impacts to the low elevation parcels.” Section 6.1.6. This ignores the stormwater runoff and detention basins in the large commercial developments surrounding the Site. How will they be impacted? Similarly, the “on-the-ground survey of low properties” is unscientific and inadequate. Section 6.1.7 states that in the future, as a condition of the groundwater discharge permit, “the Town would be willing to work with any documented property owners impacted by changing groundwater levels” resulting from the Project. This is not “mitigation” under MEPA. Is the Town really suggesting that it is going to respond to flooding in a homeowner’s basement by altering the flows to the WWTF? Or what will be the mitigation for the homeowner? This is not an acceptable way to deal with this.

Fourth, the EENF relies on the past 20 years of WWTF operations to claim that since “no impacts have been reported to the Town” from groundwater mounding, this is no problem. This is not credible, is based on the memory, apparently, of DPW officials and town workers, and is random and unscientific. Further, the past 20 years of discharge is a fraction of what is proposed by the Project. Therefore, it is completely irrelevant to future impacts. The conclusion on page 36 is unsupported.

Fifth, the Section 6.2 conclusion of “Potential Flow Impacts to Eel River Infrastructure” is also insufficient. It uses the apparently flawed groundwater model described in Part 6.1, that was based on 40 days of testing during the dry season five years ago, to make the conclusion that there will be “no significant hydraulic impacts” at the “two most likely locations for any such potential impact (Russell Mill Pond and Hayden Pond dams)...” Page 46.

Sixth, the hydraulic modeling is at odds with climate change predictions for Plymouth. It does not appear to take into account or document the impacts of flooding on groundwater mounding. This is impossible to tell from the description of the groundwater model given in the EENF. The EENF used the EEA “RMAT Climate Resilience Design Standards Tool Project Report” created in December 2021. The Project received a “moderate exposure” for urban flooding, and a “high exposure” for riverine flooding. (And a “high exposure” for Extreme Heat, which is not taken into account in the biological ecological evaluations of the Project as

described elsewhere in these comments.) Many of the inputs to this model are questionable. The Project Narrative, 3.2.1 states the project is located in a FEMA Zone X-Area of Minimal Flood Hazard (eff. 7/6/2021)

The EENF contains the following conflicting statements about flooding in the section **Climate Mitigation and Resiliency**

- “The existing WWTF is not located in an existing flood prone area and is not anticipated to be at increased flood risk under any potential SLR scenarios.”
- “The project does not involve any new construction and therefore the climate parameters analyzed in the RMAAT Climate Resilience Design Standards Tool do not apply.”
- “This project is contributing to the Climate-Ready Healthy Plymouth Report (June 2020) by reducing energy usage through eliminating the need for pumping effluent to the harbor and increasing groundwater recharge through on-site infiltration.”

The Woodwell Climate Research Center’s climate risk assessment for Plymouth contradicts the EENF finding that there is no flood risk. <https://www.woodwellclimate.org/climate-risk-assessment-plymouth-massachusetts/> This is relevant to the groundwater hydraulic model in the EENF. The Woodwell report highlights “The Grove” commercial development near the WWTF as particularly at risk. Grove at Plymouth Shopping Mall: <https://www.grovetplymouth.com/>

The Woodwell report concludes that the FEMA maps for Plymouth should not be used because they do not accurately show flood prone areas. The Woodwell Center report for Plymouth states in its summary (Emphasis supplied):

“As a result of climate change, **flood risk is projected to increase for Plymouth.** The probability of the historical 100-year rainfall event, a useful indicator of flood risk, is expected to quadruple by mid-century and be ten times more likely by the end of the century. Sea levels are also projected to rise throughout this century with an increase of 1.31 feet (0.4 meters) by 2050 and 2.66 feet (0.81 meters) by 2080. **Both sea level rise and heavier rainfall will translate into greater flood depths and extent for Plymouth.** **The vulnerability of Plymouth’s stormwater system** was also evaluated under the present and future 100-year rainfall event. Here we present our findings on extreme precipitation and flooding to help Plymouth in its plans to create a more resilient future for all residents.

Flooding: Some of the flood studies that make up parts of Plymouth’s FEMA flood map are over 30 years old which use estimates of streamflow based on drainage area and nearby stream gauges and elevation data from that time which has likely changed significantly since then. Finally, FEMA shows no flood risk in areas disconnected from rivers, also known as pluvial flooding, while Woodwell demonstrates extensive inland areas are vulnerable to flooding. This is because FEMA does not account for pluvial flooding.

Plymouth's stormwater system has several hot-spots of vulnerability to the 100-year rainfall event. We identified several hotspots of stormwater flooding throughout Plymouth. Taylor Avenue in White Horse Beach, **The Grove at Plymouth shopping mall**, the Plymouth harbor area, and the Cordage Park area in North Plymouth all show a high concentration of flooded manholes and catch basins....”

Seventh, the hydraulic model does not address stormwater impacts. The EENF does not address the Town's stormwater management. The MADEP Stormwater Standards and Stormwater Handbook provide guidance and criteria to ensure that the hydrologic budget of associated wetlands is maintained and protected. Wetlands are dependent upon both surface water and groundwater inputs and are sensitive to hydrologic shifts and alterations (they can be impacted by both increases and decreases of water levels and flow). They are impacted by both short-term runoff events and longer-term groundwater changes in recharge rates that alter baseflow. Recharge is the process of precipitation infiltrating into the ground and replenishing the underlying groundwater. MADEP Stormwater Standard 3 requires that annual groundwater recharge rates be maintained and preserved.

MADEP Stormwater Standard 3 is designed to maintain the hydrologic balance in wetlands. It requires that post- development recharge is maintained at existing pre-development recharge. MADEP Stormwater Handbook, Volume 2, Chapter 1 provides guidance and clarification regarding this requirement to maintain natural hydrology. Page 6 of this document states, ***“Standard 3 of the Stormwater Management Standards requires that proponents preserve infiltration at predevelopment levels in order to maintain base flow and groundwater recharge”***. Recharge provides baseflow to wetlands and contributes to their hydroperiod (the natural cycle of water levels through the seasons). Changes to this hydrologic balance of recharge areas to a wetland constitute “alterations” to the wetland. There should be a full EIR to determine whether the Site's land alterations and increased base flow will result in significant alterations to these recharge rates and to the hydrologic regime of the wetland.

MADEP Stormwater Manual, Volume 3, Chapter 1, page 17 provides guidance on how to evaluate impacts on wetlands associated with proposed infiltration/recharge facilities designed in accordance with Stormwater Standard 3. It states, ***“Evaluate Where Recharge Is Directed: The infiltration BMP must be evaluated to determine if the proposed recharge location will alter a Wetland Resource Area by causing changes to the hydrologic regime.”***

G. Project Narrative, Section 8.0, Alternatives Analysis

The Alternatives Analysis in Section 8.0 is insufficient. The Secretary should require a draft EIR that contains a description and analysis of all feasible alternatives that is thorough and complete. 301 CMR 11.07. The two key flaws in the alternatives analysis are:

1. Failure to consider use of reclaimed water, and

2. Failure and to consider reducing water usage through conservation and efficiency, thus reducing the volume of discharge to the groundwater (see also comments on Nutrient Management Plan, below).

The 1997 MEPA process for the Project evaluated reclaimed water reuse as a means to reduce nutrient loading impacts to the Eel River Watershed from groundwater disposal of treated effluent at the WWTF. It also addressed reducing water usage. Appendix G, p. 16. The EENF ignores both these alternatives. Apparently, at some point after the MEPA Certificate was issued in the 1990s, the Town did not follow through on these two alternatives/mitigation measures.

The Appendix G to the Horsley Whitten Group report, the *Nutrient Management Plan* (NMP) for the WWTF states that due to funding problems, the Town did not pursue reclaimed water use. The NMP states, “the Town is willing to work with potential developers/partnerships to accomplish this goal.” Appendix G, page 16-17. The Secretary should require the Town to study this alternative in a full EIR.

The Town should also be required to pursue the 1997 EIR alternative of reducing water usage. The Town Water Study Committee has identified options for reducing water usage by 3 million gallons per day. Town leadership has not followed through on this 2022 recommendation. The Secretary should require the Town to conduct a study of water use reduction and to explain why it has not implemented the recommendations of the Town Water Study Committee. The Town should be required to allocate funding to implement the recommendations and all developments and new developments should be required to comply.

The Alternatives Analysis assumptions about the impacts of increasing the base flow of the Eel River is a gross generalization. See, Section 8.0(A) “And the anticipated augmented river flows would actually be beneficial for providing enhanced baseflow to the river under drought and low flow conditions to support fish passage, habitat and recreation.” Page 65-66. Additional study is needed to determine how the additional flow, in light of climate change impacts from flooding, combined with the rapid development, creation of impervious surfaces and sand and gravel mining around the Site has actually impacted the baseflow of the river, and how additional flow will impact wetlands. This could result in an alteration of wetlands, requiring an Order of Conditions. The clear-cutting of trees has significantly reduced evapotranspiration (ET) rates which increases groundwater recharge rates, changes groundwater flow directions, and ultimately alters the hydrologic regime of the wetlands (including downstream headwater streams).

III. Mitigation

What the EENF describes as past “mitigation measures” from the 1997 EIR are not in fact “mitigation” of any substantial nature. The Nutrient Management Plan (NMP) is simply a monitoring program (Appendix G). The Eel River Monitoring Program is just that-monitoring, and the GWDP (DEP Permit) requires monitoring of the WWTF effluent and proximal

groundwater wells. This is not mitigation, it is monitoring the impacts of the pollution and operation of the WWTF.

The Town relies on the most recent Nutrient Management Plan (NMP) report from the Plymouth Department of Marine and Environmental Affairs to show “mitigation” of the increased discharge of up to 3.0 MGD. The NMP is from 2020 and based on the 1997 MEPA Certificate. As noted, the Town has not followed through on the “Use of Reclaimed Water. Appendix G, page 11.

In addition, the Town has not gotten a “Plymouth Harbor Watershed By-law” in place as required by the 1990s MEPA mitigation. The NMP states,

“A draft by-law was created by the Division and an article reserved for 2007 Town Meeting. However, preliminary discussions with DEP indicated it would be beneficial to implement the by-law following the release of the TMDL model. The model will specify which areas and what projects would most benefit the reduction in nutrients. Once the Plymouth Harbor Embayment Study is complete the Town will review the best options for the implementation of the watershed by-law.” (Page 15 of NMP).

According to the NMP, this has not been done. This is another aspect of past mitigation that the Town has not completed.

The 1997 mitigation relies on the Town keeping 3-acre rural residential zoning in order to protect groundwater quality. While the Town has maintained the 3-acre lot size for rural residential development, it has allowed ever increasingly dense residential development throughout the Town. This includes thousands of new apartments and “cluster developments” including at the Makepeace Red Brook project, and within the Eel River Watershed at Summers Reach, Oasis/The Grove, and Pine Hills. The mitigation purports to rely on local zoning and the wetlands bylaw as measures of protection for the groundwater and the environment. In fact, the Conservation Commission routinely fails to enforce the Wetlands Protection Act. The NMP states the Commission “has increased “the no-touch buffer zone from 25ft to 35ft in the Town’s Wetlands Protection Act Bylaw”. While this may be true, it is meaningless because the Conservation Commission routinely grants variances from the “no touch” zone limits. (Examples of violations and illegal variances available on request.) The NMP itself describes some wetlands violations in the Watershed, and the failure of the Town to require mitigation or correction of the violations. Appendix G, page 25. This is a pervasive longstanding issue in Plymouth and many wetlands are being illegal altered as a result.

The NMP states the Town secured “a substantial amount of open space” to prevent future nutrient loading into the watershed” the area in the Watershed has also been clear-cut and covered with hundreds of acres of impervious surfaces. Examples of improperly designed stormwater systems that are not adequately maintained abound. This includes the situation at “The Grove” a nearby mall. For every acre of open space saved, there is an equal or greater area that has been developed. Whether the protection of open space has offset the development in the Watershed should be addressed in the EIR.

The NMP is 3 years old and current data should be provided.

The EENF is incomplete because it does not provide the public with a full explanation of the history of the MEPA process for the WWTF, providing only “Snippets” and does not explain what the WWTF is, what it does, and how it serves the municipal needs of the Town. A full DEIR should:

- Include the 1990s MEPA Certificate
- Explain the Town bodies responsible for overseeing and operating the WWTF
- Describe what the WWTF does, how it operates, what water quality testing is done before and after pretreatment of the wastewater,
- Provide a copy of the Town’s pretreatment program under the NPDES permit and describe what will be done with the switch to discharging 3.0 MGD to the Aquifer

IV. Inadequate Public Outreach and Request for Site visit

The “Community Based Organizations” given notice from a list provided by the MEPA Environmental Justice Office (Cover Letter page 3), are not located in Plymouth or even Plymouth County. The EENF’s list of “Community Based Groups” are located in the Boston area. Not one of them is known to have any contact with or do any work in Plymouth or the Plymouth area or with the EJ communities identified in the EENF. The Town failed to provide local groups such as Southeastern Massachusetts Pine Barrens Alliance, Community Land & Water Coalition, Sustainable Plymouth, and other local groups working on water quality and community well being in the Town.

The EENF does not identify all private well users who may be impacted. It does not identify whether EJ community members use private wells.

The Secretary should schedule a site visit and public consultation session under 301 CMR 11.06(2). “The Secretary shall ordinarily schedule with the Proponent a site visit and public consultation session to review the Project and discuss its alternatives, its potential environmental impacts and mitigation measures. The Proponent shall be required to provide accompanied public access to the Project site during the site visit and public consultation session, unless such access is infeasible for public safety reasons or protection of proprietary information.”

V. Conclusion

The goal of ending the discharge of sewage and wastewater to Plymouth Harbor is a laudable one. It requires a full draft EIR and final EIR that reflects current conditions, including the impacts of climate change and the rapidly heating planet. This is a complex decision with long term irreversible impacts and the public should have the opportunity for full engagement.

Thank you for the opportunity to comment.

Very truly yours,

Melissa Ferretti, President and Chair, Herring Pond Wampanoag
Tribe, Inc.

melissa@herringpondtribe.org

Mettie Whipple, Executive Director, Eel River Watershed Association

mettiesartbags@gmail.com

Pine duBois, Executive Director, Jones River Watershed Association

pine@jonesriver.org

Meg Sheehan, Coordinator, Community Land & Water Coalition

meg@communitylandandwater.org

DRAFT



The Commonwealth of Massachusetts Division of Marine Fisheries

(617) 626-1520 | www.mass.gov/marinefisheries



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Lt. Governor

REBECCA L. TEPPER
Secretary

THOMAS K. O'SHEA
Commissioner

DANIEL J. MCKIERNAN
Director

December 12, 2023

Secretary Rebecca L. Tepper
Executive Office of Energy and Environmental Affairs (EEA)
MEPA Office: Nicholas Moreno, EEA No. 16758
100 Cambridge Street, Suite 900
Boston, MA 02114

Dear Secretary Tepper,

The Division of Marine Fisheries (MA DMF) has reviewed the Expanded Environmental Notification Form (EENF) for the proposed Camelot Drive Wastewater Treatment Facility (WWTF) improvement project submitted on behalf of the Town of Plymouth. The Town is proposing to increase the authorized volume of treated effluent by the Town's current Groundwater Discharge Permit (GWDP) with MassDEP that may be infiltrated at the WWTF groundwater disposal beds. Currently, the GWDP calls for the first 1.75 million gallons per day (MGD) to be discharged to Plymouth Harbor through the Town's ocean outfall, with only flows more than 1.75 MGD authorized to be discharged to disposal beds, up to a limit of 0.75 MGD. The total average annual discharge allowed by the GWDP is 2.5 MGD, and the GWDP discusses the potential for an increase of total average annual discharge to 3.0 MGD, pending MassDEP approval. The Town is seeking to increase the total average annual discharge up to 3.0 MGD and to reverse the prioritization of disposal locations such that the primary disposal location will be groundwater discharge at the WWTF disposal beds, and the secondary location will become disposal through the harbor outfall. This would improve water quality in the Harbor to support recreational and commercial shellfishing, aquaculture, eelgrass, and recreation interests. Existing marine fisheries resources and habitat and potential project impacts to those resources are outlined below.

The WWTF is approximately 1.3 miles from Plymouth Harbor, 1 mile from Eel River, and 0.75 miles from Russel Mill Pond. Groundwater flow from the WWTF generally flows towards Russell Mill Pond and the Eel River. The Eel River provides diadromous fish passage and habitat for river herring (*Alosa spp.*), Atlantic tomcod (*Microgadus tomcod*), rainbow smelt (*Osmerus mordax*), white perch (*Morone americana*), and American eels (*Anguilla rostrata*) [1]. The Eel River provides spawning and nursery habitat for rainbow smelt and Russel Mill Pond provides spawning and nursery habitat for river herring.

MA DMF offers the following comments for your consideration:

- The project includes a monitoring plan to track the progress of phosphorous dispersion through the aquifer to implement mitigation measures before significant phosphorous loading impacts the river. We recommend that the WWTF expand the monitoring to include measuring nitrogen dispersal and concentrations as well.

Questions regarding this review may be directed to Kate Frew in our Gloucester office at Kate.Frew@mass.gov.

Sincerely,



Daniel J. McKiernan
Director

Cc:

J. Sheppard, C. Petitpas (MA DMF)

J. Burtner (MA CZM)

R. Vacca (Plymouth Conservation Commission)

References

[1] Evans, N.T., K.H. Ford, B.C. Chase, and J. Sheppard. 2011. Recommended Time of Year Restrictions (TOYs) for Coastal Alteration Projects to Protect Marine Fisheries Resources in Massachusetts. Massachusetts Division of Marine Fisheries Technical Report, TR-47.

DM/kf/js/sd

DRAFT



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

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Kimberley Driscoll
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Rebecca L. Tepper
Secretary

Bonnie Heiple
Commissioner

December 15, 2023

Rebecca L. Tepper,
Secretary of Energy and Environment
Executive Office of Energy and
Environmental Affairs
100 Cambridge Street, Suite 900
ATTN: MEPA Office
Boston, MA 02114

RE: EENF Review. EOEEA # 16758
PLYMOUTH. Plymouth Wastewater
Treatment Facility Treated Effluent
Discharge at 131 Camelot Drive

Dear Secretary Tepper,

The Southeast Regional Office of the Department of Environmental Protection (MassDEP) has reviewed the Expanded Environmental Notification Form (EENF) for the Plymouth Wastewater Treatment Facility Treated Effluent Discharge at 131 Camelot Drive, Massachusetts (EOEEA #16758). The Project Proponent provides the following information for the Project:

The Town is proposing to reprioritize the primary discharge point for treated effluent from the WWTF to become the existing open-sand, disposal beds located on site, rather than the harbor outfall. The proposed project would also increase the total authorized average annual discharge from the WWTF from 2.5 MGD to 3.0 MGD, an increase foreseen in the existing GWDP, to be allowed pending MassDEP approval. The proposed changes would allow for up to a treated effluent daily maximum volume of 3 MGD to be discharged to the disposal beds. The harbor outfall would only be utilized as a secondary, backup discharge location for time periods of disposal bed repairs, emergencies, or other operational considerations. The harbor outfall's NPDES permit, maximum, discharge rate of 1.75 MGD would remain unchanged.

Bureau of Water Resources (BWR) Comments

Wastewater Management. The following comments pertain to the following sections of the EENF:

Sections 1 and 2 The Town of Plymouth holds Groundwater Discharge Permit (GWDP) 1-677. The Permit is currently expired, and it has been Administratively Continued. The Proponent has identified the requirement to submit a Groundwater Discharge Permit Renewal (BRP WP11) and a Hydrogeologic Evaluation Report (BRP WP83) to achieve the goals contained in the EENF.

Section 3.2.

In addition to Russell Mill Pond (MA941320), Plymouth Bay (MA94-17 (Fecal Coliform)) and Plymouth Harbor (MA94-16 (Estuarine Bioassessments and Fecal Coliform)) are also listed as Impaired in the 2022 Integrated List of Waters (Category 5; The 303(d) List – “Waters requiring a TMDL”).

Based upon the available data that meets acceptable data quality assurance standards, the current discharge of the Plymouth Publicly Owned Treatment Works (POTW) is not violating surface water quality standards. This data includes but is not limited to the 2017 Draft Massachusetts Estuary Report and the 2022 Integrated List of Waters which is required by the Federal Clean Water Act.

This does not necessarily mean that the waters have not been impacted, it demonstrates that the available data either does not meet the data quality standards required for quantifying impairment and/or the data does not show an impairment. The lack of listing as impaired does not indicate that there are no negative impacts, simply that the impacts are not of a severity to be impaired. For example, in the 2022 Integrated List of Waters, Russell Mill Pond is not listed as impaired for phosphorus but does indicate some of its negative impacts. Based upon MassDEP’s experience, most freshwater impoundments that have received Irrigation Return Flows from the agricultural industry have shown some degradation in water quality due to phosphorus.

Plymouth Harbor (PH 797, EH 486) and the Eel River (PH 610, EH 486) are listed as Priority and Estimated Habitats for Rare and Endangered Species by the Natural Heritage Endangered Species Program

A portion of the Eel River (9458000) is listed as a Coldwater Fish Resource by the Massachusetts Division of Fisheries and Wildlife.

MassDEP recommends that a simplified table be created to show the potential impacts, including but not limited to, the above listed resources and the potential mitigations that can occur to reduce the impact to the resource.

The original permit (circa 2000) for the current POTW contained Adaptive Management principles which was a new concept in wastewater permitting at the time. Adaptive management can reduce the overall mitigation costs of wastewater management by determining where to allocate the most cost effective solutions that would meet and sustain the water quality standards. With time, this approach can be used as the estuary system reacts to the mitigations of adaptive management and future build out. The mitigation measures proposed in the above analysis will frame the various Adaptive Management conditions in the future permit.

Section 4.1.2 Analysis of nitrogen loading.

MassDEP disagrees with the conclusion concerning the significance of the reduced nitrogen loads entering into the Plymouth Harbor, Kingston Bay, Duxbury Bay (PKD) system by moving the discharge location to the upland watershed location. This conclusion is based primarily by the discovery of a transcription error in the MEP report (see attachment). Also note, that all of the discharge is not subject to a high percentage of attenuation because the attenuation is dependent on where the discharge flow enters the Eel River system and where it does/ does not flow through the impoundments.

The Proponent is cautioned on using portions of the MEP report to draw its conclusions as to the net benefit or harm to the estuary system of implementing the Project. The MEP report uses multiple lines of evidence to determine nitrogen impacts to the estuary system. The data is analyzed using a “Weight of Evidence” approach to determine the Target concentration and the approximate nitrogen reduction in sub watersheds that would bring the estuary system to a thriving, biodiverse resource.

Ultimately, there will be disagreement over the importance of any one parameter or the process for determining the nitrogen Target concentration for the estuary. However, the data gathered and the process to analyze the data has been endorsed as a valid estimate of the causes of impairment and its pathways for rehabilitation for use for an approved TMDL by the U.S. EPA - in compliance with the Federal Clean Water Act.

However, Section VIII.3 DEVELOPMENT OF TARGET NITROGEN LOADS in the MEP Report states: “The load reductions presented below represent only one of a suite of potential reduction approaches.” This statement recognizes that there are other valid pathways to meet a future TMDL.

Although reduction of the nitrogen load in the PDK system is an overall goal, the spatial importance of the reductions cannot be overlooked as it could if there were instantaneous mixing within the estuary at three critical locations within the estuary - the northern Duxbury marsh area, the central Jones River estuary area and the Town Brook/Eel River discharge area at the southern end of the estuary.

It should be noted that the “build out” analysis (MEP Section VI.2.6.1 Build-Out) and the “alternative scenario” analysis (MEP Section IX. ALTERNATIVE WATER QUALITY MODEL SCENARIOS) consider reasonable future scenarios and the effect on the nitrogen concentrations at the primary Monitoring Stations (MS). Table VI-6 shows that MS PDH1 (closest to the Eel River) will exceed the Target Concentration and MS PDH2 just under the Threshold Concentration. Table VI-6 shows that MS PDH1 (closest to the Eel River) will exceed the Target Concentration and MS PDH2 (closest to Town Brook) just under the Threshold Concentration. Table IX-1 shows that MS PDH1 will exceed the Target Concentration in all three scenarios that are consistent with the planned discharge. Therefore, the EIR must consider mitigation that will occur to reduce the future nitrogen impact in the southern portion of the PDK estuary.

Section 8.0 C. Alternative Discharge Site Location analysis.

The Alternative disposal sites should be considered through the lens that either (or both) future hydraulic and nutrient loading of the Eel River Watershed may or may not assimilate those loads and that additional locations should be considered for disposal of some of the treated effluent to meet surface water quality standards.

These criteria eliminate Sites DD and MM which are estimated to be within the Eel River watershed or discharge close to Monitoring Station PDH1. Site 101 is outside the Eel River Watershed (likely on the Town Brook watershed would discharge close to Monitoring Station PDH2). and would facilitate more mixing in the PKD system. Another Town owned property outside the Eel River watershed is the Cold Spring School. This property abuts the surface water discharge line and would need little construction with the exception of a subsurface disposal system. The subsurface disposal system could be funded by the sale of Site 101.

