



LINCOLN, MASSACHUSETTS

OCTOBER 2021

Lincoln Woods Wastewater Treatment Plant Evaluation Report – Phase 1



**Lincoln Woods Wastewater Treatment
Plant Evaluation Report – Phase 1
Lincoln, MA**

October 2021

Prepared By:

Wright-Pierce

600 Federal Street, Suite 2151

Andover, MA 01810

978.416.8000 | www.wright-pierce.com

Table of Contents

Section 1	Introduction	1-1
1.1	Background	1-1
1.1.1	Upgrade History	1-1
1.1.2	Groundwater Discharge Permit	1-2
1.1.2.1	History of Violations	1-3
1.1.2.2	MassDEP Notice of Non-compliance	1-3
1.2	Report Purpose	1-4
1.3	Project Scope	1-4
Section 2	Condition Assessment	2-1
2.1	Description of Existing Facilities	2-1
2.2	Process Evaluation	2-1
2.2.1	Maintenance Building and Main Pump Stations	2-1
2.2.2	Flow Equalization Tank	2-2
2.2.3	Comminutor/Process Tank Inlet	2-2
2.2.4	Process Tank	2-4
2.2.5	Denitrification Filter	2-4
2.2.6	Effluent Clear Well	2-5
2.2.7	Disinfection	2-5
2.2.8	Dosing Siphon Chamber	2-5
2.2.9	Effluent Disposal	2-6
2.2.10	Chemical Storage and Feed Systems	2-6
2.3	Instrumentation Evaluation	2-7
2.4	Electrical Evaluation	2-7
2.5	HVAC Evaluation	2-7
2.6	Building Evaluation	2-8
Section 3	Existing Plant Recommendations and Estimated Costs	3-1
3.1	Introduction	3-1
3.2	Near-Term Improvements (0-5 years)	3-1
3.2.1	Cost Estimate	3-2
3.3	Short-Term Improvements (5-15 years)	3-3
3.3.1	Cost Estimate	3-3
3.4	Long-Term Improvements (20-30 years)	3-4
3.4.1	Cost Estimate	3-4
3.5	Additional Considerations (30+ years)	3-5
3.5.1	Cost Estimate	3-5
Section 4	WWTP Performance	4-1
4.1	Design Flows and Loads	4-1
4.2	Current Flows and Loads	4-2
4.2.1	WWTP Performance	4-3
4.3	Current Operation and Maintenance Costs	4-4
4.4	Capacity Analysis	4-5

4.4.1	Current Used Capacity	4-5
4.4.2	Build-out Capacity	4-6
4.4.3	Expansion Alternatives	4-8
4.4.4	WWTP Design Capacity	4-12
4.4.5	User Fee Structure	4-18

List of Appendices

Appendix A	GWDP & DEP Notices
Appendix B	RLF and Lincoln Woods Agreement
Appendix C	Equipment List and Cost Estimate

List of Tables

Table 1-1	Summary of GWDP Effluent Discharge Standards	1-2
Table 3-1	Recommended Near-Term Improvements Cost Estimate	3-2
Table 3-2	Recommended Short-Term Improvements Cost Estimate	3-3
Table 3-3	Recommended Long-Term Improvements Cost Estimate	3-4
Table 3-4	Additional Considerations Cost Estimate	3-5
Table 4-1	Original Design Conditions – 1975	4-1
Table 4-2	Flows and Loads Summary, January 2018 – June 2021	4-2
Table 4-3	Yearly Summary of WWTP BOD and TSS Removal Percentage, January 2018 – June 2021	4-3
Table 4-4	Operation Cost Summary, January 2018 – June 2021	4-4
Table 4-5	Maintenance Cost Summary, January 2018 – June 2021	4-4
Table 4-6	Operation and Maintenance Cost Summary, January 2018 – June 2021	4-5
Table 4-7	The Mall Expansion Alternatives	4-9
Table 4-8	Lincoln Woods Specific Per Bedroom Flow Rate, January 2019 – June 2021	4-10
Table 4-9	Clarifier Surface Overflow Rates Versus Flow	4-13
Table 4-10	Design Loading Rate (gpd/sq. foot), Open Sand Beds	4-14
Table 4-11	Existing WWTP Constraints Regarding Increasing Capacity	4-17
Table 4-12	Historical Mall Usage, Percentage of Overall Monthly Flow to WWTP	4-19