Proposed s.61 Findings

The “Certificate of the Secretary of Energy and Environmental Affairs on the Expanded Environmental Notification Form” may indicate that this Project requires further MEPA review and the preparation of an Environmental Impact Report. Pursuant to MEPA Regulations 301 CMR 11.12(5)(d), the Proponent will prepare Proposed Section 61 Findings to be included in the EIR in a separate chapter updating and summarizing proposed mitigation measures. In accordance with 301 CMR 11.07(6)(k), this chapter should also include separate updated draft Section 61 Findings for each State agency that will issue permits for the Project. The draft Section 61 Findings should contain clear commitments to implement mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsible for implementation, and contain a schedule for implementation.

Other Comments/Guidance

The MassDEP Southeast Regional Office appreciates the opportunity to comment on this EENF. If you have any questions regarding these comments, please contact George Zoto at George.Zoto@mass.gov or Jonathan.Hobill@mass.gov.

Very truly yours,



Jonathan E. Hobill,
Regional Engineer,
Bureau of Water Resources

JH/GZ

Cc: DEP/SERO

ATTN: Millie Garcia-Serrano, Regional Director
Gerard Martin, Deputy Regional Director, BWR
John Handrahan, Deputy Regional Director, BWSC
Seth Pickering, Deputy Regional Director, BAW
Jennifer Viveiros, Deputy Regional Director, ADMIN
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Jennifer Wharff, Solid Waste, BAW
Jeffrey Hunter, Solid Waste, BAW
Angela Gallagher, Chief, Site Management, BWSC
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Appendix B: DEIR Distribution List

DEIR DISTRIBUTION LIST

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Appendix C: Town of Plymouth Camelot Drive
Wastewater Treatment Facility Hydraulic
Loading Test Study



July 31, 2019

Mr. Jeffrey Gould
Massachusetts Department of Environmental Protection
Wastewater Program
20 Riverside Drive
Lakeville, MA 02347

RE: Town of Plymouth - Camelot Drive WWTF Loading Test Report

Dear Mr. Gould:

As you may recall, The Horsley Witten Group, Inc. (HW) is assisting the Town of Plymouth with an evaluation of the potential to increase the application of treated effluent at the Town's existing Camelot Drive Wastewater Treatment Facility (WWTF) groundwater disposal beds. The Town's current Groundwater Discharge Permit (GWDP) calls for the first 1.75 million gallons per day (MGD) of treated effluent from the WWTF to be discharged to Plymouth Harbor through the Town's ocean outfall, with only flows in excess of 1.75 MGD discharged to groundwater at the Camelot Drive disposal beds, up to a limit of 0.75 MGD.

The Town ultimately seeks to reverse the prioritization of disposal locations, with primary disposal becoming groundwater discharge and secondary becoming disposal to the outfall. The motivation behind pursuing the proposed change is to improve water quality in the Harbor and increase groundwater recharge for the aquifer. Due to the increased travel time and treatment for groundwater discharge of treated effluent, increased proportional use of the Camelot Drive disposal beds would have multiple environmental benefits, including:

- Improved water quality in the Harbor and Plymouth/Kingston/Duxbury (PKD) Bay to support shellfishing, aquaculture, eelgrass, and recreational interests.
- Reduced loading of pathogens to the Harbor. This will help the Town address concerns from the federal Food and Drug Administration (FDA) regarding viruses in the WWTF effluent that may persist in the Harbor environment long enough to pose health risks. On this point, a dye study was conducted in 2018 that documented significant retention times of outfall effluent in PKD Bay.
- Increased recharge/retention of fresh groundwater within the Plymouth-Carver Aquifer (PCA) to support baseflow to the Eel River and, potentially, Town Brook; and
- Increased recharge of groundwater to offset public drinking water withdrawals and provide mitigation to meet MassDEP Water Management Act (WMA) requirements.

Among the primary factors to evaluate when considering an increase of groundwater disposal is the hydraulic capacity of the disposal beds to accept the increased flow and the potential for hydraulic impacts to surrounding properties. The Town received approval from the Massachusetts Department of Environmental Protection (MassDEP) on June 26, 2018 to conduct an extended duration loading test of the WWTF disposal beds. The test was conducted following the MassDEP-approved protocols from August 4th to November 7, 2018, with a 40-day active loading period between August 20th and September 28th at an average rate of 1.57 million gallons per day (MGD). The attached report documents the methodology completed and the results from the loading test.

Following MassDEP review of the attached loading test report, we would like to request a meeting to discuss the next steps towards pursuing a revised GWDP that prioritizes groundwater disposal over outfall discharge. If possible, we propose that the meeting occur in the time frame from mid-September to mid-October. Key topics that we foresee discussing, among others of MassDEP interest, include:

- What is the legal process by which the desired GWDP modifications can be accomplished? Would it be an amendment, new permit, or other process? Since the current permit was adjudicated does that mean that a new permit or modification would also require an adjudicatory process?
- We are aware that increased disposal of treated effluent at the Camelot Drive disposal beds may increase nutrient loading to the Eel River. Past analyses have indicated that nutrient loading to the Eel River from the current WWTF disposal at Camelot Drive is unlikely to create significantly adverse environmental impacts. However, we recognize that additional assessments will be required to evaluate potential water quality impacts and would like to discuss the type and extent of analyses to be conducted.
- We anticipate that, due to its conservative nature in groundwater travel, nitrogen will be a key contaminant of concern to discuss. Past analyses have indicated that the predominantly freshwater Eel River system is primarily phosphorus limited and, because phosphorus tends to bind to sub-surface sediments, phosphorus transport in groundwater is greatly limited relative to nitrogen. Despite the fact that much of the Eel River is not nitrogen limited, the Town anticipates conducting a nitrogen-offset program through expanded sewer connections in the contributing areas to the Eel River and the harbor. Nitrogen reduction will provide significant benefits to brackish and saltwater portions of the Eel river and harbor system, and may provide some benefit to the freshwater portions as well. The goal is that by connecting to Town sewer existing properties that are currently served by on-site septic systems, no net nitrogen increase, or as close as possible, for key areas of the Eel River and harbor can be accomplished. We would like to discuss the details of how that analysis and program will be conducted.

Mr. Jeffrey Gould
Page 3

If you have any questions, please feel free to contact me at (508) 833-6600, or nprice@horsleywitten.com.

Sincerely,

HORSLEY WITTEN GROUP, INC.



Neal M. Price

Senior Hydrogeologist / Associate Principal

Enclosure: Town of Plymouth Camelot Drive WWTF Hydraulic Loading Test Study

Cc: Jonathan Hobill (MassDEP)
David Burns (MassDEP)
Jonathan Beder (Town of Plymouth)

DRAFT

Horsley Witten Group

Sustainable Environmental Solutions

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Town of Plymouth Camelot Drive Wastewater Treatment Facility Hydraulic Loading Test Study

Plymouth, Massachusetts

July 2019



Prepared for:
**Town of Plymouth
Sewer Division**

Prepared by:
Horsley Witten Group, Inc.

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1.0 INTRODUCTION

The Town of Plymouth owns a Wastewater Treatment Facility (WWTF), operated by Veolia Water Technologies (Veolia), located in the Camelot Drive Industrial Park in Plymouth (Figure 1). The Town's current Groundwater Discharge Permit (GWDP) with the Massachusetts Department of Environmental Protection (MassDEP) allows for an average of 0.75 million gallons per day (MGD) of treated effluent from the WWTF to be discharged to groundwater through five, open-sand, disposal beds, with a daily maximum of 3.45 MGD. However, the permit also calls for the first 1.75 MGD to be discharged to Plymouth Harbor through the Town's ocean outfall. Only flows in excess of 1.75 MGD are discharged to groundwater. Since current wastewater flows rarely exceed 1.75 mgd, minimal effluent has historically been discharged to groundwater, except for 2016 when a series of sewer main breaks made discharge through the Harbor outfall impossible.

Groundwater discharge of treated effluent at the WWTF still ultimately reaches the Harbor through either direct groundwater flow or groundwater discharge to the Eel River. However, groundwater discharge at the WWTF increases the travel time for treated effluent to reach the Harbor from instantaneous (for outfall discharge) to years. That increased travel time allows opportunities for additional in-situ treatment of the treated effluent along its path through geochemical, biological, and physical processes.

Due to the increased travel time and the further in situ treatment of treated effluent, increased groundwater discharge of treated effluent at the WWTF, with proportional decrease of Harbor discharge, would have multiple environmental benefits, including:

- Improved water quality in the Harbor and Plymouth/Kingston/Duxbury (PKD) Bay to support multiple uses including shellfishing, aquaculture, eelgrass, and recreational interests. These water quality benefits include significant reductions in pathogen loading to the harbor from WWTF discharge. Bacterial and viral loading to the harbor has been a concern expressed by both the state Division of Marine Fisheries (DMF) and the federal Food and Drug Administration (FDA).
- Increased recharge/retention of fresh groundwater within the Plymouth-Carver Aquifer (PCA) to support baseflow to the Eel River and, potentially, Town Brook.
- Increased recharge of groundwater to offset public drinking water withdrawals and provide mitigation to meet MassDEP Water Management Act (WMA) requirements.

This report describes a loading test conducted by the Horsley Witten Group (HW) at the WWTF to evaluate the potential for increased groundwater disposal at the disposal beds from a hydraulic perspective (i.e. increased groundwater elevations and changes to groundwater flow paths). During the loading test, 100% of the WWTF effluent was diverted to the disposal beds for approximately two months under carefully controlled conditions, with detailed monitoring of groundwater responses conducted, in order to field-evaluate the hydraulic impacts of increased groundwater discharge under real-world conditions.



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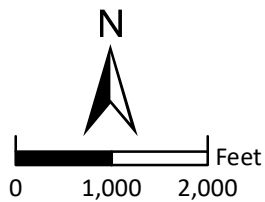
*Imagery - ESRI

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508-833-8500 • horsleywitten.com



Site Locus
Camelot Drive WWTP
Plymouth, MA



Date: 2/7/2019

Figure 1

The groundwater mounding observed during the test is used in this report for several main purposes:

1. Evaluate the potential for negative hydraulic impacts to the WWTF itself, as well as nearby private wells, septic systems, basements, or other infrastructure;
2. Update and calibrate a numerical groundwater model for the aquifer which was then used to estimate groundwater mounding, flow, and transport under different scenarios of groundwater discharge; and
3. Compare estimated groundwater mounding from this study against mounding previously reported as part of the original GWDP for the Camelot WWTF. That prior work was conducted throughout the 1990's as part of a multi-volume Feasibility Study/ Environmental Impact Report (FS/EIR).

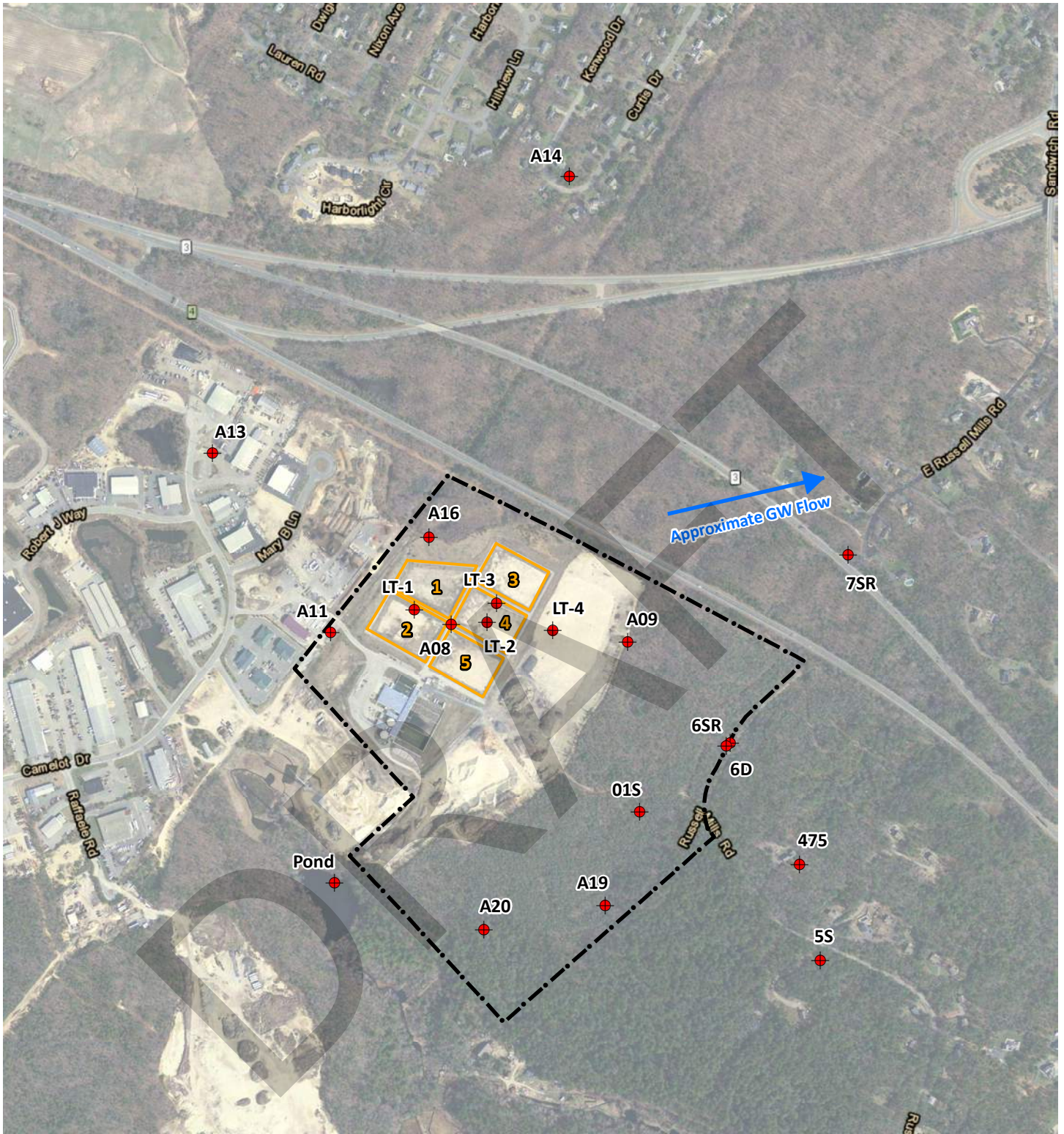
Work on this project was organized into different tasks. Task 1 included drafting a proposal letter to DEP outlining the desired loading test conditions. The loading test proposal letter and DEP approval are both attached herein as Appendix A. Following that approval, the loading test was performed under Task 2 of the proposal. Task 3 involved the analysis of loading test data, and Task 4 included the calibration and application of a regional groundwater model to analyze the potential effects of various loading scenarios. This report includes analysis and conclusions drawn from both the loading test and groundwater modeling efforts under Tasks 3 and 4. It should be noted that potential water quality impacts to surface waters resulting from increased disposal of treated effluent at the WWTF disposal beds will need to be further evaluated. Past analyses have indicated that nutrient loading to the Eel River from the current WWTF disposal at Camelot Drive is unlikely to create significantly adverse environmental impacts. However, additional assessments will be required to evaluate the potential impacts to the Eel River under potential future scenarios of increased groundwater discharge of treated effluent. Such analyses are not part of this report but are recommended before proceeding to permitting for increased groundwater discharge at the WWTF.

2.0 TASK 2 – PERFORM LOADING TEST

Hydrogeologic Setting



The Camelot Park WWTF is located within the Eel River watershed of the PCA system. The WWTF is located approximately 1.3 miles south of Plymouth Harbor, one mile west of the Eel River, and approximately a half mile north of the Warren Wells Brook tributary to the Eel River (Figure 1). The Eel River and its Wells Brook tributary create local groundwater discharge boundaries in this area, with groundwater flow direction from west to east from the WWTF towards the Eel River, with components of southeasterly and northeasterly flow. A series of monitoring wells surrounding the WWTF were used to inform this study (Figure 2).

Site-specific groundwater elevations were measured on August 2nd and 3rd, 2018, prior to the loading test, under static, non-loading conditions from the 18 monitoring wells used during the test. Figure 3 presents the contoured water table estimated from those field data. The highest groundwater elevations were observed within Camelot Park to the west of the WWTF (well A14) and the gradient slopes downward to the north, east, and south of the WWTF.



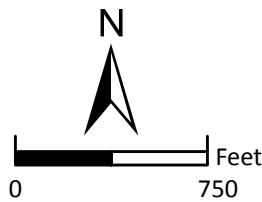
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Legend

-  Monitoring Well Locations
-  Open Bed Discharge

*Imagery - MassGIS 2013

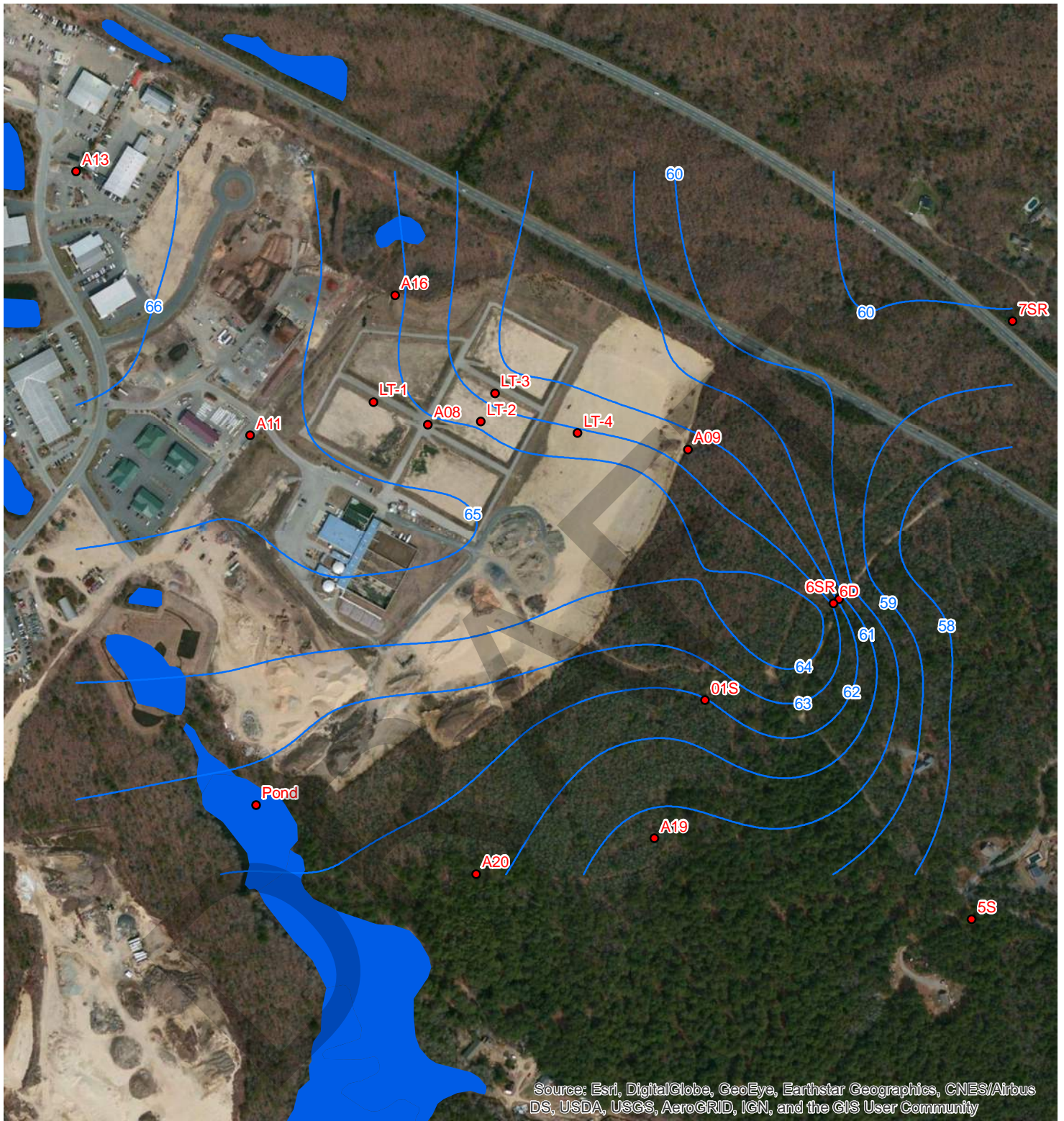
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Loading Test
 Monitoring Well Locations
 Camelot Drive WWTP
 Plymouth, MA

Date: 4/26/2017

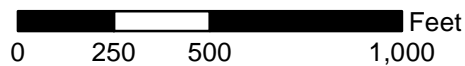
Figure 2



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Legend

- Monitoring Wells
- Observed Initial Water Table (ft)
- Water Features (MA DEP Wetlands)



Horsley Witten Group
Sustainable Environmental Solutions

Initial Water Table
Interpolated from
Field Observations
8/2/2018

Date: 3/28/2019

Figure 3

Loading Test Setup

The WWTF has five sand beds which can receive treated effluent and they are numbered as shown on Figure 2. During the loading test effluent was discharged only to bed #4. Wells monitored for the test surround the bed and are grouped into three general categories by distance, as shown in Table 1.

Table 1. Monitoring wells used in study

Well	Group	Distance From Bed Four (ft)
A08	Near	23
A09	Near	571
A11	Near	667
A16	Near	369
LT1	Near	232
LT2	Near	0
LT3	Near	0
LT4	Near	171
01S	Mid	1,117
6D	Mid	1,279
6SR	Mid	1,289
A13	Mid	1,572
A19	Mid	1,459
A20	Mid	1,494
5S	Far	2,355
7SR	Far	1,762
A14	Far	2,268
A15	Far	4,220

Surveyed horizontal positions and vertical elevations of the monitoring wells were provided by the Town of Plymouth. Survey was conducted using high-accuracy RTK GPS. Horizontal position was reported relative to the North American Datum of 1983 (NAD 83) and vertical elevation relative to the North American Vertical Datum of 1988 (NAVD 88). Offset elevations from the surveyed elevation point for each well (generally its concrete platform or metal cap) to the water level measuring point on top of the inner PVC well casing were measured upon logger placement by HW in order to determine the elevation of the measuring point for each well. Well A15 did not have a survey elevation provided. Because A15 was only used to monitor ambient water level fluctuations, its elevation was not needed for this study. Well A15 is not shown on Figure 2 because it is out of the figure's view. Well A15 is located 4,200 feet northeast from the disposal beds.

The loading test consisted of the discharge of treated effluent to bed #4 and concurrent monitoring of water table response in the wells surrounding the WWTF. Water levels were monitored primarily using automated water level loggers augmented with manual

measurements in the immediate area of bed #4 during the loading test. Baseline conditions monitoring began on August 4, 2018, 17 days prior to the start of the loading test. Loading to the bed occurred between August 20th and September 28th (40 days), and an average of 1.57 million gallons per day (MGD) of wastewater were diverted from the WWTF to bed #4 for groundwater discharge. Only 0.5 MGD were discharged on the first and last days of this period, and flows averaged 1.62 MGD during the remaining 38 days of loading. Basin loading data is included in Table 2. Monitoring continued through the loading period and for 45 days of recovery afterwards.

Table 2. Basin 4 loading data

8/4/2018: Monitoring Begins				
Date	Flow to Basins (MGD)		Date	Flow to Basins (MGD)
8/20/2018	0.557		9/10/2018	1.502
8/21/2018	1.545		9/11/2018	1.852
8/22/2018	1.772		9/12/2018	1.699
8/23/2018	1.639		9/13/2018	1.856
8/24/2018	1.543		9/14/2018	1.816
8/25/2018	1.677		9/15/2018	1.482
8/26/2018	1.364		9/16/2018	1.661
8/27/2018	1.664		9/17/2018	1.449
8/28/2018	1.568		9/18/2018	2.026
8/29/2018	1.568		9/19/2018	1.579
8/30/2018	1.737		9/20/2018	1.596
8/31/2018	1.513		9/21/2018	1.753
9/1/2018	1.591		9/22/2018	1.455
9/2/2018	1.354		9/23/2018	1.617
9/3/2018	1.426		9/24/2018	1.424
9/4/2018	1.621		9/25/2018	1.621
9/5/2018	1.505		9/26/2018	1.952
9/6/2018	1.901		9/27/2018	1.692
9/7/2018	1.509		9/28/2018	0.525
9/8/2018	1.580		Loading Test Average:	
9/9/2018	1.512		1.568	
11/7/2018: Monitoring Ends				

Throughout the loading and recovery phases of the test, depths to water in the three wells closest to bed #4 (LT-1, LT-2, and A08) were measured by hand with a water level indicator several times per week by WWTF staff in order to monitor test progression and to determine when water levels in those wells stabilized. Manual monitoring continued for four and a half weeks after loading (until November 11th) at which point water levels in the wells were declining at a rate of about a quarter inch per day.



Photo 1: Bed #4 receiving treated effluent during the loading test.

Water Level Logger Deployment and Retrieval

Nineteen automated water level loggers (Mini- and Micro-Divers by Van Nessen Instruments) and one barometric pressure monitor (Baro-Diver by Van Nessen Instruments) were placed in the monitoring wells indicated on Figure 2 and Table 1, above. Prior to deployment the loggers were digitally labelled and formatted to record pressure in units of centimeters of water (cm water). Loggers were placed in the wells on August 2nd and 3rd.

Upon placement of the loggers, depth to water measurements were performed using an electronic tape water level meter (Heron Instruments) relative to the inner casing measuring point mark. Loggers were tied to string and placed sufficiently deep in the well to allow them to remain submerged even with a decreasing water table. The string was then secured to the casing and wells were locked. In addition, one logger was attached to a submerged cinder block in the unnamed pond south/southwest of the WWTF to monitor surface water level changes (Figure 2). The barometric pressure monitor was tied to a tree near the pond to monitor atmospheric pressure, which was used to correct the water level data for barometric pressure changes.

Loggers were recovered on November 7th. During logger recovery water levels were manually-measured a second time using an electronic tape water meter. Manual water level readings at placement and recovery allowed for manual checking of water elevations at both the beginning and end of the measurement period in order to ground-truth automated logger data.

Data was downloaded from the loggers into Diver Office software (Van Nessen Instruments) for compensation and analysis. Raw logger data is first compensated for changes in barometric pressure to isolate pressure signal caused by changes in water level. Diver Office includes

BaroComp functionality, which subtracts changes in barometric pressure recorded by the Baro-Diver from the pressure values recorded by the loggers in the wells. At 9:00 and 10:00 am on October 26th, the Baro Diver recorded anomalously high pressures for too short of a time interval to have been real. These values were removed from the dataset so that they were not included in data processing.

Following barometric compensation, pressure values from the loggers were converted to height of water above the logger and then to water table elevations. Pressure values recorded by the loggers in units of centimeters of water were first converted to feet of water to match the units reported by the survey of well elevations. The elevation of the water table at the time of logger placement was determined based on hand measurement with an electronic tape water level indicator. For each hourly measurement of pressure by the logger the difference between the height of water at that time and the height recorded at the time of placement was added to the water table elevation measured at placement to determine the water table elevation at that time.

Water Level Logger Data Processing

Downloaded logger data was corrected through multiple steps to account for displacement of loggers during the monitoring period, drift correction, and ambient water level changes unrelated to the loading test.

Logger Displacement:

Because access to some of the wells occurred during the loading test by WWTF contractors conducting water quality sampling, the loggers in Well 5S, Well 01S, and Well A19 were visually observed (e.g. knotted or coiled strings) to have been vertically displaced during the monitoring period. Well LT-4 appeared to have been run over by a vehicle during the monitoring period which, in addition to destroying the well, displaced the logger inside of it. In addition, while no visual indicators of disturbance were observed, data from Wells A11, A13, and 6D also indicate that those loggers were disturbed. When loggers are replaced in a well, after having been removed, the wet string can cling to the well casing, providing enough upward force to temporarily suspend the lightweight loggers above their original height without any knotting or visual evidence of disturbance. Data corrections for displaced loggers are described below:

- Water levels in Well 5S fall to zero for a two-hour window on the morning of November 1st before resuming approximately 108 cm water lower than before this window, suggesting that the logger had been raised out of the water and then returned to a position 108 cm higher than its original position (due to the observed knotting of the string). Data following that time were corrected by the addition of 108 cm water to the records to account for that observed displacement.
- Water levels in well A19 decrease abruptly by approximately 453 cm over a single measurement interval at noon on October 30th, suggesting that this is when displacement occurred. Pressures following that time are corrected by the addition of 453 cm water to the records.

- Water levels in well LT-4 increased abruptly by 47 cm over a single measurement interval at 2 pm on October 24th, suggesting this is when the damage to the well occurred. Pressures following that time are corrected by the addition of 47 cm water to the records. Water table elevations in this well could not be drift-corrected as the measuring point elevation of the well was altered by the damage.
- Data from well A11 decreases to near zero at 8:00 am on 9/18 and remains there until 10:00 am on 10/23. Data points for that time period were eliminated. Water levels from 10/23 until logger removal were calculated based on comparing logger-recorded water depths to the hand-measured depth to water at logger retrieval. No drift adjustment was performed because a continuous record from deployment to retrieval was not available.
- Data from well A13 indicates an abrupt drop of approximately 126.6 cm over a single measurement interval at 10:00 am on 10/30. Pressures following that time are corrected by the addition of 126.6 cm to the records following that time.
- Data from well 6D indicates an abrupt drop of approximately 4.5 cm over a single measurement interval at 11:00 am on 10/17. Pressures following that time are corrected by the addition of 4.5 cm to the records following that time.
- Data from well 01S were corrupt following 9/13 due to an instrument malfunction and were excluded from further processing.

Drift Correction:

Electronic instrument data drift can occur during long-term remote field observations. To account for any drift in logger-recorded water levels, manually measured water levels taken during logger recovery were compared to the values recorded by the loggers as adjusted above. The differences between the logger-estimated water levels and the manually measured values at the time of recovery were attributed to drift and those residuals were corrected by distributing the total difference incrementally over the course of the test in a linear fashion (i.e. a 0.2 foot positive total residual would be corrected by adding 0 feet to the logger data at the time of placement, 0.1 feet halfway through the monitoring period, and 0.2 feet at logger recovery). Total residuals were less than 0.2 feet in most wells and averaged approximately 0.206 feet. Well A08 had the largest drift correction of 1.13 feet at the end of monitoring.

Ambient Water Level Changes:

Index well A15 was utilized to monitor and control for natural fluctuations in the water table throughout the test unrelated to the test itself. Well A15 is located 4,220 feet to the northeast of the loading test site. Changes in water level in a monitoring well affected by the test need to be corrected for fluctuations in the regional water table in order to isolate the effects of loading from ambient water level changes. For example, if a monitoring well indicates two feet of water level rise, but the index well indicates a one-foot increase in regional water table elevations, then the actual relative mounding in the monitoring well caused by the loading is only one foot. Natural change in the regional water table was accounted for by subtracting the the change in water level in the index well (A15) over each time increment from the water level change observed at each other well over those same time increments. Water levels in the

index well decreased by a total of 1.6 feet during the test. For comparison, water levels at regional index well PWW-22 (USGS 415453070434901 at the Plymouth Airport approximately 4.5 miles from the disposal beds) decreased by approximately one foot over the same time period. Unidentified differences in local-scale aquifer recharge and discharge likely account for the observed difference in ambient water level changes between the USGS index well and Well A15. Declining water levels are typical for late August and September in southeastern Massachusetts.

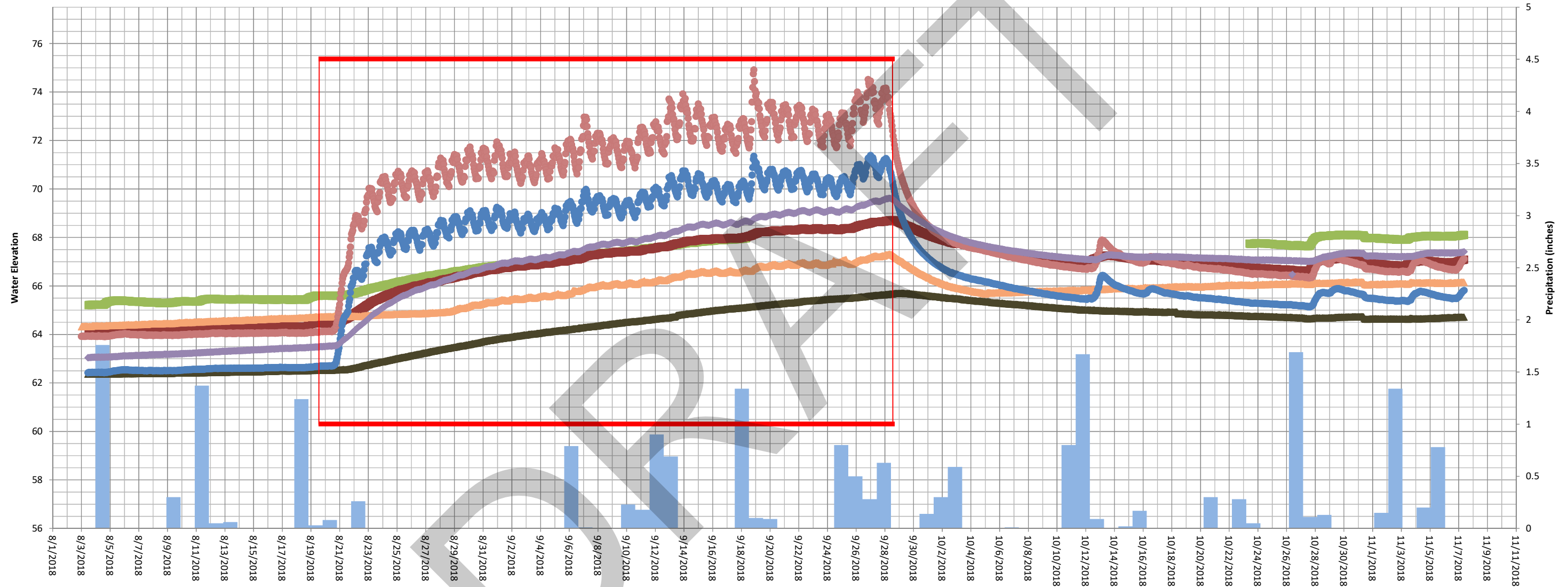
3.0 TASK 3 - ANALYZE LOADING TEST RESULTS

Processed and corrected time-series data were compiled into a series of figures (Figures 4A – D) displaying the change in height of the water table (mounding) in each well throughout the monitoring period. These plots are grouped by distance from the disposal beds and presented in terms of near-field wells, mid-field wells, and far-field wells. Figures 4a shows data from near-field wells, 4b from mid-field, 4c from far-field, and 4d from the pond. Red boxes surround the period when loading occurred. Bars indicating precipitation amounts correspond to the secondary y-axis are indicated on the right-hand side of the graphs. Table 3 lists the corrected peak mound heights during the loading test for all wells. Note that the corrected peak mound heights are greater than the field-observed mound heights because they have been corrected to account for the fact that the ambient water table was declining over the course of the test. For example, peak mound values shown for the far-field wells are due primarily to the ambient conditions correction rather than actual mounding influence from the loading test. Peak mound heights occurred at the end of the 40-day loading period because groundwater levels were still rising at the end of the test, albeit very slowly. Figure 5 graphically depicts the field-observed, peak-mound height, water table configuration at the end of the loading period. Figure 6 depicts the corrected peak mound configuration.

Water levels in almost all wells stabilized after the test at values higher than before the test, reflecting the effects of the loading test. Well A14, located approximately 2,268 feet away from the disposal beds, and the pond were the only monitoring locations with observed water levels lower upon recovery than placement. Well A14 is located far enough away from the disposal beds that the regional influence of declining water levels at the time of the test exceeded the influence of the loading test. In addition to distance of approximately 1,600 feet from bed #4, the pond was subject to evaporative losses that allowed its level to decline over the testing period despite the influence of loading.

Rates of mound growth changed in response to rain. Three large rain events occurred during the loading period: 0.8 inches on September 6th, 2.0 inches between September 10th and 13th, and 1.53 inches between September 18th and 20th. Immediately following each of these events water levels increased notably. Subsequent rain events pushed levels higher than the previous event, resulting in a step-wise pattern of increase and an overall trend of gradual increase. Near-field wells located in the vegetation-free zone surrounding the disposal beds can be seen to respond to larger precipitation events, such as the 1.3 inches which fell on September 18th, or the 1.6-inch event on October 12th. The precipitation response for the mid-field and far-field wells is lesser, perhaps indicating that precipitation more quickly and directly recharges the water table in areas cleared of vegetation and top soil.

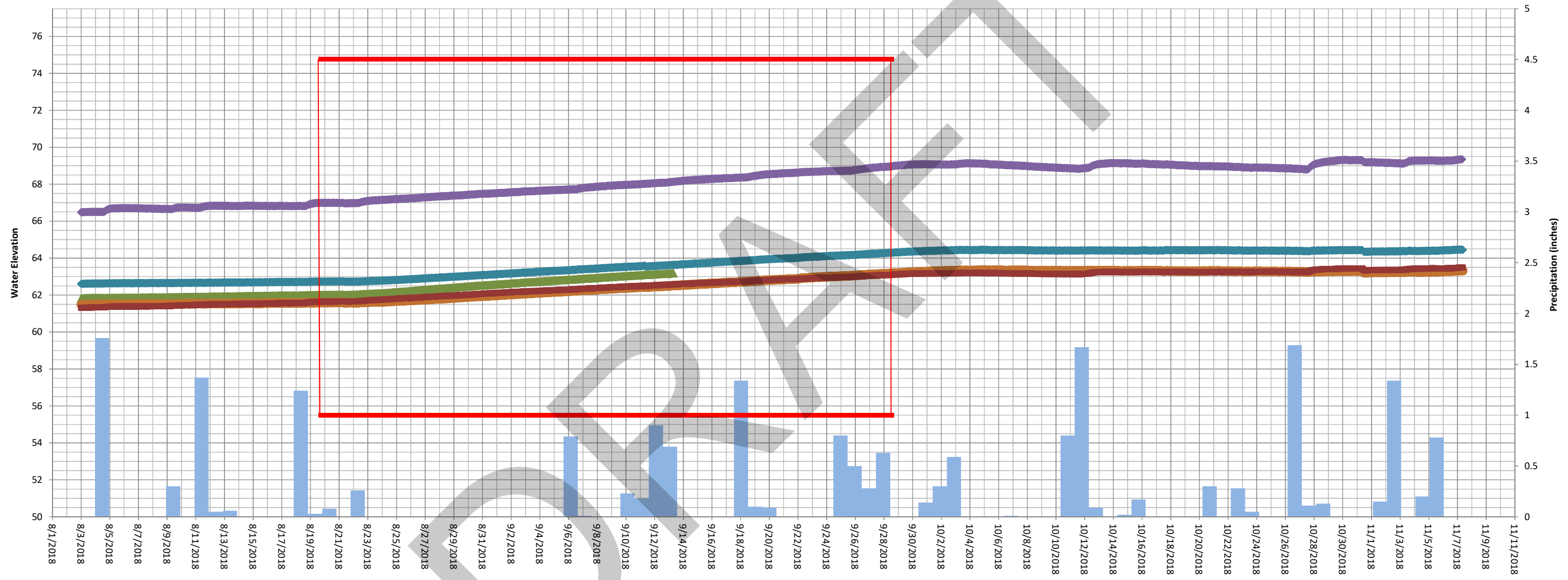
Figure 4a: Mounding Results - Near Field Wells



*Data from Well A-11 during the period of 9/18 at 09:00 until 10/23 at 11:00 indicate the logger may have been disturbed during this time, and were removed from the dataset.

■ Precipitation ▲ A-09 ■ A-11 ■ A-16 ▲ LT-1 ● LT-2 ● LT-3 ◆ LT-4 — Loading Test Duration

Figure 4b: Mounding Results -Mid Field Wells



*Data from well O1-S after 9/13/18 at 08:00 indicates that the logger was likely disturbed and was removed from the dataset. The string was found knotted near the top of the casing upon diver retrieval.

■ Precipitation ▲ O1-S ◆ 6-D ● 6-SR ◆ A-13 ■ A-20 — Loading Test Duration

Figure 4c: Mounding Results -Far Field Wells

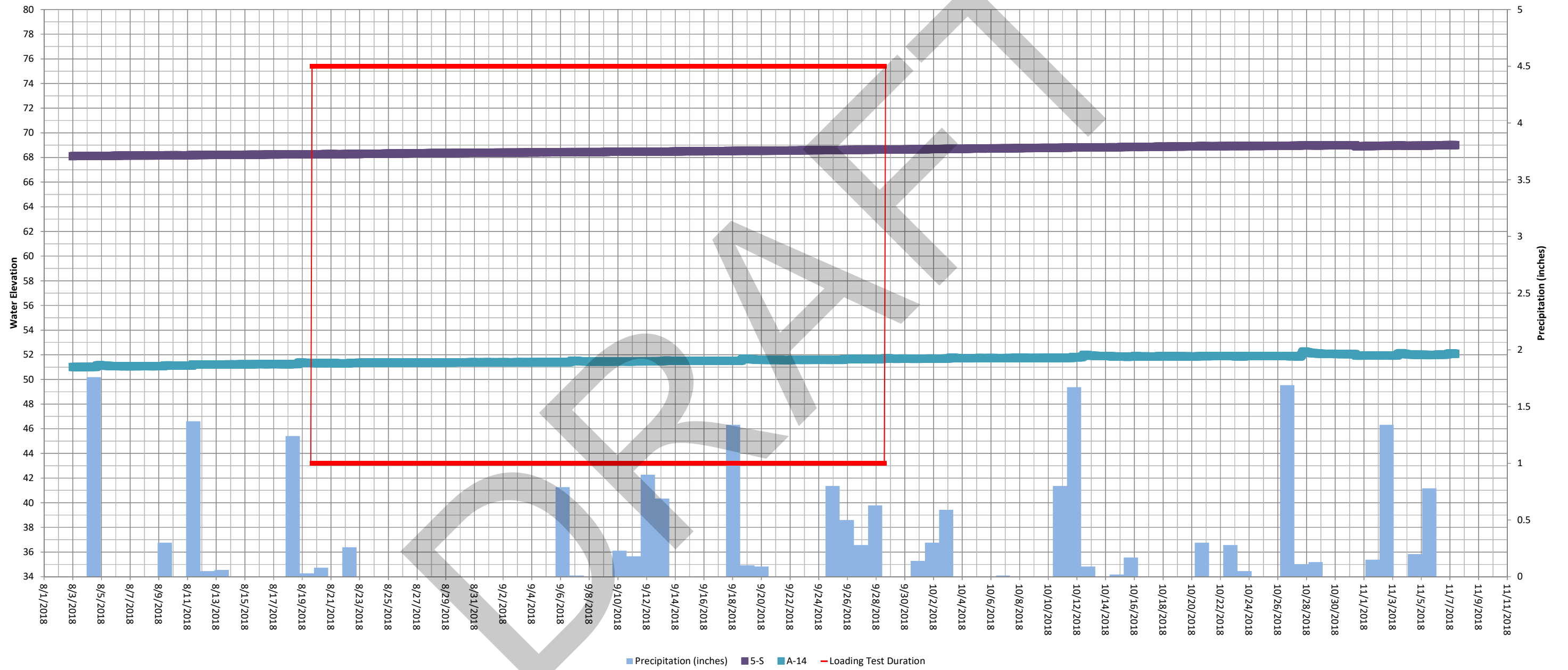
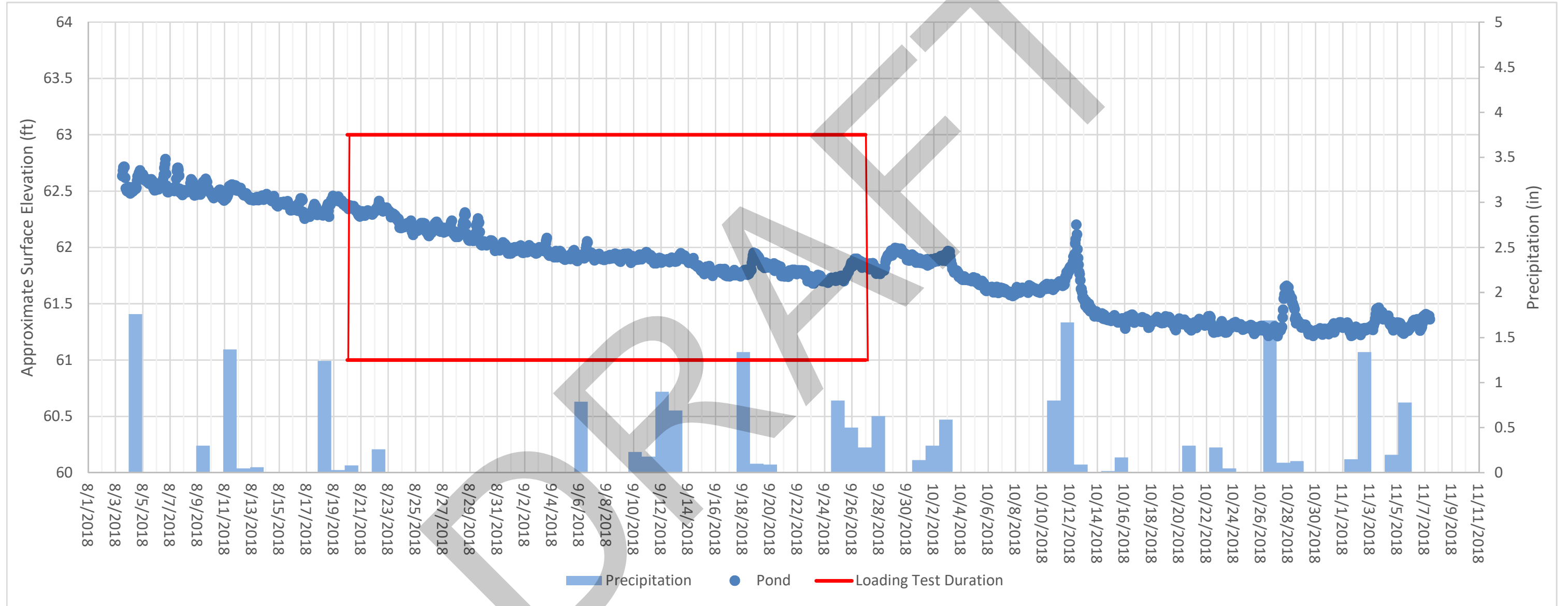
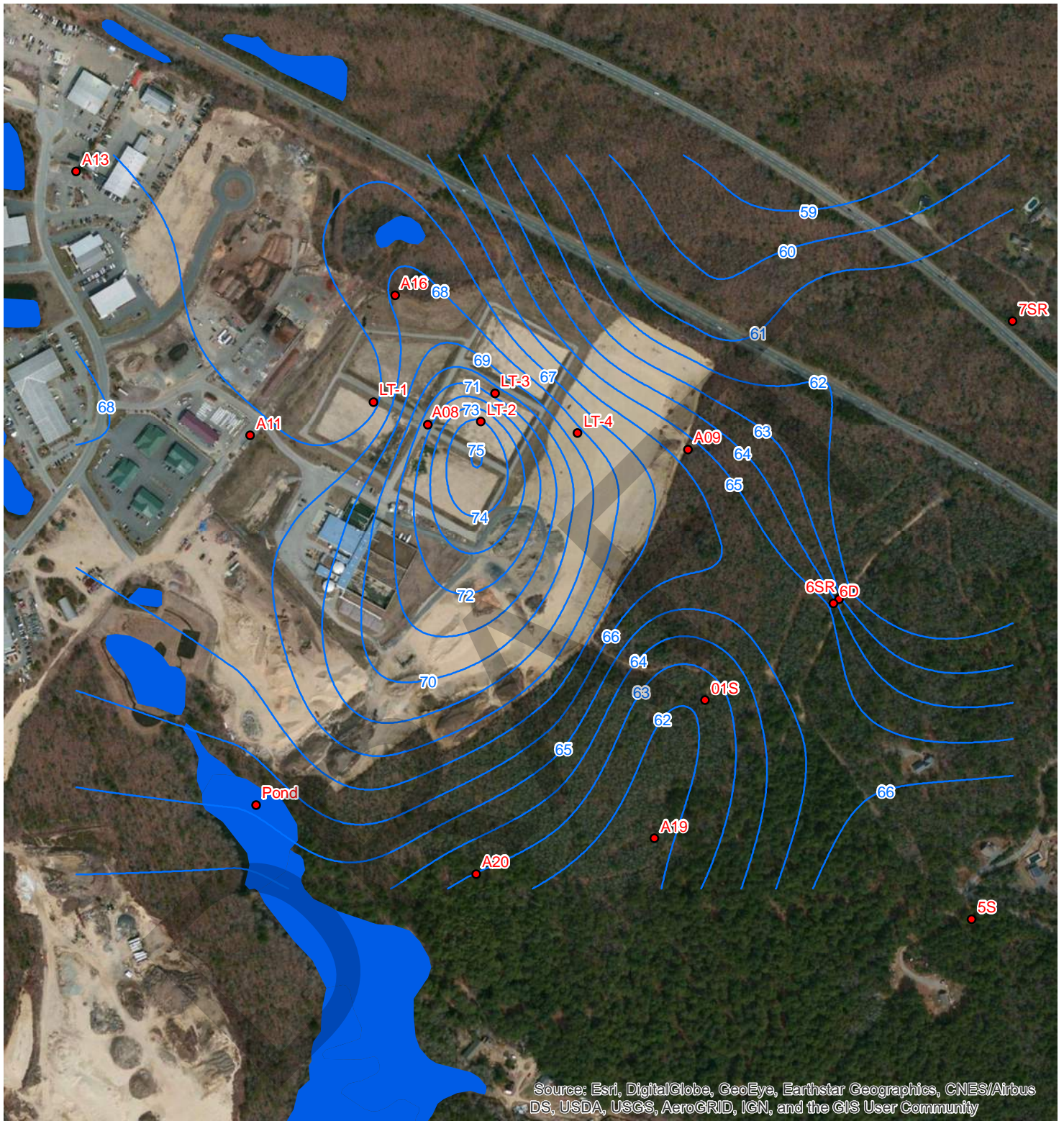


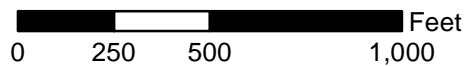
Figure 4d: Pond Surface Elevation





Legend

- Monitoring Wells
- Peak Observed Water Table (ft)
- Water Features (MA DEP Wetlands)