List of Figures

Figure 1-1	Project Site Aerial View	1-5
Figure 2-1	Process Flow Schematic	2-3
Figure 4-1	Maximum Daily Flow Per Month, June 2019 – June 2021	4-6
Figure 4-2	Build-out Flow from Apartments	4-7
Figure 4-3	Current Used Capacity with Added Build-out Flow	4-8
Figure 4-4	Total Monthly Mall Flows	4-9
Figure 4-5	WWTP Total Flow vs. Percentage of Mall Flow	4-18

List of Abbreviations

WWTP – Wastewater Treatment Plant

TCB – The Community Builders, owners of the WWTP at Lincoln Woods

WWEM – Wastewater Environmental Management Inc., contract operator of Lincoln Woods WWTP

MassDEP – Massachusetts Department of Environmental Protection, authority in charge of issuing groundwater discharge permit

GWDP – Groundwater Discharge Permit, issued to domestic and commercial wastewater, and certain industrial facilities determining allowable effluent flows and loads limits

UV – ultraviolet, beyond the violet end of the visible light spectrum, kills pathogens to provide disinfection in wastewater

BOD – Biochemical Oxygen Demand, indicator of how much oxygen is required to break down organic material in wastewater

TSS – Total Suspended Solids, particles above 2 microns in size suspended in water (sand, gravel, bacteria)

TN – Total Nitrogen, sum of nitrate-nitrogen (NO₃-N), nitrite-nitrogen (NO₂-N), ammonia-nitrogen (NH₃-N) and organically bonded nitrogen (excess levels of TN may lead to low levels of dissolved oxygen)

FET – Flow Equalization Tank, used to prevent wide variations in influent flow, temperature, and contaminant concentrations

NON – Notice of Non-compliance, notice to a facility indicating a permit violation, issued by MassDEP

RTC – Return to Compliance, a facility's plan to return effluent discharge levels back to permitted standards (includes timeframe and steps facility will take)

DMR – Discharge Monitoring Report, periodic water pollution report prepared by the facility indicating amounts of effluent contaminants

mg/L – milligrams per liter, concentration of contaminant in the wastewater (X mg of contaminant per 1 L of wastewater)

lbs./day – pounds per day, measure of pollutant loading rate (X lbs. of contaminant per 1 day)

gpd – gallons per day, measure of flow rate of wastewater

HP – horsepower, measurement of engine power (the power needed to raise 550 pounds 1 foot)

kW – kilowatt, measure of 1,000 watts of electrical power



Section 1 Introduction

1.1 Background

The Lincoln Woods Wastewater Treatment Plant (WWTP) services the Lincoln Woods Apartments and the commercial buildings at the Mall at Lincoln Station (The Mall). The WWTP is currently owned by the apartment managing company, The Community Builders (TCB). The plant is contract operated by Wastewater Environmental Management, Inc. (WWEM). An aerial site plan is included at the end of this section as Figure 1-1.

The WWTP receives flow from two offsite pump stations, one that serves a couple of housing units of Lincoln Woods (Mechanic Building Pump Station) and one that receives wastewater flow from the Mall and remainder of housing units at Lincoln Woods (Main Pump Station), including flow from the Mechanic Building Pump Station. The WWTP was built in the mid-1970s and has undergone several modifications/upgrades through the early and mid-2000s. It is permitted to treat a maximum daily flow of 26,000 gallons per day of wastewater. The facility operates under MassDEP Groundwater Discharge Permit (GWDP) number X274018/3-4.

The plant is an activated sludge-type system and consists of a flow equalization tank (FET) with chopper pumps, a comminutor, a single combined biological treatment tank that includes the aeration, clarification, and solids handling processes, a denitrification filter, UV disinfection, and open sand bed effluent disposal. The plant is supported by two chemical systems to enhance treatment - liquid methanol storage and pumping and alkalinity addition by using bags of sodium bicarbonate or hydrated lime. There is also a backup emergency generator that can power the entire plant and there is a solar array that normally powers the plant. Neither pump station has backup power.