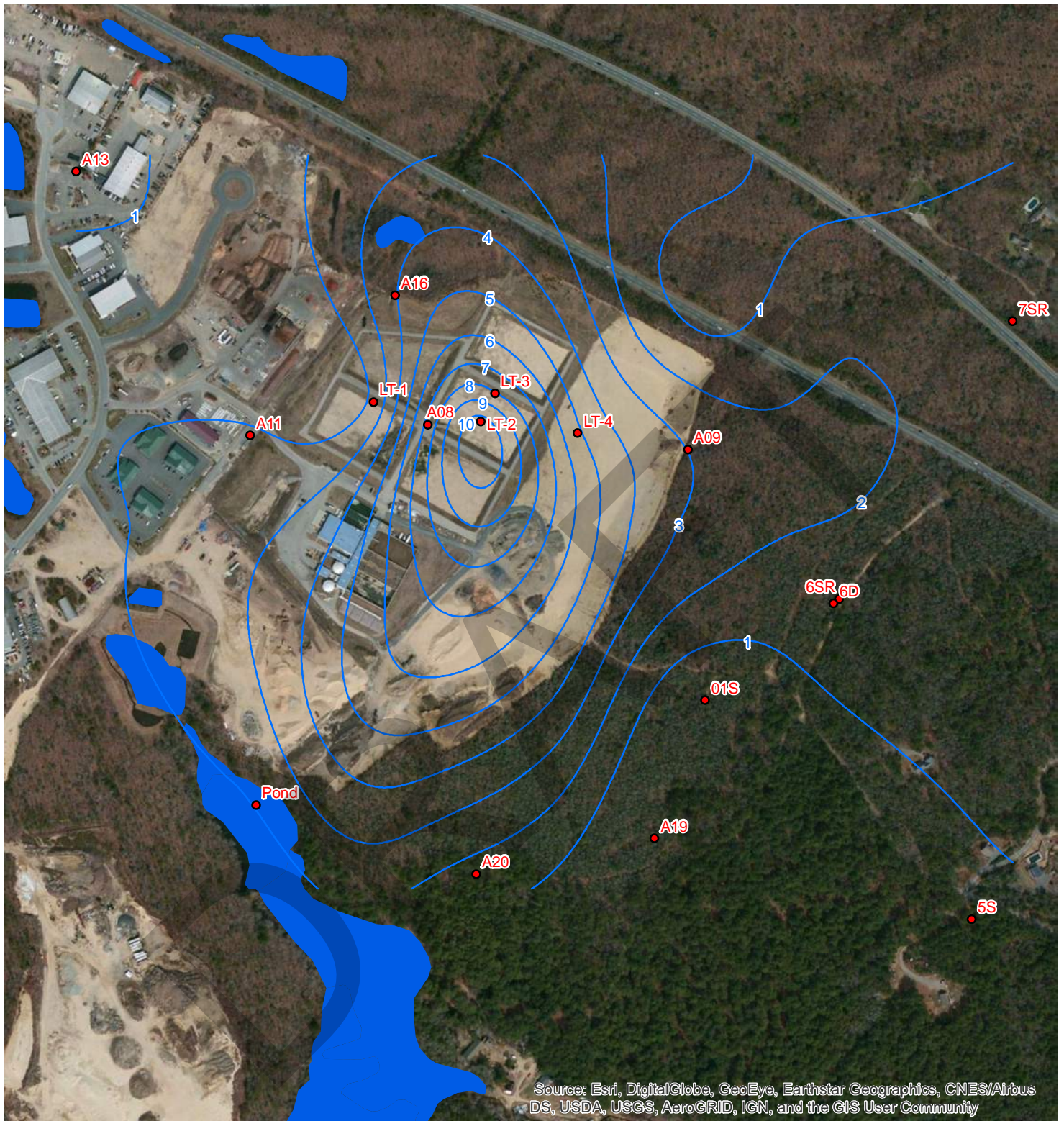


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Mounded Water Table
Interpolated from
Field Observation
9/27/2018

Date: 4/1/2019

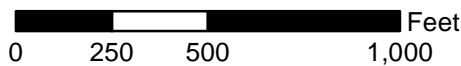
Figure 5



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Legend

- Monitoring Wells
- Observed Peak Mounding (ft)
- Water Features (MA DEP Wetlands)



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Sustainable Environmental Solutions

Peak Mounding
Interpolated from
Field Observations
9/27/2018

Date: 4/1/2019

Figure 6

Table 3. Peak, corrected, groundwater heights observed during loading test

Well	Range	Max Mound
LT2	Near	10.33
LT3	Near	8.07
LT4	Near	5.20
A16	Near	3.94
A09	Near	2.98
LT1	Near	2.29
A11	Near	2.14
6SR	Mid	1.72
6D	Mid	1.69
A20	Mid	1.64
A13	Mid	0.87
7SR	Far	1.61
A14	Far	1.02
5S	Far	0.87
Average Max Mound		
Far Field Average		0.313
Mid Field Average		0.851
Near Field Average		3.76

Near-Field Wells

As would be expected, the greatest mounding was detected in the wells closest to bed #4 where wastewater was discharged, and mounding decreased with distance. Well LT-2, located within the bed itself, saw the highest water elevation increase of 10.3 feet above ambient levels. Wells nearest to bed #4 experienced a rapid increase in corrected groundwater levels which tapered to a slower increase after approximately 3 days. The rate of increase in the nearest two wells was approximately 20 times higher in the first 3 days of testing than in the subsequent 35 days. Following that initial high rate of change, and not including the brief spike due to rain observed on September 20th, water levels generally increased gradually and asymptotically throughout the duration of the test. Daily fluctuations corresponding with loading patterns in the wells nearest the bed can be seen. After loading ceased, water levels in the near-field wells fell quickly, and water levels stabilized approximately one month after the end of the loading period at levels higher than before the test.

Mid-Field Wells

In comparison to the near-field wells, corrected water levels in mid-field wells increased more modestly throughout the loading period. Total mounding was similar in all the mid-field wells. Wells A20, 6D, 6SR, and 7SR are located 1,300 to 1,700 feet south or east of the bed and all exhibited mounding of approximately 1.7 feet. Well A13, located 1,500 feet to the northwest, had a maximum mound height of 0.9 feet. Water levels in the mid-field wells increased slowly and consistently throughout the test. Post loading-period water level decline was also greatly diminished in the mid-field wells relative to the near-field wells.

Far-Field Wells

Corrected water levels in far-field wells increased by a very small amount over the monitoring period, and at a nearly linear rate. Water level increases due to loading were essentially balanced by ambient water level declines. The influence of loading is so muted this far away from the disposal beds that there is no evident change in response between the loading and recovery phases of the test. The corrected water table rise (mounding) attributed to these wells in Table 3 is largely due to the ambient water level correction, as opposed to loading test effects.

Pond

Corrected water levels in the pond declined over the monitoring period as the influence of ambient water level decline and evaporation exceeded the influence of the loading test. The pond exhibited the strongest response to rain events due to its direct connection to the atmosphere.

4.0 TASK 4 –CONDUCT GROUNDWATER MODELING

In addition to observation of water levels during the loading test, a numerical groundwater model was used to further study the effects of loading at the WWTF. Using a computer model allows for the simulation of loading conditions other than those evaluated in the single loading test which was performed. Additionally, the computational tools available in the model allow for the evaluation of parameters which are difficult to quantify in situ. Groundwater transport direction and velocity, travel time, and fate of water discharged to the beds can all be evaluated using mathematical formulae and an understanding of local hydrogeology.

Modelling was performed using the software Groundwater Vistas version 6 (Environmental Simulations Inc.). The model created for this project was derived from the USGS model of the PCA (USGS Scientific Investigations Report 2009-5063). The PCA model is a regional groundwater model developed by the USGS for the purpose of evaluating the impacts of development, discharge, and pumping on groundwater in the region.

Local Refinement and Calibration of the Model

Observations and data collected during the loading test were used to calibrate and refine the USGS groundwater model to further explore the impacts of groundwater discharge at the WWTF. The USGS model was refined in the following ways to better inform this project:

- The locations of the disposal beds at the WWTF and the wells monitored during this test were added to the model.
- The model grid in the area surrounding the WWTF was refined to increase the resolution of calculations in the area of interest. Model cells within the range of monitoring wells were refined by a factor of two, from cell sizes of 400 ft by 400 ft down to 200 ft by 200 ft. Cells in the vicinity of the disposal beds were refined by an additional factor of two (100 ft by 100 ft). Increased model resolution allows for more accurate representation of the geometry of the sand beds and other geographic features. Additionally, a finer grid increases the resolution at which results are calculated, resulting in more precise model simulations.
- The steady state model (a single output solution representing long-term average conditions) was converted to a transient model (includes time-variable inputs to allow for time-variable outputs) in order to calibrate the model to data from the loading test. The purpose of the transient model is to capture not only the peak mounding results but also to capture the rate of increase and recovery of the water table.
- Calibration targets were added to the model in the positions of the monitoring wells in order to compare model-predicted results to field-observed values. Six calibration time periods were assigned throughout the test; one representing initial conditions during the steady state equilibration period, three during the loading period to capture increasing water levels and peak water levels, and two during recovery to capture the immediate and longer-term recovery of water levels following loading. The model was calibrated by evaluating the simulated water level response of each well throughout the test, as compared to the field-measured response.

The refined model was then calibrated based on loading test observations. To simulate the loading test, injection wells were added in model layer 1 for the five cells representing the location of bed #4. These five cells have a total area approximately equal to the area of the sand bed (50,000 versus 51,000 square feet) and occupy a similar geometry to the sand bed. Transient injection patterns were applied to the injection wells to represent the variable loading that occurred during the test. Model stress periods included a steady state equilibration period with no loading, followed by a transient period of 40 days during which 1.5 million gallons per day (as recorded during the loading test) was distributed between the 5 wells, and finally a second transient period of 40 days with no discharge to simulate loading test recovery.

During calibration, factors including vertical and horizontal conductivity, porosity, specific yield, and specific storage were altered iteratively in the zones surrounding the WWTF in order to best match the modeled output to observed field conditions. Initial model runs yielded excessive mounding in the wells nearest the disposal bed (>17' in well LT-2), and an underestimate of mounding in the farther afield wells. The best response was achieved by increasing conductivity in the zones surrounding the WWTF by approximately 20%, reducing

specific storage in the surface layer from 0.026 to 0.01, and reducing specific yield from 0.26 to 0.1. Mounding in the near field wells was slightly over estimated by these changes, but the outer extent of the mound was accurately captured in the mid-field wells, with minimal mounding simulated in the far field wells (as observed).

Transient model calibration involved comparing the observed water levels in the well at various times throughout the test to calculated water levels at those times. Model calibration is generally quite good with the exceptions of Wells 5-S and A14. Well 5-S had a calculated residual of 14.2 feet under background conditions (manual measurement upon logger placement). Well A14 had a calculated residual of -5.8 feet under background conditions. Average residuals across all wells were 4.45 feet (model results 4.45 feet lower than observed), including wells A14 and 5S with the poor results. Root-Mean-Square (RMS) error calculations were performed to evaluate model calibration. Excluding Well 5-S and Well A14 yielded an RMS error of 1.3 feet, which is normalized to 9.2% of the range of observed water table elevations. In addition, approximately 0.8 feet of the water level residuals between modeled and observed conditions is due to the fact that the datum of the model (NGVD 1929) is different from the datum of the well elevation survey (NAVD 1988). NGVD29 is approximately 0.8 feet higher than NAVD88 in the Plymouth area. Figure 7 depicts the simulated versus observed water levels for model calibration. Figure 8 graphically depicts the time series of modeled versus observed mounding during the loading test for selected wells. The geographical configuration of modeled versus observed mounding during the loading test is shown in Figure 9 below.

Figure 7. Model Calibration

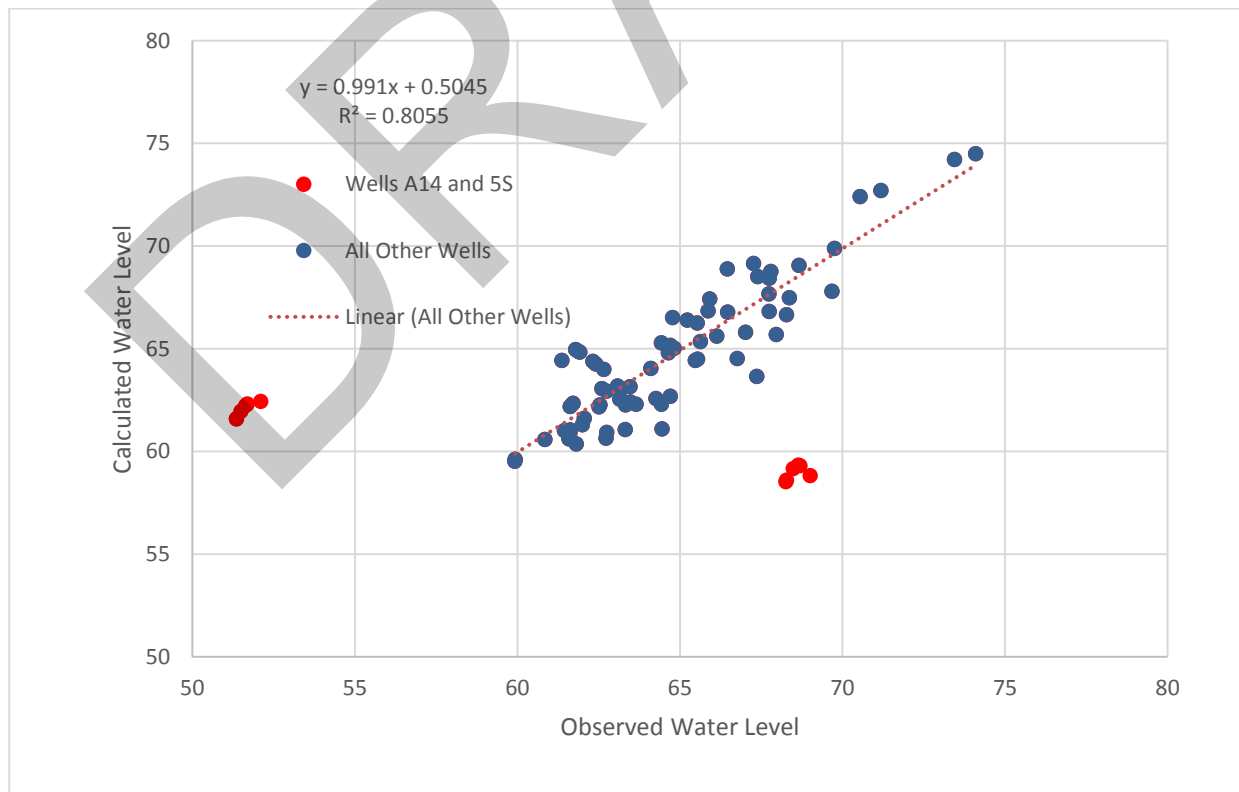
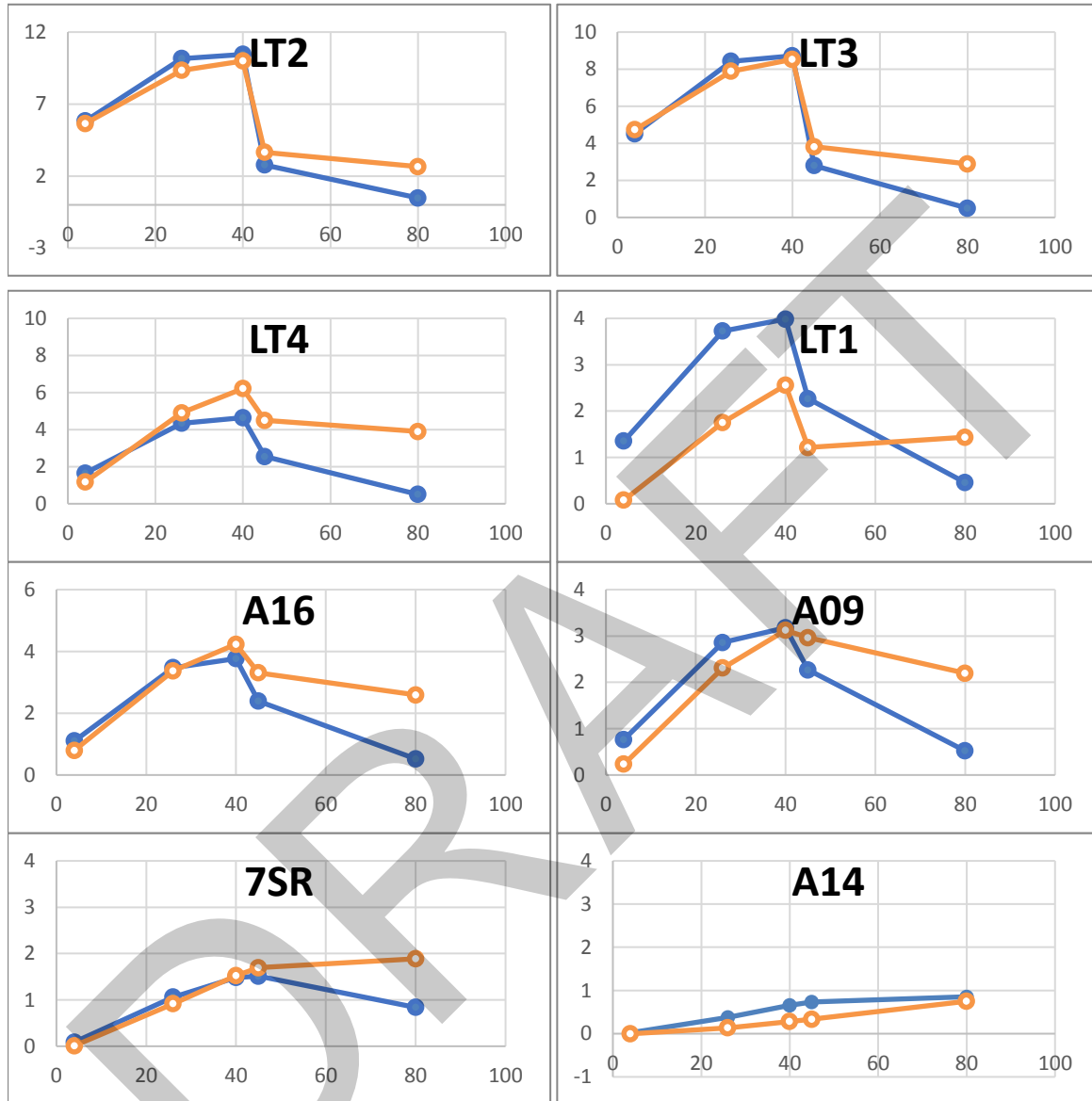
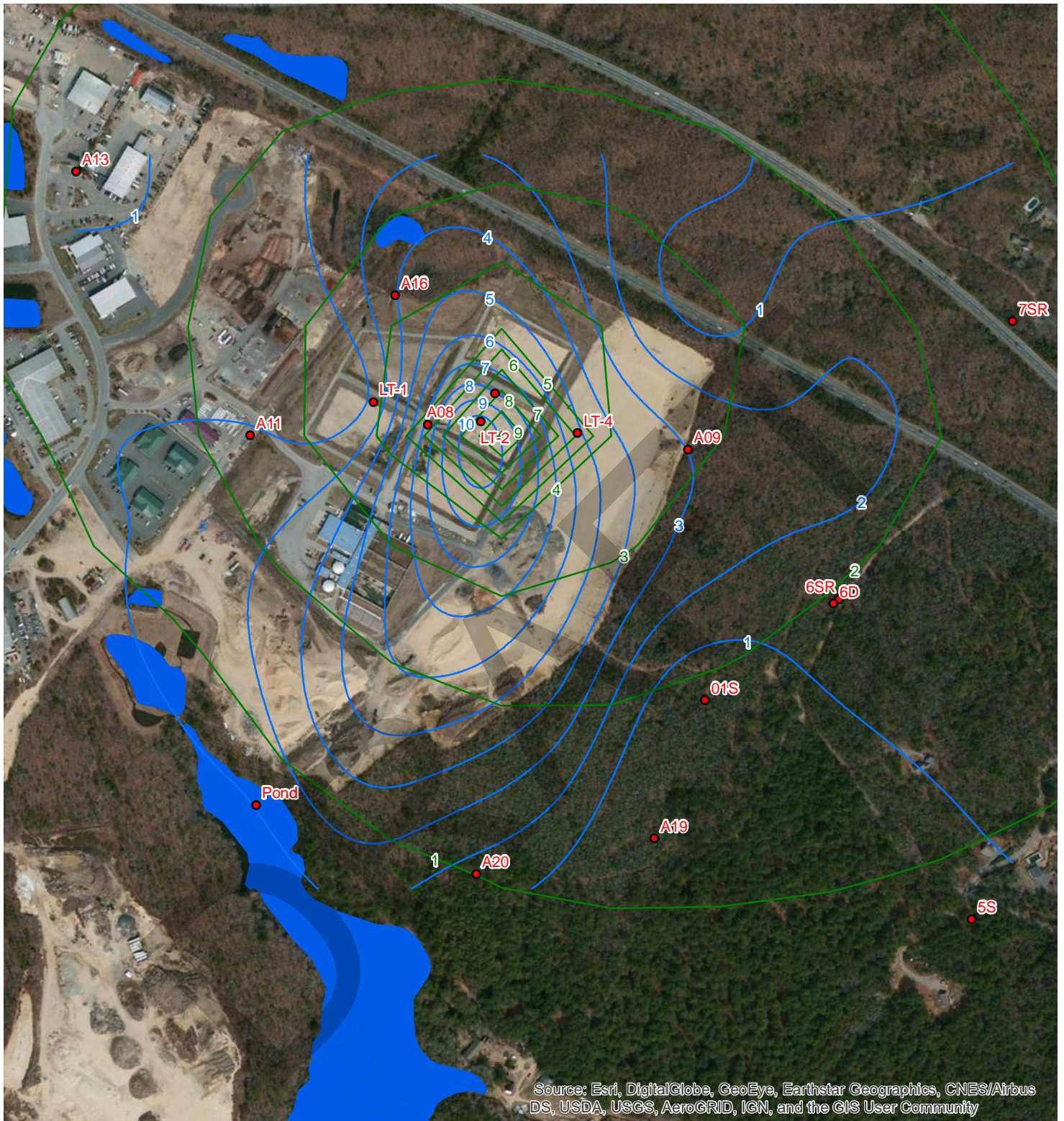


Figure 8: Time series comparisons of observed and model calculated (blue) mounding amounts at near- and mid-field wells.



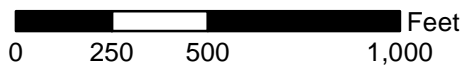
Observed (orange) and model calculated (blue) mound heights at various loading times (x-axis, in days since loading began).



Path: H:\Projects\2017\17004 Plymouth Camelot Dr WWTP Loading\GISMapsNewFigures\9_ModelVsObsMound.mxd

Legend

- Monitoring Wells
- Model Peak Mounding (ft)
- Observed Peak Mounding (ft)
- Water Features (MA DEP Wetlands)



Horsley Witten Group
Sustainable Environmental Solutions

Model Evaluation
Predicted Versus Observed
Peak Mound Height

Date: 3/28/2019

Figure 9

Groundwater Modeling Simulations

Following model calibration, the model was used to simulate steady state groundwater loading at the WWTF under two potential groundwater discharge scenarios – 1.5 MGD and 3.0 MGD. 1.5 MGD represents the approximate loading rate used during the loading test as well as a number close to the approximate overall, current, average, WWTF effluent discharge. 3.0 MGD represents the current permitted treatment capacity of the WWTF. Steady state modeling conditions simulate long-term average conditions; in this case groundwater discharge at the WWTF at the two different scenario rates occurring every day for infinity. Steady state modeling allows for an evaluation of the estimated impacts from groundwater infiltration for a time frame far longer than the duration of the loading test.

Modeled Mounding Analysis

Baseline water table elevations for the predictive steady state model were established by running a steady state simulation of the calibrated aquifer model that included no groundwater discharge at the WWTF. The model was then run with the relevant scenario WWTF discharge rates (1.5 MGD and 3.0 MGD) for infinity and those results were compared to the baseline results. Model-simulated water level changes from the baseline represents water table mounding which would occur under steady state wastewater loading at the WWTF. Under steady state loading conditions, peak mounding under the disposal beds grew to approximately 6 feet above baseline conditions for the 1.5 MGD scenario, and 12 feet for the 3.0 MGD scenario. Figure 10a and 10b depict the steady state water table configuration with 1.5 MGD and 3.0 MGD of WWTF disposal, respectively, and Figures 11a and 11b depict the steady state groundwater mound under those same respective conditions. Mounding does not increase to the south of the WWTF as much as to the north due to drainage through the Warren Wells Brook discharge boundary.

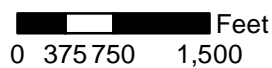


Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Path: H:\Projects\2017\17004 Plymouth Camelot Dr WWTP Loading\GISMapsNewFigures\10a_1p5mgd_table.mxd

Legend

- Monitoring Wells
- Water Features (MA DEP Wetlands)
- 1.5 mgd Model Water Table



Horsley Witten Group
Sustainable Environmental Solutions



Steady State Discharge
Water Table Contours
1.5 MGD Scenario

Date: 3/28/2019

Figure 10a

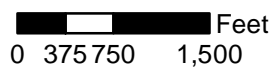


Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Path: H:\Projects\2017\17004 Plymouth Camelot Dr WWTP Loading\GISMaps\NewFigures\10b_3mgd_table.mxd

Legend

- Monitoring Wells
- Water Features (MA DEP Wetlands)
- 1.5 mgd Model Water Table



Horsley Witten Group
Sustainable Environmental Solutions



Steady State Discharge
Water Table Contours
3 MGD Scenario

Date: 3/28/2019

Figure 10b

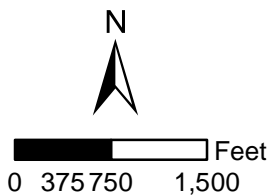


Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Path: H:\Projects\2017\17004 Plymouth Camelot Dr WWTP Loading\GISMaps\NewFigures\11a_1p5mgd_mound.mxd

Legend

- 1.5 mgd Model Mound
- Monitoring Wells
- Water Features (MA DEP Wetlands)



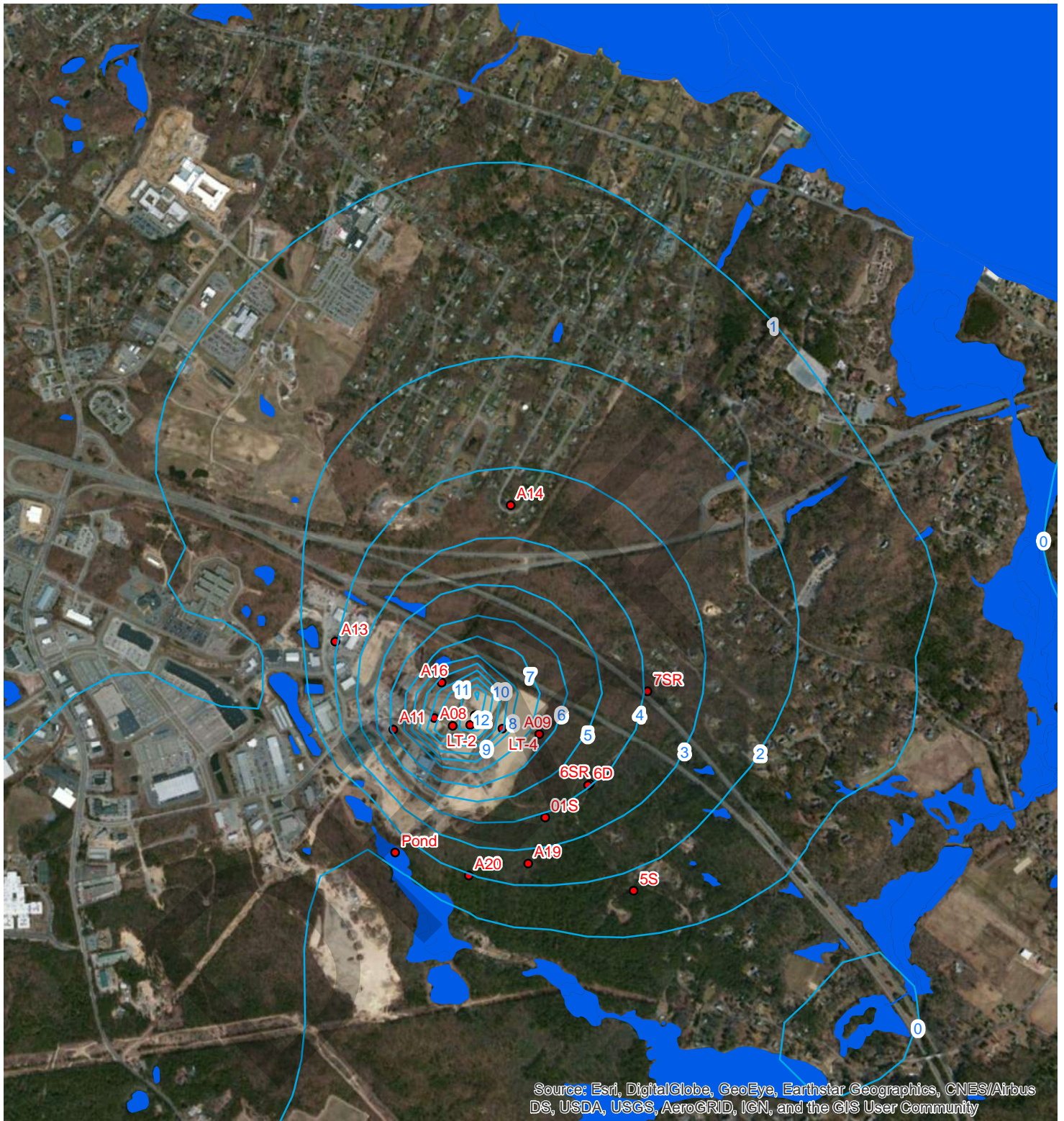
Horsley Witten Group
Sustainable Environmental Solutions



Steady State Discharge
Mound Height
1.5 MGD Scenario

Date: 3/28/2019

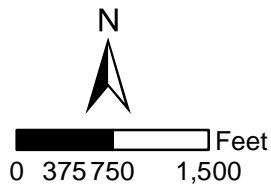
Figure 11a



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Legend

-  3.0 mgd Mound
-  Water Features (MA DEP Wetlands)
-  Monitoring Wells



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Sustainable Environmental Solutions

Steady State Discharge
Mound Height
3 MGD Scenario

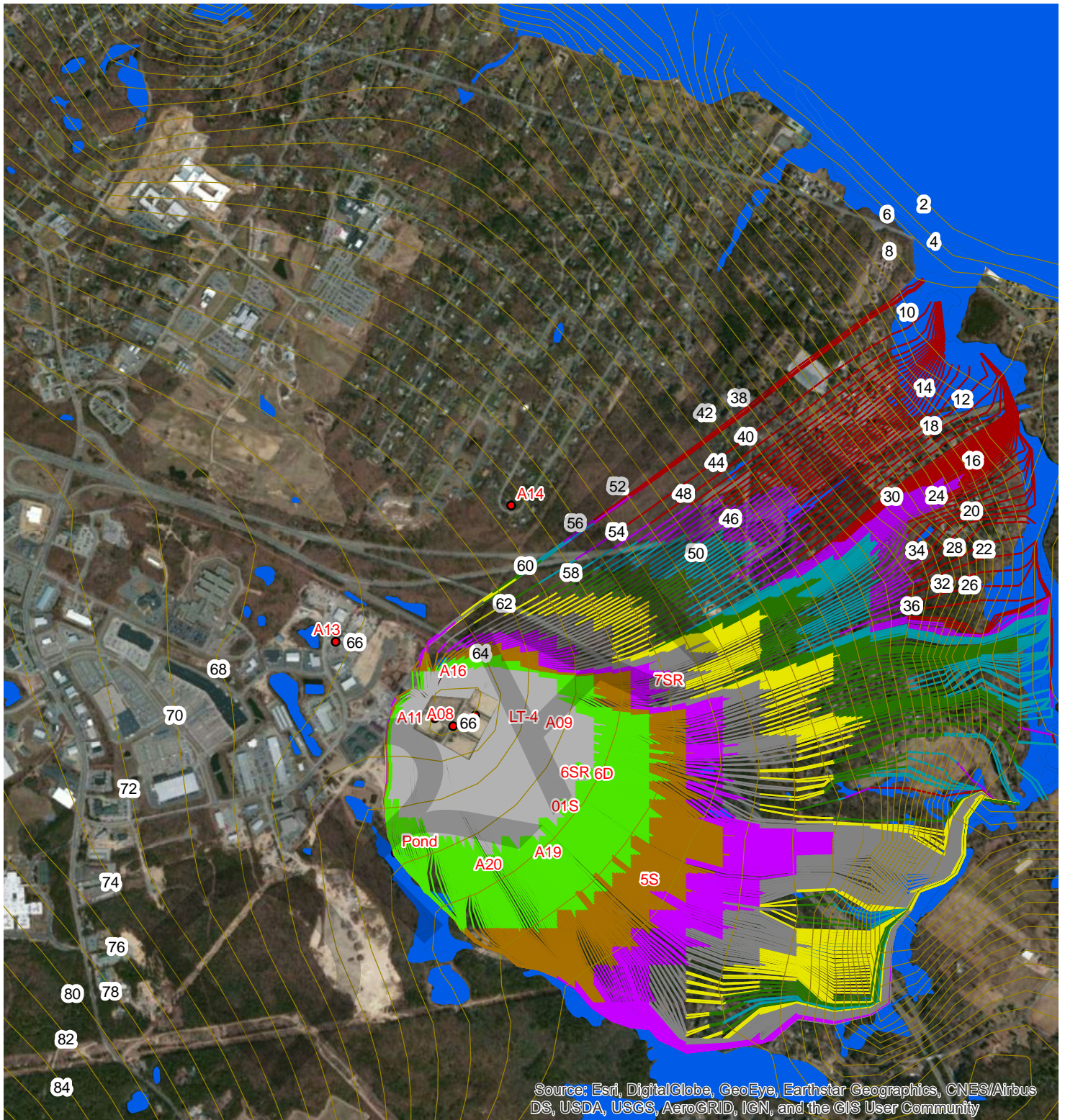
Date: 3/28/2019

Figure 11b

Fate and Transport Analysis

Particle tracking analysis was undertaken to simulate how groundwater is anticipated to migrate away from the WWTF under the same steady state scenario conditions of WWTF discharge (1.5 MGD and 3.0 MGD). Particles were arranged surrounding the disposal beds to track the fate and transport of wastewater after discharge at the WWTF. As shown on Figures 12 a and 12b for the 1.5 MGD and 3.0 MGD scenarios, respectively, all particles terminate in either Warren Wells Brook or somewhere along the Eel River. In general, particle end points are fairly evenly distributed along the river with a somewhat greater concentration terminating along the upper reaches.


The particle pathlines on Figures 12a and 12b are also color coded to depict approximate groundwater travel times. Approximate travel times range from two to more than ten years before discharge to surface waters with the shortest travel times corresponding to the shorter travel distances to Warren Wells Brook and upper reaches of the Eel River, and the longest travel times to the tidally-influenced portion of the lower Eel River. Travel times decrease slightly under the 3.0 MGD discharge scenario, relative to the 1.5 MGD scenario, due to the higher flow velocities created by the steeper groundwater gradient with the higher groundwater mound. The larger groundwater mound under the 3.0 MGD scenario also allows the shape of the transport pattern to fan out to a slightly wider plume shape than is the case for the 1.5 MGD scenario. All travel times are planning-level approximations based upon existing information in the groundwater model. In reality, groundwater travel times are quite complex and influenced by spatially variable aquifer characteristics that the model does not fully depict at such a fine resolution.



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Legend

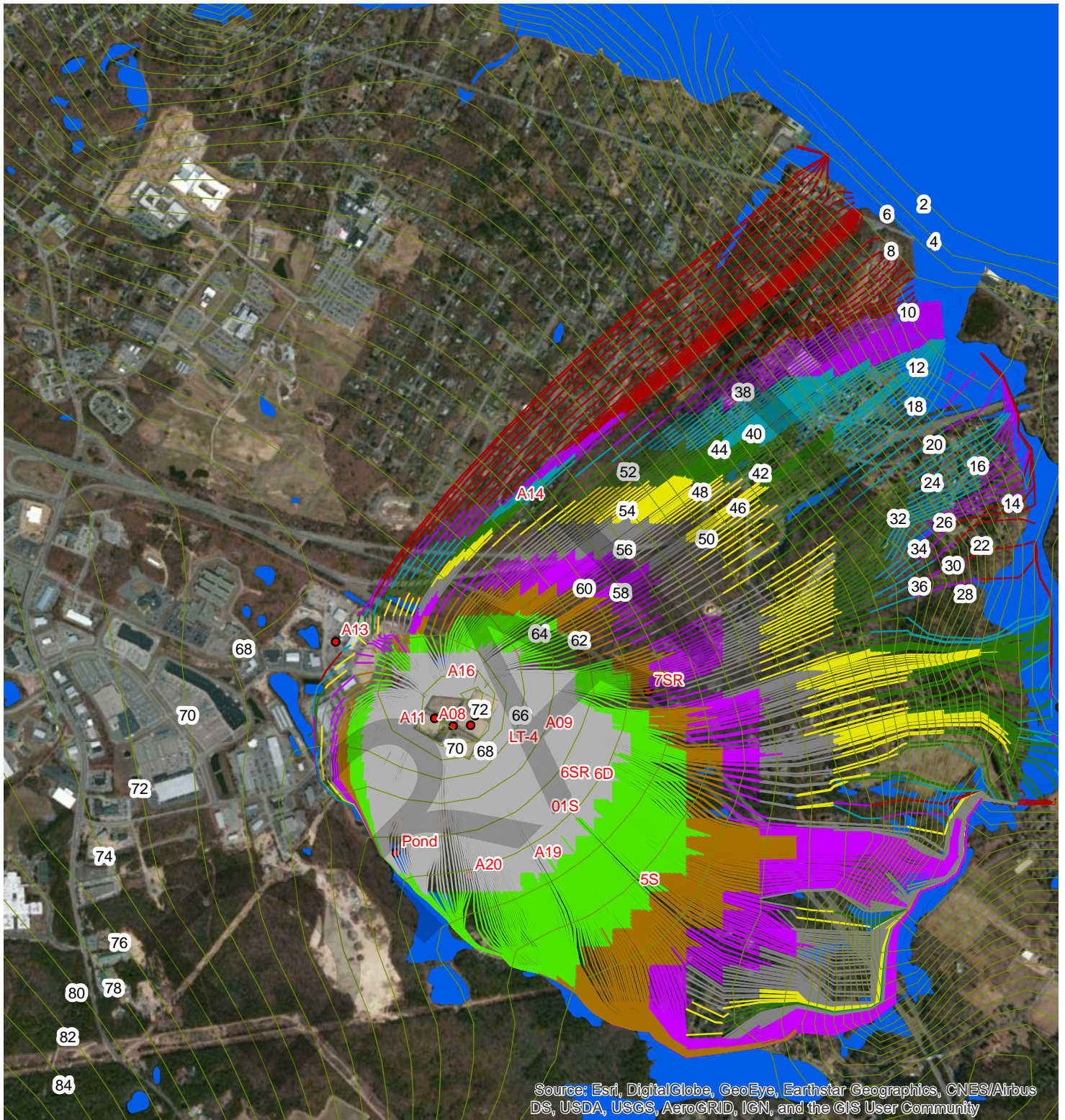
- 1.5 mgd Simulated Water Table
- 1.5 mgd Stead State Discharge**
- Year 1
- Year 2
- Year 3
- Year 4

- Year 5
 - Year 6
 - Year 7
 - Year 8
 - Year 9
 - Year 10+
- N
- 
- 0 375 750 1,500 Feet

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**Steady State Discharge
Particle Fates and Travel Times
1.5 MGD Scenario**

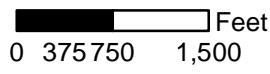


Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Path: H:\Projects\2017\17004 Plymouth Camelot Dr WWTP Loading\GISMaps\NewFigures\190328_3mgd_pathlines.mxd

Legend

- 3 mgd Simulated Water Table
- 3 mgd Steady State Discharge**
- Time2**
- Year 1
- Year 2
- Year 3
- Year 4
- Year 5
- Year 6
- Year 7
- Year 8
- Year 9
- Year 10+



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**Steady State Discharge
Particle Fates and Travel Times
3 MGD Scenario**

Date: 3/28/2019

Figure 12b

5.0 HYDRAULIC IMPACT ASSESSMENT

From a hydraulic standpoint, potential impacts from increased groundwater discharge at the WWTF consist of locations where elevated groundwater elevations might impact existing infrastructure. In this case, such infrastructure includes the WWTF disposal beds themselves as well as surrounding commercial and residential properties with septic systems and/or basements that might be impacted by increased groundwater levels. For the WWTF disposal beds, the current depth to water from the bottom of the disposal beds is approximately 20 feet. With a steady state, simulated, peak groundwater mound beneath the beds of approximately 6 feet under 1.5 MGD loading conditions, approximately 14 feet of unsaturated separation from groundwater is expected to remain. The steady state, simulated, peak groundwater mound beneath the beds increases to approximately 12 feet under 3.0 MGD loading conditions, leaving approximately 8 feet of unsaturated separation from groundwater. Therefore, potential steady state groundwater discharges of either 1.5 MGD or 3.0 MGD are not anticipated to impact the utility of the disposal beds.

Regarding neighboring properties, low-lying properties with potential to be impacted by increased groundwater elevations were previously evaluated in the 1990s as part of the FS/EIR conducted prior to permitting the WWTF. Several small areas of potential low properties were identified along Russel Mills Road downgradient of the WWTF, but impact to those properties was deemed unlikely and the WWTF was permitted and constructed. To HW's knowledge, the Town is unaware of any reported issues from elevated groundwater levels since the WWTF became operational. Also, to HW's knowledge, no impacts to the commercial properties surrounding the WWTF were ever anticipated or realized.

HW has repeated a general assessment of the potential for groundwater impacts to low-properties here similar to what was done during the FS/EIR process, but taking advantage of more accurate data that is currently available. Those locations identified as being potentially low from the FS/EIR were given special consideration in this analysis. To conduct this assessment HW utilized high accuracy, light detection and ranging (LiDAR) topography data available from MassGIS and compared that to the modeled, steady state, water table configuration that includes 1.5 MGD of WWTF discharge. By subtracting those two sets of contoured data, depth to mounded groundwater contour maps were created. Those maps are included herein as Figures 13a and 13b, with locations with 15 feet or less of separation from the mounded water table highlighted. Individual, developed parcels are also highlighted where both the simulated separation from the mounded water table is 15 feet or less and the simulated groundwater mound height is approximately 2 feet or more. These highlighted, developed parcels are conceptually those with the potential to be negatively impacted by increased groundwater discharge at the WWTF, as opposed to just being naturally low-lying.

A separation distance of less than 15 feet was selected for highlighting both because that was the same number used in the FS/EIR analyses during the 1990s, and because it allows for a margin of error to account for potential data inaccuracies. In actuality, basements or septic system components are unlikely to be greater than 8 to 10 feet below ground surface so the use of a 15-foot separation distance highlight allows for between 5-7 feet of margin of error. Potential sources of data inaccuracy related to the separation from groundwater estimates include:

- The datum difference between the groundwater model (NGVD29) and the LiDAR topography (NAVD88) means that the groundwater separation shown on Figures 13a and 13b are approximately 0.8 feet less than is actually estimated;
- The fact that groundwater modeling simulations of the potential mounded water table height are simulations and actual groundwater conditions may differ from simulated conditions;
- The fact that the actual elevations of basements, septic systems, or other infrastructure have not been surveyed and are, therefore, not accurately known; and
- The fact that LiDAR data, while highly accurate from a remote sensing standpoint, is not as accurate as ground-based topographical survey on a site-specific basis.

As can be seen from Figures 13a and 13b, most of the areas with an estimated depth to groundwater of 15 feet or less already meet that criteria under existing conditions with no simulated WWTF groundwater loading. The addition of simulated wastewater loading at, 1.5 MGD first, and 3.0 MGD next, only add relatively minor additional areas around the peripheries of the natural low-lying areas.

There are three general areas with developed parcels that are both within the mapped extent of the simulated 2-foot steady state groundwater mound, and where the land surface has an estimated separation from the mounded water table of 15 feet or less. Those three areas are the Camelot Drive industrial park area, an area of East Russell Mills Road, and a small area at the southern end of Curtis Drive. According to Town staff, properties in the industrial park do not have basements and are not currently connected to Town sewer. However, connection of Camelot Drive to Town sewer is planned as part of the next phase of sewer expansion. It is an objective of the Town, as part of the Comprehensive Wastewater Master Plan, to install municipal sewer in Camelot Drive, and the Town will be requesting funding at the 2020 Annual Town Meeting. Therefore, only those properties along East Russell Mills Road and Curtis Drive are anticipated to require further evaluation from a hydraulic impact standpoint.

On Figure 13a it can be seen that only approximately a half dozen parcels along East Russell Mills Road, and three others along Curtis Drive, are simulated to meet both the 2-foot groundwater mound height and the less than 15 feet of separation from the mounded water table criteria under the 1.5 MGD scenario. Most of those parcels are already less than 15 feet above groundwater under existing conditions. The 1.5 MGD loading scenario appears likely to add zero parcels on Curtis Drive, and perhaps two on East Russell Mills Road, tripping that criteria relative to existing conditions. On Figure 13b it can be seen that zero to, perhaps, one additional parcel each are added along Curtis Drive and East Russell Mills Road when simulated groundwater loading is increased to 3.0 MGD. With the exception of the WWTF disposal beds themselves, the areas highlighted on Figure 13b to have 15 feet or less of separation from the mounded water table expand only minimally under 3.0 MGD steady state discharge conditions, as compared to 1.5 MGD conditions.

It is recommended that further research be conducted to survey or determine the actual elevations of basement floors and septic system components within the identified areas of Russell Mills Road and Curtis Drive be conducted to further evaluate if any potential risks to infrastructure are anticipated. In addition, Title V septic system inspections should be conducted for those systems where site-specific survey indicates a likely shallow depth to groundwater under existing conditions. These inspections would document systems which may

be already non-compliant under existing conditions, prior to any potential future increase of groundwater loading at the WWTF.

According to Town staff, during the initial permitting process for the WWTF in the 1990s, the Town conducted repairs on the Hayden Pond dam on the Eel River in order to mitigate against any potential, though not anticipated, flow impacts from WWTF-induced groundwater mounding. The Town also paid the private dam owner at Russell Mills Pond, also on the Eel River, to conduct their own repairs for the same purposes. Mitigation for any potential, though unanticipated, flow impacts from groundwater mounding to dams has, therefore, already been completed.

The groundwater mounding evaluation conducted during this study shows less than one foot of groundwater mounding along the entire length of the Eel River, even under the 3.0 MGD scenario (Figure 11b). Due to the free-flowing nature of the river (hydraulic conductivity three orders of magnitude higher than the surrounding aquifer), any changes in actual river level would be significantly less than in the surrounding aquifer. Groundwater mounding from increased WWTF groundwater discharge will increase baseflow to the Eel River in general but, because groundwater flow from the WWTF is distributed to discharge along the entire length of the Eel River, as well as directly to the Harbor, any flow increase in the Eel River resulting from WWTF groundwater mounding will spread over a large area, diminishing the potential for concentrated, negative flow impacts at any one location. Overall, potential changes in Eel River flow resulting from WWTF groundwater mounding will be small relative to natural climatic variations. Therefore, no significant risk is anticipated for in-river structures, such as bridges and dams, as a result of groundwater mounding at the WWTF.

In addition to potential impacts to infrastructure, it should be noted that groundwater discharge at the WWTF will increase the groundwater gradient between the WWTF and both Warren Wells Brook and the Eel River. That increased gradient is included in the figures and analyses presented herein regarding fate and transport of groundwater beneath the WWTF. Potential water quality impacts to surface waters resulting from both the disposal of treated effluent itself and the increased groundwater gradient will need to be further evaluated.

6.0 SUMMARY

The results of the loading test and subsequent modeling suggest that the hydrogeologic setting underlying and surrounding the WWTF has the capacity to accept the groundwater discharge of at least 3.0 MGD of treated effluent. Peak mounding beneath the disposal beds during the full-scale, 1.5 MGD loading test was approximately 10 feet and simulated steady state peak mounding at 1.5 MGD is approximately 6 feet. This discrepancy is due to the fact that during the loading test the entire 1.5 MGD was directed to one disposal bed, while the steady state simulation spreads that volume out over all five disposal beds. Under the 3.0 MGD steady state discharge scenario the peak mound height beneath the beds increases to approximately 12 feet.

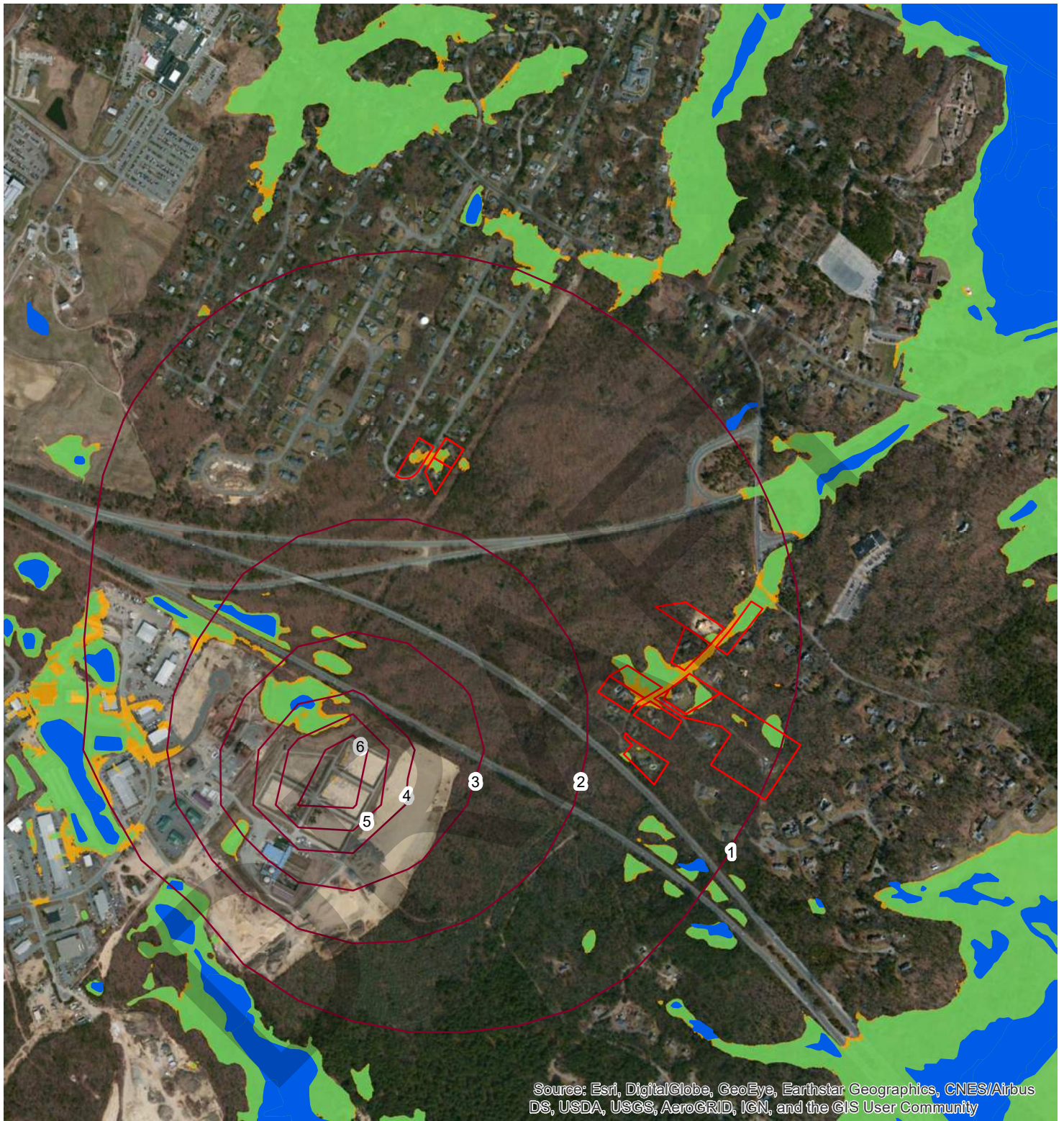
Available unsaturated thickness beneath the disposal beds is estimated to be 14 feet under the 1.5 MGD steady state scenario and 8 feet under the 3.0 MGD steady state scenario. Under the 1.5 MGD steady state scenario, the modeled two-foot groundwater mound reached out

approximately 700 feet to south, 1,500 feet to the east, 1,700-feet to the north, and 700 feet to the west. Under the 3.0 MGD steady state scenario, those distances increase to approximately 1,200 feet to south, 3,200 feet to the east, 3,600 feet to the north, and 1,100 feet to the west.