1.1.1 Upgrade History

The WWTP was originally constructed in 1975 and included the following treatment components:

- Raw Influent Pump Station
- Comminutor and Bypass Rack
- Combination Process Tank that includes:
 - Aeration Tank
 - Clarifier
 - Sludge Digester
- Chlorine Contact Chamber
- Polishing Filters
- Dosing Siphon
- Final Sand Beds
- Effluent Storage Overflow Tank

Multiple upgrades and additions have been made to the treatment plant over the past 46 years. In 1998, The Mall connected their sewer system with Lincoln Woods. In the early 2000s, the plant had issues with meeting nitrogen-based effluent standards. As a result, the first major upgrade since the original construction was implemented in 2003. This upgrade constructed a flow equalization tank with pumps and air to reduce spikes to the biological system, new process tank inlet flow box and bypass bar rack, denitrification filter, effluent clear well storage tank with filter backwash pumps, methanol storage and feed system to assist in denitrification, and emergency backup generator. In 2007 the chlorine disinfection system was replaced with ultraviolet disinfection. A new force main

from the clear well to the WWTP building (location of UV) and through to the dosing siphon chamber before the sand beds was constructed. Soon after, in 2009, the main pump station was repaired and the pumps were replaced, the plant replaced the existing comminutor, installed new process blowers, and a new flow box and bar rack was installed. The most recent set of repairs occurred in 2015 when the process tank was painted, and new air diffusers were installed. A solar array was added to the site in 2016, which powers the entire plant. The generator was replaced in 2019 and powers the entire plant in a power outage situation.

1.1.2 Groundwater Discharge Permit

The WWTP operates under permit X274018/3-4, last issued on December 15, 2017 and expiring on December 15, 2022. The final permit is included in Appendix A.

The GWDP effluent limits are summarized in Table 1-1.

Table 1-1 Summary of GWDP Effluent Discharge Standards

Component	Effluent	Monitoring Frequency
Maximum Daily Flow	26,000 gpd	Daily
Total Biochemical Oxygen Demand (BOD5)	30.0 mg/L	Monthly
Total Suspended Solids (TSS)	30.0 mg/L	Monthly
Total Nitrogen (NO ₃ + NO ₂ + TKN)	10.0 mg/L	Weekly
Total Nitrate-Nitrogen (NO ₃)	10.0 mg/L	Weekly
Oil and Grease	15.0 mg/L	Monthly
Fecal Coliform	200 colonies/100mL	Monthly
pH	6.5-8.5	Daily
Total Phosphorus	Monitor	Quarterly
Orthophosphate	Monitor	Quarterly
Volatile Organic Compounds	Monitor	Annually

1.1.2.1 History of Violations

The WWTP has had a history of permit violations. As part of this evaluation, WWTP data was analyzed from January 2018 to June 2021. Since 2018, there has been 1 effluent flow violation, 11 BOD violations, 1 TSS violation, 6 nitrate violations, and 16 Total Nitrogen violations. Many of these violations were the result of mechanical equipment failure and not operator error. The violations typically occur when too much influent flow enters the process tank due to a failure of the FET pumps and/or pump controls. However, some violations for total nitrogen result when the wastewater temperature changes significantly, and the process must be altered through the use of methanol addition. This is not uncommon in nitrogen removal facilities and must be closely monitored by the operator as the seasons change.

In addition to the GWDP, the plant is also required to monitor three groundwater monitoring wells, one upgradient (ES-3) and three downgradient (MW-GZA-1, MW-SHA-1 & 2) of the WWTP to see the impact the WWTP discharge is having on the groundwater source. The plant is required to test pH, water level, specific conductance, nitrate, total nitrogen, chloride, total phosphorus, and ortho-phosphate. pH, water level, and specific conductance testing is required monthly, nitrate, total nitrogen, and chloride are required quarterly, and total phosphorus and ortho-phosphate are required semi-annually. WP reviewed monitoring well data from 2017 through the end of 2020 (2021 has not been completed). Of critical concern are the nitrogen-based parameters, as those have the largest impact on groundwater health. The recommended value to stay below is 10 mg/L for nitrate and total nitrogen. The data reviewed showed several violations and elevated levels of both nitrate and total nitrogen in the downgradient wells, with upgradient levels being consistently lower than 3 mg/L. This suggests that the WWTP is negatively effecting groundwater levels of nitrogen.

1.1.2.2 MassDEP Notice of Non-compliance

As a result of historical permit violations, the plant has received notice of non-compliances (NON) throughout the years. The most recent NON was received on February 26, 2021. The notice documented several occasions in which the GWDP effluent discharge standards were violated between January 1, 2019 and November 30, 2020. The notice required the plant to submit a Return to Compliance (RTC) plan explaining how the plant intends to bring itself back to compliance and the timeframe in which it plans to do so. The RTC was completed on March 14, 2021. The NON and RTC are included in Appendix A. The return to compliance plan outlines reasonable operational changes moving into the future, the largest being managing solids in the process as the seasons change and wastewater temperature varies. It also noted that several of the “violations” were actually misinterpretations of hand-written values that were entered wrong into the final DMR, mostly related to flow values.