No infrastructure was identified as being likely to be impacted by elevated groundwater under either modeled 1.5 MGD or 3.0 MGD discharge conditions. Approximately a half-dozen developed parcels along Russel Mills Road and three along Curtis Drive were identified to have a separation from groundwater of less than 15 feet under steady state mounding conditions under the 1.5 MGD. Several additional parcels along Russell Mills Road were identified to meet those criteria under the 3.0 MGD scenario, with no additional parcels meeting those criteria along Curtis Drive. According to Town staff, properties in the industrial park proximal to the WWTF do not have basements and are not connected to Town sewer. However, connection of Camelot Drive to Town sewer is planned as part of the next phase of sewer expansion. It is an objective of the Town, as part of the Comprehensive Wastewater Master Plan, to install municipal sewer in Camelot Drive, and the Town will be requesting funding at the 2020 Annual Town Meeting.

The areas simulated to have less than 15 feet of separation from groundwater increase slightly, relative to existing conditions, with the simulated addition of 1.5 MGD of WWTF disposal. Only a few developed parcels appear likely to cross that 15-foot separation criteria as a result of WWTF disposal under the 1.5 MGD scenario. The areas meeting that criteria increase slightly more moving from the 1.5 MGD to the 3.0 MGD scenarios, but the number of properties at potential risk does not change appreciably. Further investigation of the elevations of basements and septic systems, and Title V septic system inspections, are recommended for those parcels within the highlighted areas of less than 15 feet of estimated groundwater separation.




Sensitive receptors to near the WWTF include the Eel River and its tributaries, which would see increased groundwater contributions due to groundwater discharge at the WWTF. Further study is needed to determine the extent of water quality impacts on these river systems under proposed discharge scenarios. No public drinking water supplies or other potential sensitive receptors are located near the WWTF.






Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community


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Legend

-  Water Features (MA DEP Wetlands)
-  Monitoring Wells
-  Developed parcels with a simulated mound height of approximately 2 ft AND separation from simulated mounded seasonal high ground water \leq 15 feet

Depth to Groundwater less than 15 feet given...

-  Existing conditions
-  1.5 mgd Discharge Scenario
-  1.5 mgd Pumping Scenario Simulated Mound Height (feet)

 Feet
0 250 500 1,000



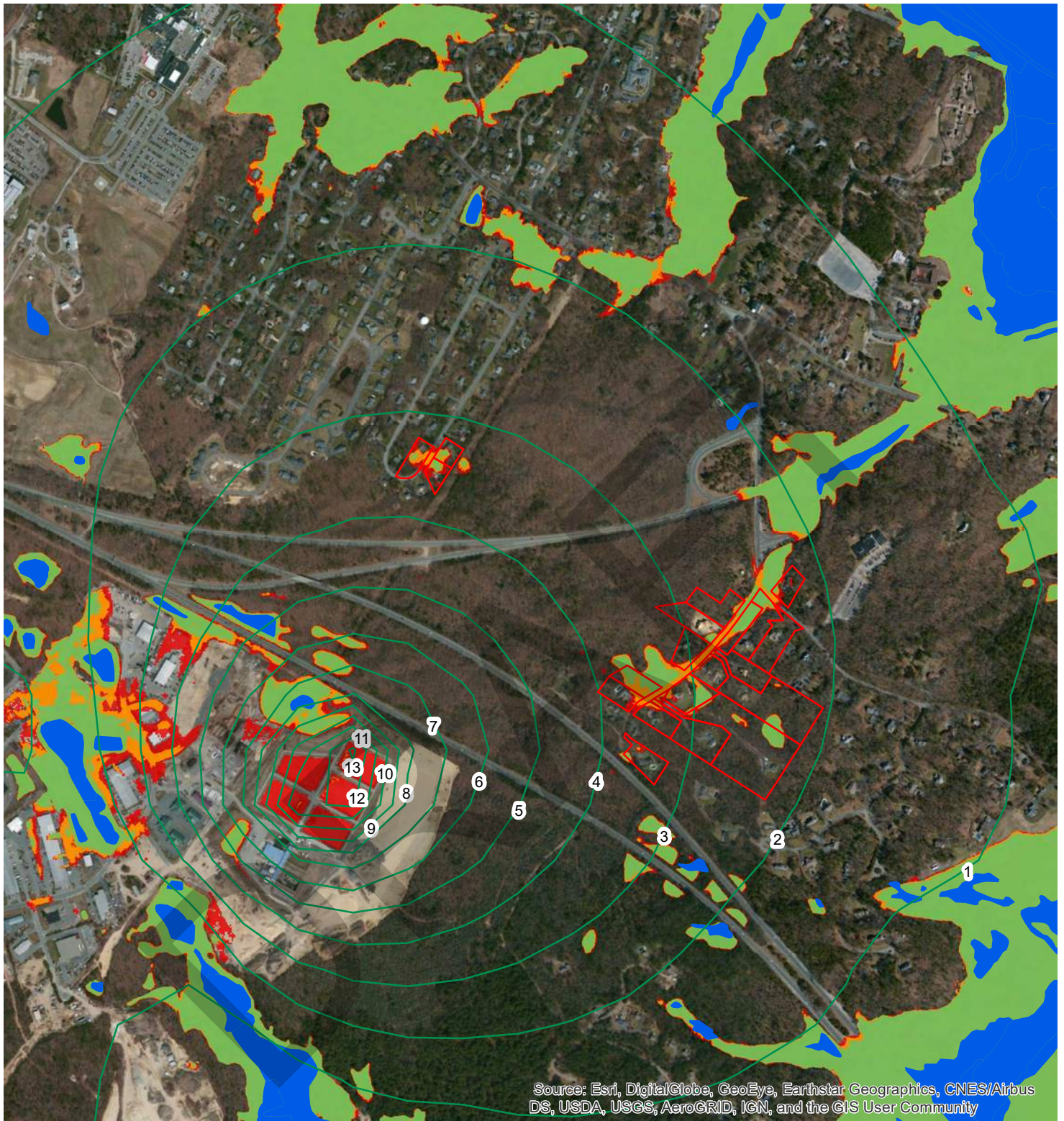
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Depth to Water Table
Areas Within 15 ft of Surface
Model Output - 1.5 mgd





Date: 7/25/2019

Figure 13a






Path: \\hw-file2\HW-Server\Projects\2017\17004 Plymouth Camelot Dr WWTP Loading\GIS\Maps\NewFigures\13b_depthToGW3.mxd

Legend

-  Water Features (MA DEP Wetlands)
-  Monitoring Wells
-  Developed parcels with a simulated mound height of at least 2 ft AND separation from simulated mounded seasonal high ground water ≤ 15 feet
-  3 mgd Pumping Scenario Simulated Mound Height (feet)

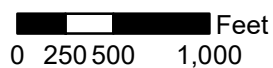
Depth to Groundwater less than 15 feet given...

-  Existing Conditions
-  1.5 mgd Discharge Scenario
-  3 mgd Discharge Scenario

Horsley Witten Group
Sustainable Environmental Solutions



Depth to Water Table
Areas Within 15 ft of Surface
Model Output - 3 mgd



Date: 7/25/2019

Figure 13b

APPENDIX 1 – MassDEP Correspondence



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Southeast Regional Office • 20 Riverside Drive, Lakeville MA 02347 • 508-946-2700

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

June 26, 2018

Jonathan Beder, DPW Director
Town of Plymouth
159 Camelot Drive
Plymouth, MA 02360

RE: PLYMOUTH- BWR-Groundwater
Discharge Permit SE # 677-1
Loading Test Conditional Approval

Dear Director Beder:

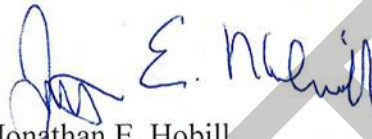
The Department of Environmental Protection (MassDEP) has received the proposal, dated June 26, 2017, to perform a hydraulic loading test with treated effluent at the existing effluent disposal site. The proposal was submitted by Horsley and Witten Group on behalf of the Town of Plymouth (the Town). The current Groundwater Discharge Permit (SE #677-1) allows the town to discharge an annual average of 0.75 million gallons per day (MGD), not to exceed a maximum of 3.45 MGD to the disposal beds at the Camelot Drive Wastewater Treatment Facility. MassDEP approves the proposed loading test with the following conditions:

- All terms and conditions of the permit SE 677-1 remain in effect with the exception that the condition "Flows to the ocean outfall shall be maximized" is suspended for the time that effluent is directed to the disposal beds.
- MassDEP shall be notified 48 hours before the loading of the disposal beds begins and when the loading of the beds ends
- In order to estimate the total nutrient load during the loading test, samples of total nitrogen (nitrite, nitrate, TKN), ortho and total phosphorus shall be taken and analyzed on a weekly basis starting on the first day of the loading test. The samples shall be 24 hour composite samples.
- The test shall be terminated or immediate actions take to mitigate the condition(s) if wastewater is observed on the ground surface (either through overland flow or groundwater breakout) outside of the discharge bed area.
- A report of the loading test results shall be submitted to this office

If, in the future, the Town desires to increase the maximum flow for the Groundwater Discharge Permit, a draft scope of work for a Hydrogeological Evaluation pursuant to 314 CMR 5.09 must be submitted to begin the approval process for increased flow.

Please provide this office with a copy of the results of the loading test upon completion. If you have any questions, please contact David Burns at (508) 946-2738.

Sincerely,



Jonathan E. Hobill
Regional Engineer

Ecc: DEP SERO:
ATTN: Brett Rowe, BWR
Kermit Studley, BWR
Jeffrey Gould, BWR
David R. Burns BWR
DEP-Boston
ATTN: Marybeth Chubb

Cc: Gary Frizzell, Wastewater Supt.
Town of Plymouth
131 Camelot Drive
Plymouth, MA 02360

Neal M. Price, Senior Hydrogeologist
Horsley Witten Group, Inc.
90 Route 6a, Unit 1
Sandwich, MA 02563



June 26, 2017

Mr. Jeffrey Gould
Massachusetts Department of Environmental Protection
Wastewater Program
20 Riverside Drive
Lakeville, MA 02347

RE: Town of Plymouth - Camelot Drive WWTF Revised Loading Test Proposal

Dear Mr. Gould:

The Horsley Witten Group, Inc. (HW) is assisting the Town of Plymouth with an evaluation of the potential to increase the application of treated effluent at the Town's existing Camelot Drive Wastewater Treatment Facility (WWTF) groundwater disposal beds. This revised proposal is sent in response to feedback from our April 2017 meeting with the Massachusetts Department of Environmental Protection (MassDEP). This revised proposal includes analysis of existing data from a time period last summer when the WWTF disposal beds were receiving significant effluent flow.

The Town's current Groundwater Discharge Permit (GWDP) calls for the first 1.75 million gallons per day (MGD) of treated effluent from the WWTF to be discharged to Plymouth Harbor through the Town's ocean outfall. Under the current GWDP, only flows in excess of 1.75 MGD are discharged to groundwater at the Camelot Drive disposal beds, up to a limit of 0.75 MGD.

Rationale for Increased Groundwater Discharge

The motivation behind pursuing the proposed increase in groundwater discharge is to improve water quality in the Harbor and increase groundwater recharge for the aquifer. While groundwater discharge of treated effluent at Camelot Park still ultimately reaches the Harbor through either direct groundwater flow or groundwater discharge to the Eel River, groundwater discharge at Camelot Park significantly increases the travel time (compared to direct outfall discharge to the Harbor) for treated effluent to reach the Harbor and allows opportunities for additional in-situ treatment of the treated effluent along its path through geochemical, biological, and physical processes.

Due to the increased travel time and treatment for groundwater discharge of treated effluent, increased proportional use of the Camelot Drive disposal beds would have multiple environmental benefits, including:

- Improved water quality in the Harbor and Plymouth/Kingston/Duxbury (PKD) Bay to support shellfishing, aquaculture, eelgrass, and recreational interests.

- Reduced loading of pathogens to the Harbor. This will help the Town address anticipated concerns from the federal Food and Drug Administration (FDA) regarding viruses in the WWTF effluent that may persist in the Harbor environment long enough to pose health risks. On this point, a dye study is planned for later this summer to better estimate the residence time of WWTF effluent in the Harbor.
- Increased recharge/retention of fresh groundwater within the Plymouth-Carver Aquifer (PCA) to support baseflow to the Eel River and, potentially, Town Brook; and
- Increased recharge of groundwater to offset public drinking water withdrawals and provide mitigation to meet MassDEP Water Management Act (WMA) requirements.

We are aware that increased disposal of treated effluent at the Camelot Drive disposal beds may increase nutrient loading to the Eel River. Past analyses have indicated that nutrient loading to the Eel River from the current WWTF disposal at Camelot Drive is unlikely to create significantly adverse environmental impacts. However, we recognize that additional assessments will be required to evaluate the potential impacts to the Eel River under potential future scenarios of increased groundwater discharge of treated effluent prior to final permitting of an amended GWDP. We are currently proposing a loading test that would be limited to an assessment of the hydraulic/ groundwater mounding impacts of increased groundwater discharge at the Camelot Drive WWTF. If the hydraulic impact assessment proves successful, water quality impact assessments would be conducted before proceeding to permitting for increased groundwater discharge at Camelot Drive.

Prior Loading Test Proposal

MassDEP, on December 7, 2015, previously approved a loading test proposal for the Camelot Drive WWTF site. That test was never conducted. This revised proposal differs from that prior proposal in several ways regarding both flow rate and monitoring methodology. However, the differences are relatively minor and the concept behind the test remains the same. The main impetus behind this currently proposed change in methodology is the fact that during emergency conditions created in 2016 by sewer force main leaks, 100% of the WWTF effluent was applied to the Camelot Drive disposal beds for extended periods of time with no observed ill impacts. This has led us to believe that the loading test should be conducted at a higher application rate than previously approved in order to maximize the hydraulic response from the test and better evaluate the potential groundwater mounding impacts from increased groundwater disposal. The closer the test application rate is to the proposed new groundwater discharge rate, the more reliable the potential impact assessment will be. In addition, this current proposal includes conducting monitoring of all wells with automated data loggers to improve data resolution.

Analysis of Summer 2016 Discharges to Groundwater Disposal Beds

Due to operational limitations caused by the 2016 sewer force main breaks, mentioned above, 100 % of the WWTF effluent was discharged to the Camelot Drive disposal beds during the summer of 2016. Based on data provided by the Town, large volume effluent discharge to the

disposal beds began on June 13, 2016 and lasted until November 13, 2017. Over that approximately five month time period effluent discharge to the disposal beds averaged approximately 1.51 MGD. There was no specific monitoring plan in place during this summer 2016 high volume groundwater disposal bed use period. However, regular monthly GWDP monitoring of water levels and water quality occurred, as usual, for the various wells in the vicinity of the disposal beds. The following analyses are based upon the regular monthly monitoring data for those wells routinely sampled as part of the GWDP requirements, through the end of 2016, as supplied by the Town.

Figure 1 depicts the WWTF disposal beds and the surrounding groundwater wells proposed for the current loading test. Data from a subset of those Figure 1 wells, those closest to the disposal beds, were analyzed for potential effects from high volume summer 2016 groundwater disposal. We looked at changes in groundwater elevation (groundwater mounding) and changes in water quality that may have potentially occurred as a result of the summer 2016 high volume groundwater disposal period. In order to normalize the water level data from the WWTF area wells for background changes unrelated to WWTF activity, we also downloaded data from the USGS Index Well PWW-494 located in Myles Standish State Forest and included those index well data in our analyses.

Figures 2A, 2B, and 2C depict the groundwater level changes over an approximately one-year time period for near-field wells, mid-field wells, and far-field wells, respectively, relative to their distance from the disposal beds. USGS Index Well data is included on all three figures for comparison. The summer 2016 high volume groundwater disposal period is highlighted gray on these figures. Because measuring point (MP) elevations have not yet been surveyed for any of these wells, all water levels are depicted as depths to water (DTW). That means that patterns of rising and falling water levels appear inverted on the graphs (i.e., rising water levels show as a downward trend on the DTW graphs, and vice versa). That also means that the vertical position of any well on the graph relative to another has more to do with the relative topographic positions of those wells than it does with any groundwater elevation differences.

Figure 2A. Groundwater Levels of Near-Field Wells

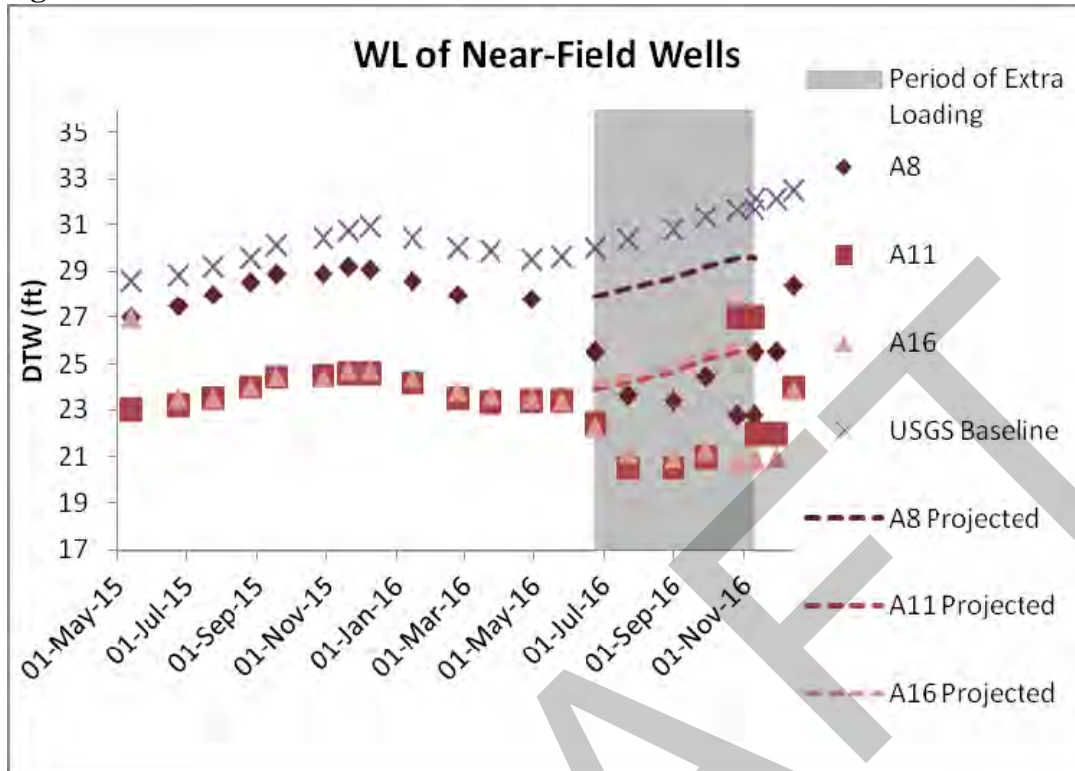


Figure 2B. Groundwater Levels of Mid-Field Wells

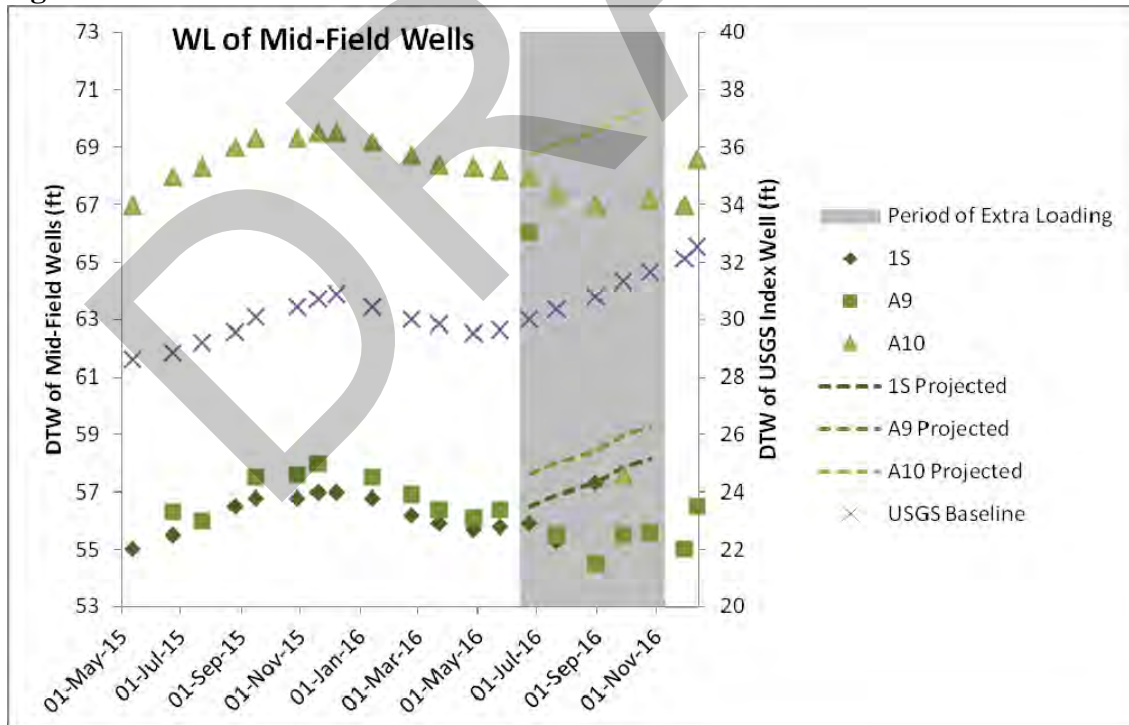
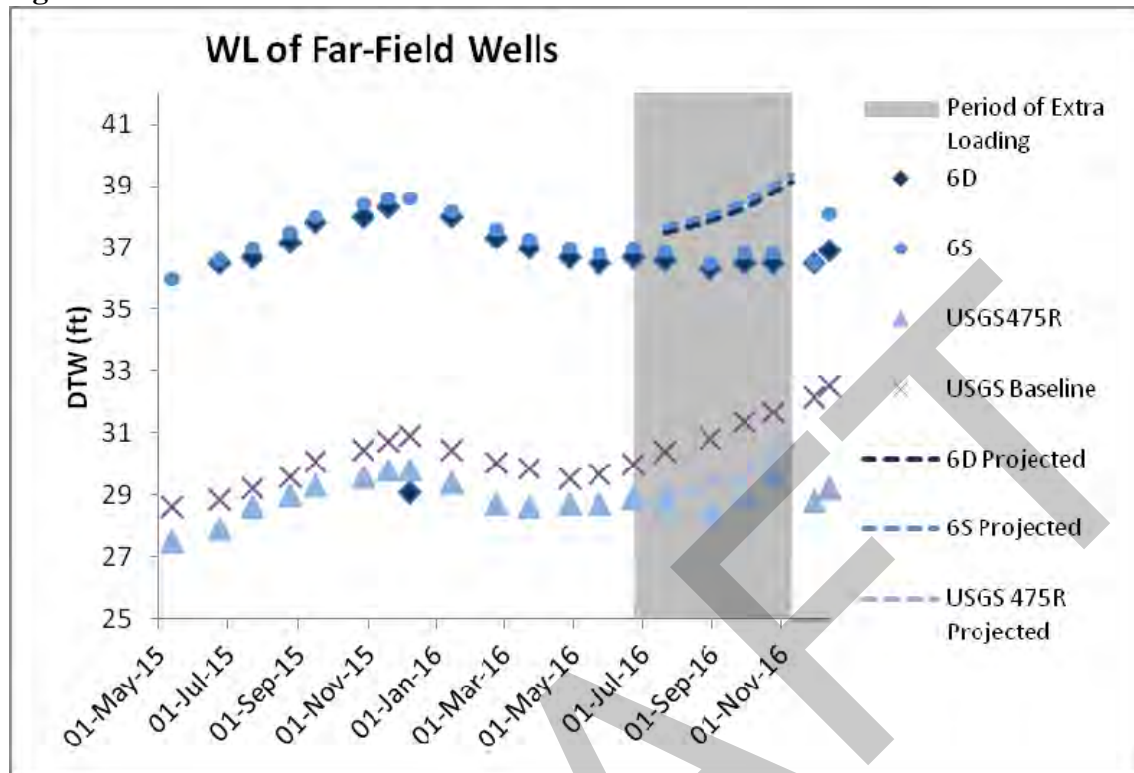


Figure 2C. Groundwater Levels of Far-Field Wells



It can be clearly seen from Figures 2A, 2B, and 2C that water level changes in the vicinity of the WWTF closely mimic those observed at the USGS Index Well prior to the summer 2016 high volume groundwater disposal period. During that disposal period, the water level patterns sharply diverge. Water levels at the USGS Index Well over that period show a steady drop of approximately three feet (i.e., increasing DTW) in response to the significant 2016 drought. In contrast water levels in the vicinity of the WWTF show a sharp and opposite reaction of rising water levels (i.e., decreasing DTW). For visual comparison, Figures 2A, 2B, and 2C also depict projected trends for each well of how water levels would have been expected to behave, by comparison to the USGS Index Well data, were it not for the influence of groundwater disposal at the disposal beds. The groundwater mounding effect in the WWTF area is variable based on distance from the disposal beds, as one would expect. Near-field wells show the greatest mounding effect and far-field wells show the least.