1.2 Report Purpose

The overall project for the Town of Lincoln consists of two phases with an option to include a third. Phase 1 and this report intends to provide a detailed background of the Lincoln Woods WWTP, its usage and compliance history, as well as describe the current condition of the treatment facilities and performance. This report includes details regarding the remaining capacity of the WWTP and how the Town of Lincoln may address expansion of the development area within The Mall. Recommended upgrades are also provided in this report along with their associated costs and recommended timeline, grouped by project year for the existing system. Phase 2 of the project involves looking into the future and evaluating how expansion and development will impact the existing treatment system, alternative treatment methods with cost-benefit analyses, and providing an ultimate recommendation for the Town of Lincoln moving forward. The optional Phase 3 will investigate and evaluate a new facility if the Phase is selected to move forward.

The Phase 1 report is set up as follows:

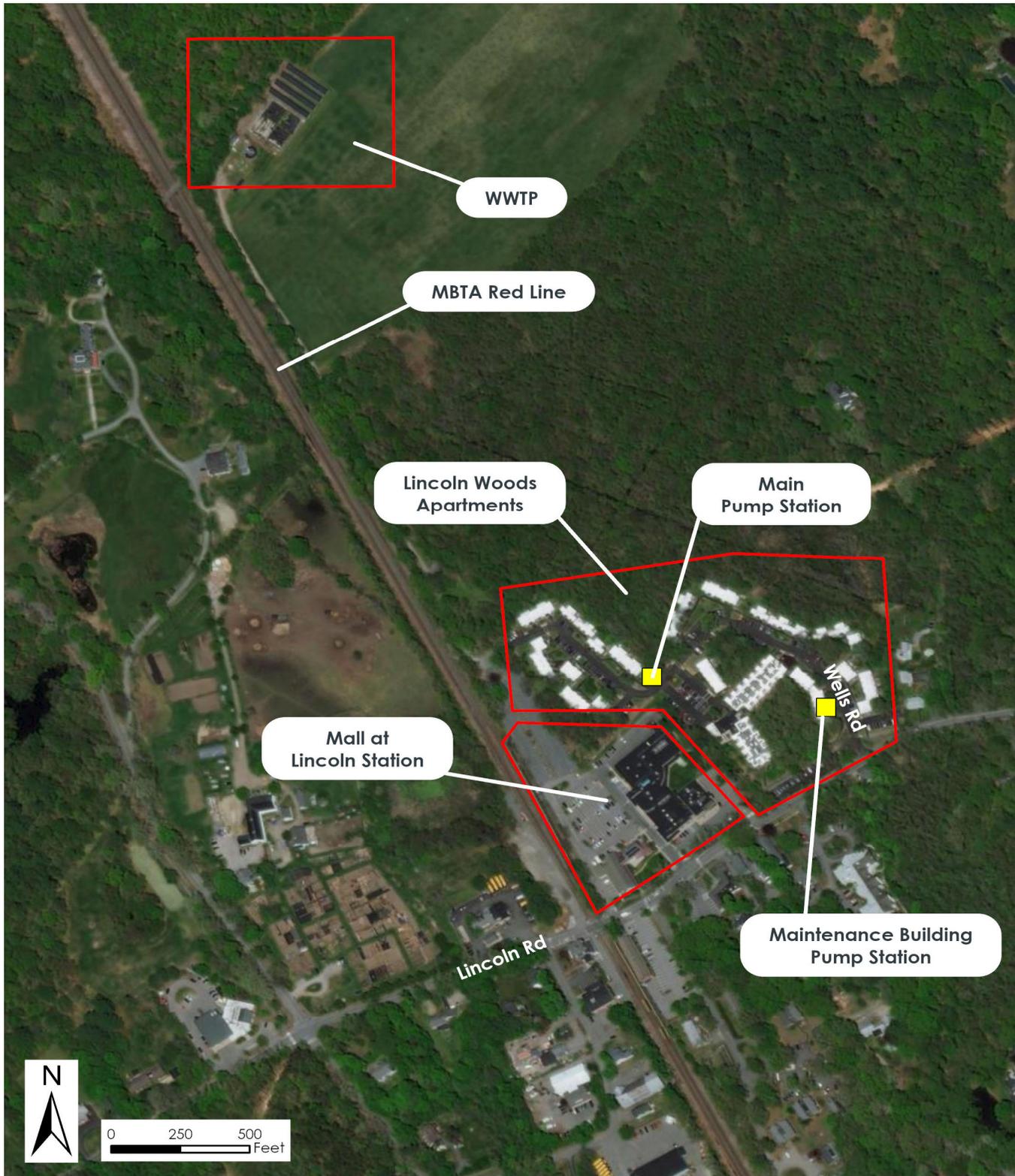
- Section 1 – Introduction
- Section 2 – Condition Assessment
- Section 3 – WWTP Recommendations
- Section 4 - WWTP Performance & Capacity