Table 1, below, depicts the estimated groundwater mound height for each near-field and far-field well, for each month of high volume groundwater disposal. Estimated groundwater mound heights are significantly greater than the simple difference of water levels from before to during high volume groundwater disposal. Our mound height estimates also compensate for the expected ambient changes in groundwater level over that same time period based on comparison to the USGS Index Well data. Basically, the estimated mound height for each well at any time is the difference between the observed groundwater level and the projected groundwater level. The maximum estimated mound height value for each well is highlighted.

Table 1. Estimated Groundwater Mound Height Summer2016 for Near & Far-Field Wells

Month	Average flow per day (MGD)	A8	A11	A16	A10	A9	1S	6D	6S	USGS475R
June	0.937	2.4	1.5	1.9	1.8	ND	1.7	2.0	1.7	1.1
July	1.641	4.7	3.8	3.3	2.8	2.5	2.7	2.5	2.2	1.6
August	1.571	5.3	4.2	4.0	3.6	3.9	1.1	3.2	3.0	2.3
September	1.515	4.7	4.2	4.2	ND	3.4	NS	3.5	3.3	2.3
October	1.541	6.7	-1.5	5.0	4.2	3.6	NS	3.8	3.6	1.9

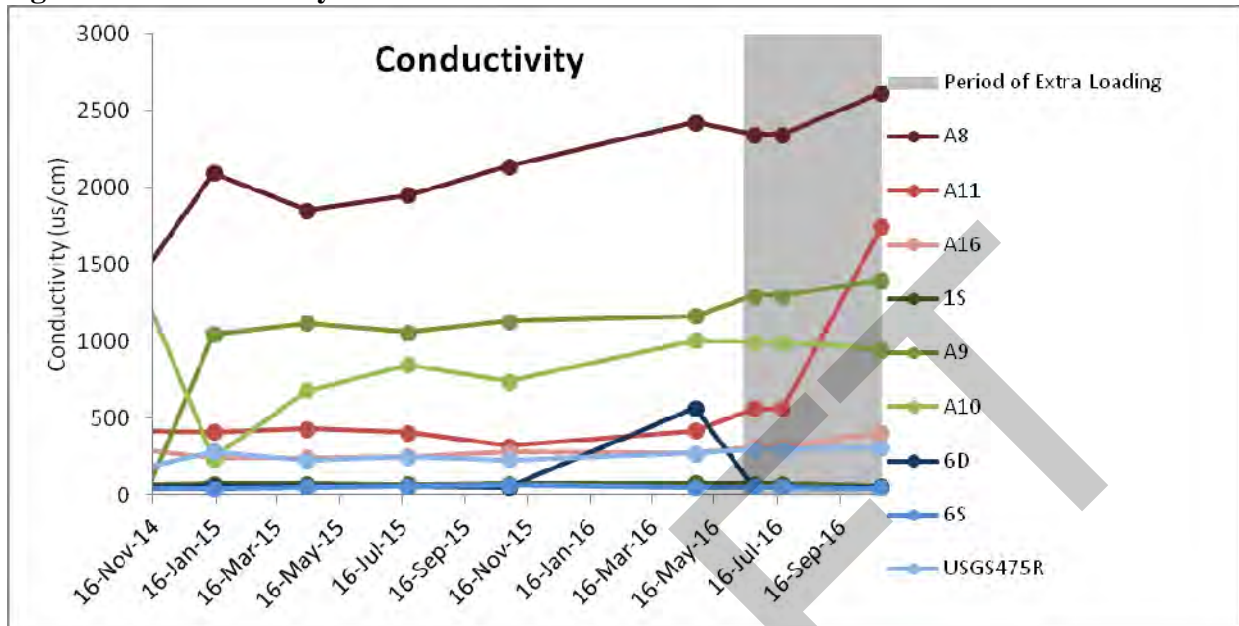
ND: Data collected was determined to be low quality
NS: No data was collected
Bold values indicate the peak mound height
Measurements taken in the middle of each month

The time required for the maximum mound height to develop for any specific well varied greatly between approximately one month and five months over the summer 2016 time period. Moreover, there is no clear relationship between distance from the disposal fields and time required for the development of maximum mound height. This could be partly because the mound heights are relatively consistent over the summer 2016 time period so that minor errors in manual water level measurement, or correlations to the ambient USGS Index Well create the appearance of time variance where such variance may in fact be minimal. We note two key observations from this table:

- While there is month to month and well to well variance, in general it appears that the bulk of the mound growth occurred relatively quickly in the first month or two of the summer 2016 time period.
- The shape of the mound appears relatively shallow sloped where the further afield mid-field wells exhibit only moderately less mound growth than do the nearer wells. This is characteristic of higher transmissivity aquifers such as the subject location.
- The maximum magnitude of the estimated mound height is relatively small (between approximately 2 – 6 feet) despite approximately five months of loading at an average rate of approximately 1.5 MGD. This is true, despite the conservative approach of mathematically increasing the observed mound heights to account for ambient water level declines over the summer 2016 time period. More detailed analysis will need to be done as part of the proposed loading test, but it is unlikely that mound heights of the magnitude observed over summer 2016 time period would have significant negative impact on nearby sensitive receptors.

We also looked at potential changes in water quality that may have resulted from increased use of the groundwater disposal beds over the summer 2016 time period. Figures 3A, 3B, and 3C depict measured values for total nitrogen, total phosphorus, and conductivity, respectively, for near-field and mid-field wells. Only near-field and mid-field wells were analyzed because those wells would be likely the first to show any potential impacts from the short-term increase of loading to the groundwater disposal beds in the summer of 2016. Total nitrogen, total phosphorus, and conductivity were selected for analysis because those parameters were thought to be of greatest interest, and/or be the most likely to be conservatively transported over the short-term summer of 2016 time period. In order not to obscure the data from any well based on graph scale, Figure 3A uses a separate vertical axis for well A9 because that well has historically

Figure 3C. Conductivity for Near & Far-Field Wells



In general, Figure 3A shows no obvious, widespread impact to total nitrogen concentrations from the summer 2016 increased groundwater disposal period. Significant increases in total nitrogen concentration over the summer 2016 time period are observed only at wells A8 and A16. Both wells are relatively close to the disposal beds. However, both wells, and others, have exhibited equal or greater increases and decreases of total nitrogen concentration at other times in the past outside of the summer 2016 time period.

Similarly, Figure 3B shows no obvious, widespread impact to total phosphorus concentrations over the summer 2016 time period. A significant increase in total phosphorus concentration over the summer 2016 time period is observed only at well A8. Well A8 is near the center of the disposal beds. However, well A8, and others, have exhibited equal or greater increases and decreases of total phosphorus concentration at other times in the past outside of the summer 2016 time period.

Figure 3C shows minor to significant increases of conductivity over the summer 2016 time period at several wells in close proximity to the disposal beds; most notably wells A8 and A11. Both wells are relatively close to the disposal beds. However, except for well A11, the Figure 3C wells have exhibited equal or greater changes in conductivity at other times in the past outside of the summer 2016 time period. The summer 2016 time period exhibited the greatest increase in conductivity from well A11 over at least the two-year time period analyzed as part of this letter.

In summary, though the increased groundwater disposal that occurred over the summer of 2016 was conducted as an emergency response and no formal monitoring methodology was in place, analysis of the available routine GWDP monitoring data proved quite informative regarding the

generalized responses of the local aquifer to increased loading of the WWTF disposal beds. A well defined groundwater mound of moderate extent can be clearly observed from the water level data. That mound appears to have developed to an extent generally consistent with reasonable expectations for an aquifer such as the subject site. In addition, minor to moderate water quality responses can also be seen from some wells for some parameters, but those responses are not inconsistent with past variability for those parameters or wells. This analysis of 2016 data is highly helpful for planning and implementing the proposed 2017 loading test, described below.

Current Proposed Loading Test Methodology

This loading test proposal is designed to monitor the groundwater response to a Camelot Drive disposal beds discharge condition similar to that which occurred last spring and summer when 100% of the WWTF treated effluent was discharged to the disposal beds. The loading test would be conducted over several weeks while directing effluent from the Camelot Drive WWTF to the existing disposal beds while monitoring the water levels in nearby monitoring wells. The loading test will be used to compare observed groundwater mounding to the estimated groundwater mounding previously reported as part of the original Groundwater Discharge Permitting for the Camelot Drive WWTF.

The data obtained from the loading test will be used to develop groundwater contour maps, estimate groundwater flow direction and evaluate groundwater mounding resulting from the loading test. The information gained from the loading test will also inform numerical groundwater modeling to be used to estimate groundwater mounding under different scenarios of groundwater discharge

Loading to Discharge Basins

The Town of Plymouth has five existing disposal beds at its existing Camelot Drive WWTF. The basins are numbered 1 through 5 as shown on the attached Figure 1.

To the extent possible, working within operational constraints at the WWTF, the Town will not use the disposal beds for 2-3 weeks prior to the test (send all effluent to the ocean outfall) in order to create ambient baseline conditions. Following the baseline period, the Town will then apply approximately 1.5 MGD into the discharge basins for a 2 to 3 week duration loading test. However, due to operational constraints with the way batches of effluent are processed at the WWTF, that volume and consistency of groundwater discharge may not be achievable. The Town will attempt to meet that 1.5 MGD target to the extent practical with the goal of applying as steady and consistent a flow as possible.

Any daily flow in excess of 1.5 MGD, will be sent to the ocean outfall. All, or most, of the discharge will be applied into Basin 4 (where monitoring well LT-2 is located in the center) throughout the loading test. If it becomes necessary to discharge to more than one basin, a portion of the discharge will be diverted into Basin 3 while maintaining flow into Basin 4. Basin 3 will be followed by Basins 1, 5, and then 2, if necessary. The goal is to discharge to as few basins as possible in order to maximize the groundwater mounding effect.

The Town will monitor flow to the beds (total and how much to each bed). It is understood that flow is applied to the beds in batches depending upon variations of the flow rate into the WWTF. Given that limitation, the Town will attempt to distribute as constant a flow as possible to the basins. If unanticipated and undesirable conditions (e.g. flooding or groundwater breakout) are observed during the loading test, the volume of effluent discharged to the disposal beds will be reduced.

The rate of flow from the WWTF to the disposal beds will be measured using a flow meter. The daily discharge volume will be recorded daily throughout the loading test. The discharge rate will be kept as constant as possible; however the loading rate will tend to vary over time as the operational controls at the WWTF do not currently allow precise dosing to the disposal beds.

Groundwater Monitoring

Existing monitoring wells will be used to monitor groundwater levels (Figure 1 and Table 2). The distances from the center of Basin 4 to the monitoring wells are summarized in Table 1. Wells LT1, LT2, LT3, LT4, A8, A9, A11, and A16 (nearfield wells), will be monitored with automated water level loggers recording at a half-hour interval. An additional logger will be used to monitor barometric pressure in order to compensate the water level data for atmospheric pressure variations. The Town will make regular checks of the disposal beds to ensure that they are accepting the flows during the test. The Town will record manual depth to water readings from those closest and accessible nearfield wells (A8, LT1, and LT3) twice per week to monitor test progress.

Wells A13, 1S, A19, A20, 6SR, and 6D (midfield wells), and farfield wells A14, 7SR, 475, and 5S will also be measured with automated water level loggers recording at a half-hour interval. In addition, a data logger will be installed in the small pond south of the WWTF property.

Monitoring Well A15, located approximately 4,200 feet east of the WWTF discharge will be monitored for ambient water-level fluctuations with an automated water level logger. USGS Index Well PWW-22 data from the Plymouth Airport will also be downloaded and used to assess ambient conditions. Index Well PWW-22 has real-time, daily data available to complement the high frequency data collection proposed on Site. Unfortunately, Index Well PWW-494 used for the above analysis of summer of 2016 groundwater data, has only once monthly manual data.

Table 2. Observation Well Summary

Well ID	Up or Down Gradient of Discharge	Distance from the Center of Discharge Basin 4 (feet)	Direction from Center of Basin 4
LT2	At Discharge	130	S
LT3	At Discharge	130	N
A8	At Discharge	200	W
LT1	Up Gradient	440	W
A11	Up Gradient	850	W
A13	Up Gradient	1,750	NW
A16	Cross Gradient	530	N
A20	Cross Gradient	1,600	S
A14	Cross Gradient	2,000	N
LT4	Down Gradient	300	E
A9	Down Gradient	770	E
1S	Down Gradient	1,270	SE
6SR	Down Gradient	1,440	SE
6D	Down Gradient	1,440	SE
A19	Down Gradient	1,630	SE
475	Down Gradient	1,690	E
7SR	Down Gradient	2,020	NE
5S	Down Gradient	2,470	SE
A15	Down Gradient	4,220	NE

Water level measurements will begin one week prior to the initiation of the 2-3 week baseline period of the loading test (when, to the extent practical, 100% WWTF discharge will be directed to the outfall. The readings will be collected to establish any ambient water-level trends leading to the loading test. Water level measurements at all observation wells will continue through the 2-3 week baseline period, then through the 2-3 week duration active loading period of the test, and finally through the recovery period when effluent discharge will be shifted back to the harbor outfall.

Duration of Test

Total test duration will be decided in concert with the Town based upon interim results. We anticipate that the active loading portion of the test will last approximately two to three weeks. However, this may be extended if water levels below the discharge beds do not stabilize. Stabilization will be defined as an average change of nearfield wells water levels of no more than 0.1 feet per day over two consecutive days.

Recovery

Water level measurements will continue for 2-3 weeks in all observation wells after the loading test is complete to monitor recovery. After the test, all discharge to the beds will cease and be switched to the ocean outfall. Post-test monitoring will measure the decline of groundwater levels to ambient conditions until stabilization occurs, or for a maximum of three weeks.

Precipitation

The Town will monitor precipitation at the WWTF on a daily basis.

Analyses

Water level logger data will be compiled into graphs showing the height of the water table with time over the course of the loading test. Cross sections will be created of the groundwater mound depicting the growth and decay of the mound by geographic position and relative to the ground surface and to the WWTF loading.

Loading test results will be used to inform the USGS MODFLOW model of the Plymouth-Carver Aquifer (PCA) in order to estimate the height and extent of groundwater mounding anticipated at the WWTF under various loading scenarios.

If you have any questions, please feel free to contact me at (508) 833-6600 with any questions.

Sincerely,

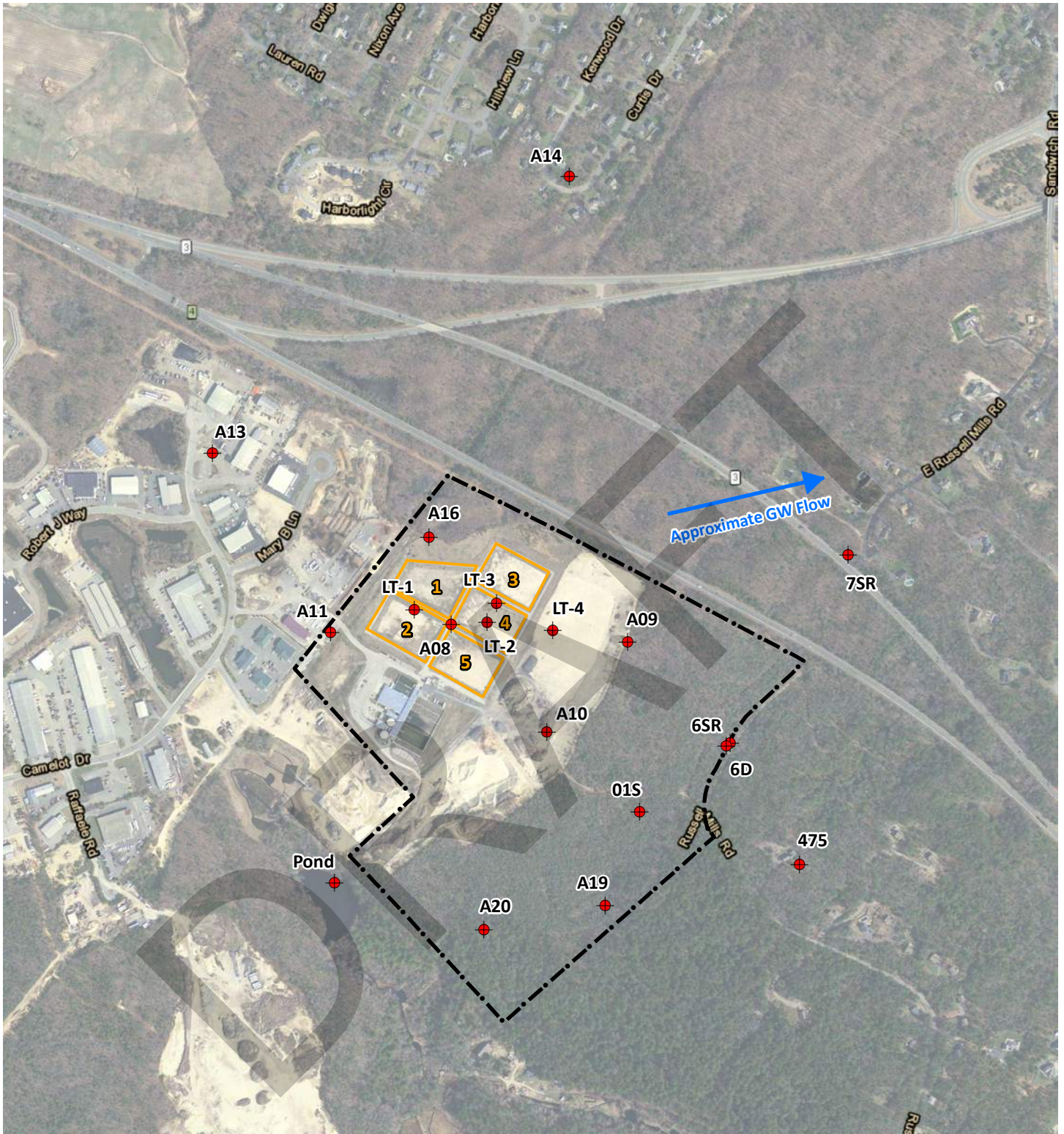
HORSLEY WITTEN GROUP, INC.



Neal M. Price



Senior Hydrogeologist

Enclosures: Figure 1



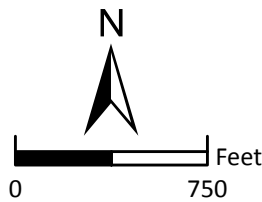
Document Path: H:\Projects\2017\17004 Plymouth Camelot Dr. WWTP Loading\GIS\Maps\MonWellLocs_170515.mxd

Legend

-  Monitoring Well Locations
-  Open Bed Discharge

*Imagery - MassGIS 2013

Horsley Witten Group
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 508-833-6600 • horsleywitten.com

Loading Test
 Monitoring Well Locations
 Camelot Drive WWTF
 Plymouth, MA

Date: 5/15/2017

Figure 1

Appendix D: MEP Nitrogen Loading Calculation
Spreadsheets

<i>Plymouth Harbor - Duxbury Bay - Kingston Bay</i>														<i>Present N Loads</i>			
<i>N Loads by Input (kg/y):</i>																	
Watershed Name	shed ID#	Wastewater	WWTF	Lawn Fertilizers	Cran Bogs	Agricultural Fields	Golf Courses	Landfill	Impervious Surface Runoff	Wetlands	Atmospheric Deposition	"Natural" Surfaces	Buildout	% of Pond Outflow	UnAtten N Load	Atten %	Atten N Load
PDK Whole System		113,728	18,953	8,815	6,816	555	4,599	2,471	19,136	7,946	62,034	7,831	42,925		252,884		216,935
PDK N TOTAL		19,273	80	1,292	802	-	1,177	247	2,041	-	24,410	1,151	5,161		50,473		50,357
Plymouth Harbor LT10N	1A	4,993	-	293	-	-	-	-	416	-	5	177	637		5,884		5,884
Duxbury Marsh TOTAL		8,440	80	707	653	-	252	-	1,088	-	2,198	637	3,417		14,055		14,055
Careswell Pond	2	361	-	25	-	-	-	-	47	-	129	31	318		594		594
Duxbury Marsh	3	8,079	80	681	653	-	252	-	1,041	-	29	606	3,098		11,421		11,421
Duxbury Marsh Estuary Surface											2,040				2,040		2,040
Blue Fish River TOTAL		5,839	-	292	149	-	925	247	537	-	599	336	1,108		8,926		8,811
North Hill Pond	4	188	-	14	60	-	98	-	22	-	476	51	62		910		910
Blue Fish River LT10	5	3,720	-	171	63	-	715	-	284	-	46	144	1,095		5,143		5,143
Duxbury PWS1	7	71	-	4	-	-	95	-	13	-	-	6	23		189		189
Duxbury PWS2	10	354	-	23	-	-	-	-	42	-	-	14	47		432		432
Duxbury PWS3	6	260	-	11	-	-	18	-	21	-	-	34	16		345		345
Bluefish River GT10 N	8	376	-	19	8	-	-	247	60	-	-	43	(247)		753		753
Bluefish River GT10 S	11	760	-	42	-	-	-	-	84	-	10	25	78		922		922
Island Creek Pond TOTAL	ICP	110	-	7	18	-	-	-	11	-	66	19	34	29%	231		116
Plymouth Harbor LT10N Estuary Surface											21,608				21,608		21,608
PDK Mid TOTAL		43,187	2,782	3,490	4,548	160	783	46	7,105	7,946	21,598	3,863	17,793		95,508		83,089
Plymouth Harbor LT10Mid	1B	14,364	947	1,358	521	15	-	-	2,526	-	135	738	4,195		20,603		20,603
Island Creek Pond TOTAL	ICP	264	-	17	43	-	-	-	27	-	159	45	82	71%	555		277
Blackwater Pond	21	657	-	11	55	-	-	-	52	109	36	36	87		956		956
Bracketts Pond TOTAL	BP	1,167	-	92	14	26	-	-	167	6	97	90	643	100%	1,660		767
Plymouth Harbor LT10Mid Estuary Surface											17,968				17,968		17,968
Jones River TOTAL		26,735	1,835	2,011	3,914	120	783	46	4,334	7,831	3,203	2,954	12,785		53,767		42,518
Foundry Pond Stream TOTAL		1,806	134	192	57	-	-	46	1,148	-	569	328	2,016		4,281		3,786
Foundry Pond Stream	29	1,642	134	186	35	-	-	46	952	-	51	140	1,777		3,187		3,187
Smelt Pond TOTAL	SP	83	-	6	22	-	-	-	76	-	505	128	84	100%	820		326
Kingston PWS1 TOTAL	PWS1	80	-	-	-	-	-	-	120	-	13	61	155		274		274
Jones River Gauge TOTAL		24,929	1,701	1,820	3,857	120	783	-	3,186	7,831	2,634	2,626	10,768		49,486		38,731
Jones River Gauge LT10	34	561	1,501	79	-	-	710	-	262	305	8	99	526		3,526		3,526
Jones River Gauge GT10	35	971	-	42	-	-	-	-	113	47	-	51	62		1,225		1,225
Jones River USGS Gauge TOTAL		23,397	201	1,699	3,857	120	73	-	2,810	7,479	2,625	2,476	10,180		44,735		33,980
Jones River USGS Gauge	23	15,157	201	1,018	3,111	21	73	-	2,126	4,243	273	1,193	6,232		27,417		27,417
Silver Lake	20	2,550	-	267	184	83	-	-	-	293	1,287	880	143	42%	5,545	50%	2,772
Harrobs Corner Bog Pond	22	342	-	19	38	15	-	-	37	154	135	41	419	100%	781	50%	391
Indian Pond	25	21	-	1	38	-	-	-	7	128	270	9	39	100%	475	50%	238
Bay State Comp. Bog Reservoir	32	215	-	15	49	-	-	-	38	288	194	55	994	100%	855	50%	427
Dennetts Pond	33	102	-	5	13	-	-	-	24	3	32	13	78	100%	192	50%	96
Crossman Pond	38	416	-	41	-	-	-	-	40	-	85	12	45	100%	595	50%	297
Pembroke St South Pond TOTAL	PSSP	4,594	-	332	423	-	-	-	537	2,369	348	272	2,231	100%	8,875	50%	2,342
PDK S TOTAL		51,268	16,091	4,033	1,467	394	2,638	2,177	9,991	-	16,026	2,818	19,971		106,904		83,489
Plymouth Harbor LT10S	1C	10,228	66	1,354	-	-	-	-	2,539	-	-	331	4,000		14,517		14,517
Plymouth PWS2	31	160	-	34	-	-	-	-	81	-	-	3	89		279		279
Plymouth WWTF Outfall			14,412										513		14,412		14,412

Plymouth Harbor - Duxbury Bay - Kingston Bay N Loads by Input (kg/y):														% of Pond Outflow	Present N Loads								
Watershed Name	shed ID#	Wastewater	WWTF	Lawn Fertilizers	Cran Bogs	Agricultural Fields	Golf Courses	Landfill	Impervious Surface Runoff	Wetlands	Atmospheric Deposition	"Natural" Surfaces	Buildout		UnAtten N Load	Atten %	Atten N Load						
Plymouth WWTF Deep Discharge (scenarios only)																							
Plymouth Harbor LT10S Estuary Surface																	9,349				9,349		9,349
Spooner Pond Stream TOTAL		1,817	-	234	-	-	-	-	673	-	92	153	1,657	2,969		2,969							
Spooner Pond Stream LT10		30	1,159	-	234	-	-	-	499	-	92	93	1,494	2,078		2,078							
Spooner Pond Stream GT10		41	658	-	-	-	-	-	174	-	-	60	163	891		891							
Town Brook Gauge TOTAL		29,414	388	1,898	503	30	206	-	4,371	-	2,923	873	9,209	40,606	0%	25,846							
Plymouth PWS1		39	975	-	42	-	-	-	590	-	-	54	584	1,660		1,660							
Town Brook Gauge		44	6,920	-	437	41	-	-	1,351	-	55	207	3,272	9,010		9,010							
Triangle Pond TOTAL		TP	1,363	-	50	-	-	-	232	-	98	33	564	1,776	67%	852							
Little Pond TOTAL		LP	689	242	111	-	-	-	127	-	168	19	227	1,356	62%	539							
Lout Pond TOTAL		Lout	8,850	66	570	212	14	93	943	-	1,226	261	2,049	12,234	100%	5,166							
Billington Sea TOTAL		BS	10,617	80	689	251	17	113	1,129	-	1,377	298	2,513	14,571	55%	8,619							
Eel River TOTAL		9,649	1,224	514	963	364	2,432	2,177	2,327	-	3,662	1,457	4,504	24,771	4%	16,116							
Eel River Gauge		53	-	-	-	-	-	-	5	-	1	1	-	8		8							
Eel River 3A TOTAL		9,649	1,224	514	963	364	2,432	2,177	2,322	-	3,661	1,456	4,504	24,763		16,780							
Eel River 3A		54	2,195	-	120	-	56	98	439	-	184	152	1,085	3,245		3,245							
Howland Pond TOTAL		989	-	60	103	202	2,218	-	317	-	248	297	2,369	4,434	0%	2,233							
Howland Pond		55	172	-	7	-	124	-	28	-	46	16	295	391	50%	196							
Eel River Mid		56	143	-	9	-	60	-	44	-	0	36	443	293		293							
Cold Bottom Pond TOTAL		CBP	86	-	6	-	-	77	28	-	22	20	17	239	56%	119							
Forge Pond TOTAL		FP	589	-	39	103	18	2,141	216	-	181	225	1,614	3,512	100%	1,626							
Eel River West TOTAL		6,465	1,224	333	860	106	117	2,177	1,566	-	3,229	1,007	1,049	17,084	0%	11,302							
Eel River W		58	2,503	1,224	63	-	32	92	2,177	-	14	270	(652)	7,396		7,396							
Hayden Mill Pond		59	34	-	-	-	74	-	7	-	41	5	93	161	50%	81							
Well		68	7	-	0	123	-	-	5	-	63	18	62	216		216							
Russell Mill Pond TOTAL		RMP	3,615	-	251	604	-	25	482	-	1,948	557	1,345	7,482	100%	3,005							
Cooks Pond TOTAL		CP	172	-	11	107	-	-	32	-	723	101	122	1,145	100%	329							
South Triangle Pond TOTAL		STP	35	-	3	8	-	-	8	-	263	19	41	335	72%	109							
Little South Pond TOTAL		LSP	99	-	6	18	-	-	12	-	176	37	38	349	43%	166							

PONDS		Other ponds (not modified) are not shown															
Russell Mill Pond TOTAL		RMP	3,615	-	251	604	-	25	-	482	-	1,948	557	1,345	7,482	50%	3,005
Russell Mill Pond		61	3,084	-	213	519	-	25	-	370	-	235	292	792	4,737		4,737
Island Pond		IP	271	-	19	7	-	-	30	-	66	7	16	399	100%	199	
Gunners Exchange/Hoyt Ponds TOTAL		GEHP	60	-	4	12	-	-	24	-	337	64	69	500	100%	203	
Boot/Ingalls Ponds TOTAL		BIP	156	-	11	58	-	-	44	-	437	136	335	841	83%	381	
Great South Pond TOTAL		GSP	45	-	4	9	-	-	15	-	875	58	133	1,006	59%	489	

<i>Plymouth Harbor - Duxbury Bay - Kingston Bay N Loads by Input (kg/y):</i>														% of Pond Outflow	<i>Present N Loads</i>	
Watershed Name	shed ID#	Wastewater	WWTF	Lawn Fertilizers	Cran Bogs	Agricultural Fields	Golf Courses	Landfill	Impervious Surface Runoff	Wetlands	Atmospheric Deposition	"Natural" Surfaces	Buildout		UnAtten N Load	Atten %
PDK Whole System		113,728	32,200	8,815	6,816	555	4,599	2,471	19,136	7,946	62,034	7,831	42,925	266,132		230,182
PDK N TOTAL		19,273	80	1,292	802	-	1,177	247	2,041	-	24,410	1,151	5,161	50,473		50,357
Plymouth Harbor LT10N	1A	4,993	-	293	-	-	-	-	416	-	5	177	637	5,884		5,884
Duxbury Marsh TOTAL		8,440	80	707	653	-	252	-	1,088	-	2,198	637	3,417	14,055		14,055
Careswell Pond	2	361	-	25	-	-	-	-	47	-	129	31	318	594		594
Duxbury Marsh	3	8,079	80	681	653	-	252	-	1,041	-	29	606	3,098	11,421		11,421
Duxbury Marsh Estuary Surface											2,040			2,040		2,040
Blue Fish River TOTAL		5,839	-	292	149	-	925	247	537	-	599	336	1,108	8,926		8,811
North Hill Pond	4	188	-	14	60	-	98	-	22	-	476	51	62	910		910
Blue Fish River LT10	5	3,720	-	171	63	-	715	-	284	-	46	144	1,095	5,143		5,143
Duxbury PWS1	7	71	-	4	-	-	95	-	13	-	-	6	23	189		189
Duxbury PWS2	10	354	-	23	-	-	-	-	42	-	-	14	47	432		432
Duxbury PWS3	6	260	-	11	-	-	18	-	21	-	-	34	16	345		345
Bluefish River GT10 N	8	376	-	19	8	-	-	247	60	-	-	43	(247)	753		753
Bluefish River GT10 S	11	760	-	42	-	-	-	-	84	-	10	25	78	922		922
Island Creek Pond TOTAL	ICP	110	-	7	18	-	-	-	11	-	66	19	34	231	29%	116
Plymouth Harbor LT10N Estuary Surface											21,608			21,608		21,608
PDK Mid TOTAL		43,187	2,782	3,490	4,548	160	783	46	7,105	7,946	21,598	3,863	17,793	95,508		83,089
Plymouth Harbor LT10Mid	1B	14,364	947	1,358	521	15	-	-	2,526	-	135	738	4,195	20,603		20,603
Island Creek Pond TOTAL	ICP	264	-	17	43	-	-	-	27	-	159	45	82	555	71%	277
Blackwater Pond	21	657	-	11	55	-	-	-	52	109	36	36	87	956		956
Bracketts Pond TOTAL	BP	1,167	-	92	14	26	-	-	167	6	97	90	643	1,660	100%	767
Plymouth Harbor LT10Mid Estuary Surface											17,968			17,968		17,968
Jones River TOTAL		26,735	1,835	2,011	3,914	120	783	46	4,334	7,831	3,203	2,954	12,785	53,767		42,518
Foundry Pond Stream TOTAL		1,806	134	192	57	-	-	46	1,148	-	569	328	2,016	4,281		3,786
Foundry Pond Stream	29	1,642	134	186	35	-	-	46	952	-	51	140	1,777	3,187		3,187
Smelt Pond TOTAL	SP	83	-	6	22	-	-	-	76	-	505	128	84	820	100%	326
Kingston PWS1 TOTAL	PWS1	80	-	-	-	-	-	-	120	-	13	61	155	274		274
Jones River Gauge TOTAL		24,929	1,701	1,820	3,857	120	783	-	3,186	7,831	2,634	2,626	10,768	49,486		38,731
Jones River Gauge LT10	34	561	1,501	79	-	-	710	-	262	305	8	99	526	3,526		3,526
Jones River Gauge GT10	35	971	-	42	-	-	-	-	113	47	-	51	62	1,225		1,225
Jones River USGS Gauge TOTAL		23,397	201	1,699	3,857	120	73	-	2,810	7,479	2,625	2,476	10,180	44,735		33,980
Jones River USGS Gauge	23	15,157	201	1,018	3,111	21	73	-	2,126	4,243	273	1,193	6,232	27,417		27,417
Silver Lake	20	2,550	-	267	184	83	-	-	-	293	1,287	880	143	5,545	42%	2,772
Harrobs Corner Bog Pond	22	342	-	19	38	15	-	-	37	154	135	41	419	781	100%	391
Indian Pond	25	21	-	1	38	-	-	-	7	128	270	9	39	475	50%	238
Bay State Comp. Bog Reservoir	32	215	-	15	49	-	-	-	38	288	194	55	994	855	50%	427
Dennetts Pond	33	102	-	5	13	-	-	-	24	3	32	13	78	192	50%	96
Crossman Pond	38	416	-	41	-	-	-	-	40	-	85	12	45	595	50%	297
Pembroke St South Pond TOTAL	PSSP	4,594	-	332	423	-	-	-	537	2,369	348	272	2,231	8,875	50%	2,342
PDK S TOTAL		51,268	29,338	4,033	1,467	394	2,638	2,177	9,991	-	16,026	2,818	19,971	120,151		96,736
Plymouth Harbor LT10S	1C	10,228	66	1,354	-	-	-	-	2,539	-	-	331	4,000	14,517		14,517
Plymouth PWS2	31	160	-	34	-	-	-	-	81	-	-	3	89	279		279

Plymouth Harbor - Duxbury Bay - Kingston Bay N Loads by Input (kg/y):														Present N Loads			
Watershed Name	shed ID#	Wastewater	WWTF	Lawn Fertilizers	Cran Bogs	Agricultural Fields	Golf Courses	Landfill	Impervious Surface Runoff	Wetlands	Atmospheric Deposition	"Natural" Surfaces	Buildout	% of Pond Outflow	UnAtten N Load	Atten %	Atten N Load
Plymouth WWTF Outfall			27,660										513		27,660		27,660
Plymouth WWTF Deep Discharge (scenarios only)																	
Plymouth Harbor LT10S Estuary Surface											9,349				9,349		9,349
Spoooner Pond Stream TOTAL		1,817	-	234	-	-	-	-	673	-	92	153	1,657		2,969		2,969
Spoooner Pond Stream LT10	30	1,159	-	234	-	-	-	-	499	-	92	93	1,494		2,078		2,078
Spoooner Pond Stream GT10	41	658	-	-	-	-	-	-	174	-	-	60	163		891		891
Town Brook Gauge TOTAL		29,414	388	1,898	503	30	206	-	4,371	-	2,923	873	9,209		40,606	0%	25,846
Plymouth PWS1	39	975	-	42	-	-	-	-	590	-	-	54	584		1,660		1,660
Town Brook Gauge	44	6,920	-	437	41	-	-	-	1,351	-	55	207	3,272		9,010		9,010
Triangle Pond TOTAL	TP	1,363	-	50	-	-	-	-	232	-	98	33	564	67%	1,776		852
Little Pond TOTAL	LP	689	242	111	-	-	-	-	127	-	168	19	227	62%	1,356		539
Lout Pond TOTAL	Lout	8,850	66	570	212	14	93	-	943	-	1,226	261	2,049	100%	12,234		5,166
Billington Sea TOTAL	BS	10,617	80	689	251	17	113	-	1,129	-	1,377	298	2,513	55%	14,571		8,619
Eel River TOTAL		9,649	1,224	514	963	364	2,432	2,177	2,327	-	3,662	1,457	4,504		24,771	4%	16,116
Eel River Gauge	53	-	-	-	-	-	-	-	5	-	1	1	-		8		8
Eel River 3A TOTAL		9,649	1,224	514	963	364	2,432	2,177	2,322	-	3,661	1,456	4,504		24,763		16,780
Eel River 3A	54	2,195	-	120	-	56	98	-	439	-	184	152	1,085		3,245		3,245
Howland Pond TOTAL		989	-	60	103	202	2,218	-	317	-	248	297	2,369		4,434	0%	2,233
Howland Pond	55	172	-	7	-	124	-	-	28	-	46	16	295		391	50%	196
Eel River Mid	56	143	-	9	-	60	-	-	44	-	0	36	443		293		293
Cold Bottom Pond TOTAL	CBP	86	-	6	-	-	77	-	28	-	22	20	17	56%	239		119
Forge Pond TOTAL	FP	589	-	39	103	18	2,141	-	216	-	181	225	1,614	100%	3,512		1,626
Eel River West TOTAL		6,465	1,224	333	860	106	117	2,177	1,566	-	3,229	1,007	1,049		17,084	0%	11,302
Eel River W	58	2,503	1,224	63	-	32	92	2,177	1,020	-	14	270	(652)		7,396		7,396
Hayden Mill Pond	59	34	-	-	-	74	-	-	7	-	41	5	93		161	50%	81
Well	68	7	-	0	123	-	-	-	5	-	63	18	62		216		216
Russell Mill Pond TOTAL	RMP	3,615	-	251	604	-	25	-	482	-	1,948	557	1,345	100%	7,482	50%	3,005
Cooks Pond TOTAL	CP	172	-	11	107	-	-	-	32	-	723	101	122	100%	1,145		329
South Triangle Pond TOTAL	STP	35	-	3	8	-	-	-	8	-	263	19	41	72%	335		109
Little South Pond TOTAL	LSP	99	-	6	18	-	-	-	12	-	176	37	38	43%	349		166

PONDS																	
Russell Mill Pond TOTAL	RMP	3,615	-	251	604	-	25	-	482	-	1,948	557	1,345		7,482	50%	3,005
Russell Mill Pond	61	3,084	-	213	519	-	25	-	370	-	235	292	792		4,737		4,737
Island Pond	IP	271	-	19	7	-	-	-	30	-	66	7	16	100%	399		199
Gunners Exchange/Hoyt Ponds TOTAL	GEHP	60	-	4	12	-	-	-	24	-	337	64	69	100%	500		203
Boot/Ingalls Ponds TOTAL	BIP	156	-	11	58	-	-	-	44	-	437	136	335	83%	841		381
Great South Pond TOTAL	GSP	45	-	4	9	-	-	-	15	-	875	58	133	59%	1,006		489

		Plymouth Harbor - Duxbury Bay - Kingston Bay N Loads by Input (kg/y):												% of Pond Outflow	Present N Loads		
Watershed Name	shed ID#	Wastewater	WWTF	Lawn Fertilizers	Cran Bogs	Agricultural Fields	Golf Courses	Landfill	Impervious Surface Runoff	Wetlands	Atmospheric Deposition	"Natural" Surfaces	Buildout		UnAtten N Load	Atten %	Atten N Load
PDK Whole System		113,728	31,110	8,815	6,816	555	4,599	2,471	19,136	7,946	62,034	7,831	42,925	265,042		219,234	
PDK N TOTAL		19,273	80	1,292	802	-	1,177	247	2,041	-	24,410	1,151	5,161	50,473		50,357	
Plymouth Harbor LT10N	1A	4,993	-	293	-	-	-	-	416	-	5	177	637	5,884		5,884	
Duxbury Marsh TOTAL		8,440	80	707	653	-	252	-	1,088	-	2,198	637	3,417	14,055		14,055	
Careswell Pond	2	361	-	25	-	-	-	-	47	-	129	31	318	594		594	
Duxbury Marsh	3	8,079	80	681	653	-	252	-	1,041	-	29	606	3,098	11,421		11,421	
Duxbury Marsh Estuary Surface											2,040			2,040		2,040	
Blue Fish River TOTAL		5,839	-	292	149	-	925	247	537	-	599	336	1,108	8,926		8,811	
North Hill Pond	4	188	-	14	60	-	98	-	22	-	476	51	62	910		910	
Blue Fish River LT10	5	3,720	-	171	63	-	715	-	284	-	46	144	1,095	5,143		5,143	
Duxbury PWS1	7	71	-	4	-	-	95	-	13	-	-	6	23	189		189	
Duxbury PWS2	10	354	-	23	-	-	-	-	42	-	-	14	47	432		432	
Duxbury PWS3	6	260	-	11	-	-	18	-	21	-	-	34	16	345		345	
Bluefish River GT10 N	8	376	-	19	8	-	-	247	60	-	-	43	(247)	753		753	
Bluefish River GT10 S	11	760	-	42	-	-	-	-	84	-	10	25	78	922		922	
Island Creek Pond TOTAL	ICP	110	-	7	18	-	-	-	11	-	66	19	34	231	29%	116	
Plymouth Harbor LT10N Estuary Surface											21,608			21,608		21,608	
PDK Mid TOTAL		43,187	2,782	3,490	4,548	160	783	46	7,105	7,946	21,598	3,863	17,793	95,508		83,089	
Plymouth Harbor LT10Mid	1B	14,364	947	1,358	521	15	-	-	2,526	-	135	738	4,195	20,603		20,603	
Island Creek Pond TOTAL	ICP	264	-	17	43	-	-	-	27	-	159	45	82	555	71%	277	
Blackwater Pond	21	657	-	11	55	-	-	-	52	109	36	36	87	956		956	
Bracketts Pond TOTAL	BP	1,167	-	92	14	26	-	-	167	6	97	90	643	100%	767		
Plymouth Harbor LT10Mid Estuary Surface											17,968			17,968		17,968	
Jones River TOTAL		26,735	1,835	2,011	3,914	120	783	46	4,334	7,831	3,203	2,954	12,785	53,767		42,518	
Foundry Pond Stream TOTAL		1,806	134	192	57	-	-	46	1,148	-	569	328	2,016	4,281		3,786	
Foundry Pond Stream	29	1,642	134	186	35	-	-	46	952	-	51	140	1,777	3,187		3,187	
Smelt Pond TOTAL	SP	83	-	6	22	-	-	-	76	-	505	128	84	820	100%	326	
Kingston PWS1 TOTAL	PWS1	80	-	-	-	-	-	-	120	-	13	61	155	274		274	
Jones River Gauge TOTAL		24,929	1,701	1,820	3,857	120	783	-	3,186	7,831	2,634	2,626	10,768	49,486		38,731	
Jones River Gauge LT10	34	561	1,501	79	-	-	710	-	262	305	8	99	526	3,526		3,526	
Jones River Gauge GT10	35	971	-	42	-	-	-	-	113	47	-	51	62	1,225		1,225	
Jones River USGS Gauge TOTAL		23,397	201	1,699	3,857	120	73	-	2,810	7,479	2,625	2,476	10,180	44,735		33,980	
Jones River USGS Gauge	23	15,157	201	1,018	3,111	21	73	-	2,126	4,243	273	1,193	6,232	27,417		27,417	
Silver Lake	20	2,550	-	267	184	83	-	-	-	293	1,287	880	143	5,545	42%	2,772	
Harrobs Corner Bog Pond	22	342	-	19	38	15	-	-	37	154	135	41	419	781	100%	391	
Indian Pond	25	21	-	1	38	-	-	-	7	128	270	9	39	475	50%	238	
Bay State Comp. Bog Reservoir	32	215	-	15	49	-	-	-	38	288	194	55	994	855	100%	427	
Dennetts Pond	33	102	-	5	13	-	-	-	24	3	32	13	78	192	100%	96	
Crossman Pond	38	416	-	41	-	-	-	-	40	-	85	12	45	595	50%	297	
Pembroke St South Pond TOTAL	PSSP	4,594	-	332	423	-	-	-	537	2,369	348	272	2,231	8,875	100%	2,342	
PDK S TOTAL		51,268	28,248	4,033	1,467	394	2,638	2,177	9,991	-	16,026	2,818	19,971	119,061		85,788	

Watershed Name	shed ID#	<i>Plymouth Harbor - Duxbury Bay - Kingston Bay</i> <i>N Loads by Input (kg/y):</i>											% of Pond Outflow	<i>Present N Loads</i>			
		Wastewater	WWTF	Lawn Fertilizers	Cran Bogs	Agricultural Fields	Golf Courses	Landfill	Impervious Surface Runoff	Wetlands	Atmospheric Deposition	"Natural" Surfaces		Buildout	UnAtten N Load	Atten %	Atten N Load
Plymouth Harbor LT10S	1C	10,228	1,154	1,354	-	-	-	-	2,539	-	-	331	4,000		15,605		15,605
Plymouth PWS2	31	160	-	34	-	-	-	-	81	-	-	3	89		279		279
Plymouth WWTF Outfall			-										513		-		-
Plymouth WWTF Deep Discharge (scenarios only)																	
Plymouth Harbor LT10S Estuary Surface											9,349				9,349		9,349
Spoooner Pond Stream TOTAL		1,817	-	234	-	-	-	-	673	-	92	153	1,657		2,969		2,969
Spoooner Pond Stream LT10	30	1,159	-	234	-	-	-	-	499	-	92	93	1,494		2,078		2,078
Spoooner Pond Stream GT10	41	658	-	-	-	-	-	-	174	-	-	60	163		891		891
Town Brook Gauge TOTAL		29,414	388	1,898	503	30	206	-	4,371	-	2,923	873	9,209		40,606	0%	25,846
Plymouth PWS1	39	975	-	42	-	-	-	-	590	-	-	54	584		1,660		1,660
Town Brook Gauge	44	6,920	-	437	41	-	-	-	1,351	-	55	207	3,272		9,010		9,010
Triangle Pond TOTAL	TP	1,363	-	50	-	-	-	-	232	-	98	33	564	67%	1,776		852
Little Pond TOTAL	LP	689	242	111	-	-	-	-	127	-	168	19	227	62%	1,356		539
Lout Pond TOTAL	Lout	8,850	66	570	212	14	93	-	943	-	1,226	261	2,049	100%	12,234		5,166
Billington Sea TOTAL	BS	10,617	80	689	251	17	113	-	1,129	-	1,377	298	2,513	55%	14,571		8,619
Eel River TOTAL		9,649	26,706	514	963	364	2,432	2,177	2,327	-	3,662	1,457	4,504		50,252	4%	31,739
Eel River Gauge	53	-	-	-	-	-	-	-	5	-	1	1	-		8		8
Eel River 3A TOTAL		9,649	26,706	514	963	364	2,432	2,177	2,322	-	3,661	1,456	4,504		50,245		33,054
Eel River 3A	54	2,195	6,176	120	-	56	98	-	439	-	184	152	1,085		9,421		9,421
Howland Pond TOTAL		989	-	60	103	202	2,218	-	317	-	248	297	2,369		4,434	0%	2,233
Howland Pond	55	172	-	7	-	124	-	-	28	-	46	16	295		391	50%	196
Eel River Mid	56	143	-	9	-	60	-	-	44	-	0	36	443		293		293
Cold Bottom Pond TOTAL	CBP	86	-	6	-	-	77	-	28	-	22	20	17	56%	239		119
Forge Pond TOTAL	FP	589	-	39	103	18	2,141	-	216	-	181	225	1,614	100%	3,512		1,626
Eel River West TOTAL		6,465	20,530	333	860	106	117	2,177	1,566	-	3,229	1,007	1,049		36,390	0%	21,400
Eel River W	58	2,503	2,115	63	-	32	92	2,177	1,020	-	14	270	(652)		8,286		8,286
Hayden Mill Pond	59	34	5,968	-	-	74	-	-	7	-	41	5	93		6,129	50%	3,065
Well	68	7	-	0	123	-	-	-	5	-	63	18	62		216		216
Russell Mill Pond TOTAL	RMP	3,615	12,447	251	604	-	25	-	482	-	1,948	557	1,345	100%	19,929		9,229
Cooks Pond TOTAL	CP	172	-	11	107	-	-	-	32	-	723	101	122	100%	1,145		329
South Triangle Pond TOTAL	STP	35	-	3	8	-	-	-	8	-	263	19	41	72%	335		109
Little South Pond TOTAL	LSP	99	-	6	18	-	-	-	12	-	176	37	38	43%	349		166

POND'S		Other ponds (not modified) are not shown.															
Russell Mill Pond TOTAL	RMP	3,615	12,447	251	604	-	25	-	482	-	1,948	557	1,345		19,929	50%	9,229
Russell Mill Pond	61	3,084	12,447	213	519	-	25	-	370	-	235	292	792		17,184		17,184
Island Pond	IP	271	-	19	7	-	-	-	30	-	66	7	16	100%	399		199
Gunners Exchange/Hoyt Ponds TOTAL	GEHP	60	-	4	12	-	-	-	24	-	337	64	69	100%	500		203
Boot/Ingalls Ponds TOTAL	BIP	156	-	11	58	-	-	-	44	-	437	136	335	83%	841		381
Great South Pond TOTAL	GSP	45	-	4	9	-	-	-	15	-	875	58	133	59%	1,006		489