1.3 Project Scope

The scope of Phase 1 of this project includes the study and evaluation of the WWTP's existing condition, capacity, and performance. Future capacity and performance and treatment alternatives will be discussed in the next phase. The Phase 1 project scope includes the following:

- Collect and review relevant data and information including:
 - Operating and maintenance data for the existing WWTP
 - Permit compliance and historical discharge monitoring report (DMR) data (3 years)
 - Project related data such as manuals and drawings
- Conduct a site visit of the wastewater plant to evaluate existing condition of the facilities
 - Evaluate remaining useful life of processes and equipment
 - Develop project schedule and cost estimates for replacement/upgrade recommendations
- Evaluate current user fee and historical usage of The Mall
- Analyze current WWTP flows and loads and compare against design flows and loads data, including plant performance
- Evaluate current capacity of the WWTP and analyze additional available capacity

Figure 1-1 Project Site Aerial View



2

Section 2 WWTP Condition Assessment

2.1 Description of Existing Facilities

The WWTP at Lincoln Woods consists of two offsite pump stations, the sewer collection system, the WWTP processes and equipment, and the effluent disposal system. A description, purpose, and evaluation of each unit process and equipment is included below. In order to assist in following the descriptions, a process flow schematic is included as Figure 2-1.

The unit processes, equipment, and structures were observed and evaluated during a site visit on July 30, 2021 attended by WP engineers, TCB, and the WWTP contract operator, Steve Hansen of WWEM. Each section below goes into greater detail and develops the basis for recommendations in Section 3 of this report.

2.2 Process Evaluation

The process evaluation for the WWTP seeks to establish the condition of the existing equipment and process tankage, remaining useful life, understanding how they are operated, and if improvements are necessary. This section will follow the treatment path of the wastewater through the plant.

2.2.1 Maintenance Building and Main Pump Stations

There are two offsite pump stations that are part of the sewer collection system, both located at the Lincoln Woods Apartment complex. The Maintenance Building Pump Station collects wastewater from a portion of the housing units from Lincoln Woods, pumps flow to the Main Pump Station and the Main Pump Station also collects wastewater from the remainder of the Lincoln Woods housing units and The Mall and pumps all of the flow directly to the equalization tank at the WWTP that is located north of the complex. Both stations are submersible-type pump stations, and their wet wells are made entirely of steel and operate automatically with a float type level control system.

The Main Pump Station is located outdoors, across from the main office (unit 50) parking lot. This station has two submersible influent pumps, each with a capacity of 75 gallons per minute and a 7.5 HP motor. The Maintenance Building Pump Station is located inside the maintenance garage (unit 29), in the basement of one of the apartment buildings. This station also has two submersible influent pumps. Design information for the Maintenance Building Pump Station could not be located. The Main Pump station was repaired in 2009, with sand-blasted and painted wet well walls and new pumps. It is unclear if the Maintenance Building Pump Station has been repaired since its original design.

Both stations have rust-coated chains and rusted interior walls. The pumps were not inspected as they are submersible and were not removed as part of the site visit. The estimated life span of the influent wet wells are 60 years, which can be increased with proper maintenance and re-painting. The estimated life span is 20 years for the pumps and motors.

The location of the Maintenance Building Pump station has many construction and code-related issues. The station currently is constructed within the building, in an active maintenance and storage area, with no protection around the wet well and ventilation is not up to current building and NFPA code standards. The access to pumps and the wet well is very difficult for operators. Overall, this station would not be able to be constructed as-is under current code and completing any upgrades would be very difficult.

Both pump stations have local alarming and dial-out alarm features. Odor issues do not appear to be a significant problem.

2.2.2 Flow Equalization Tank

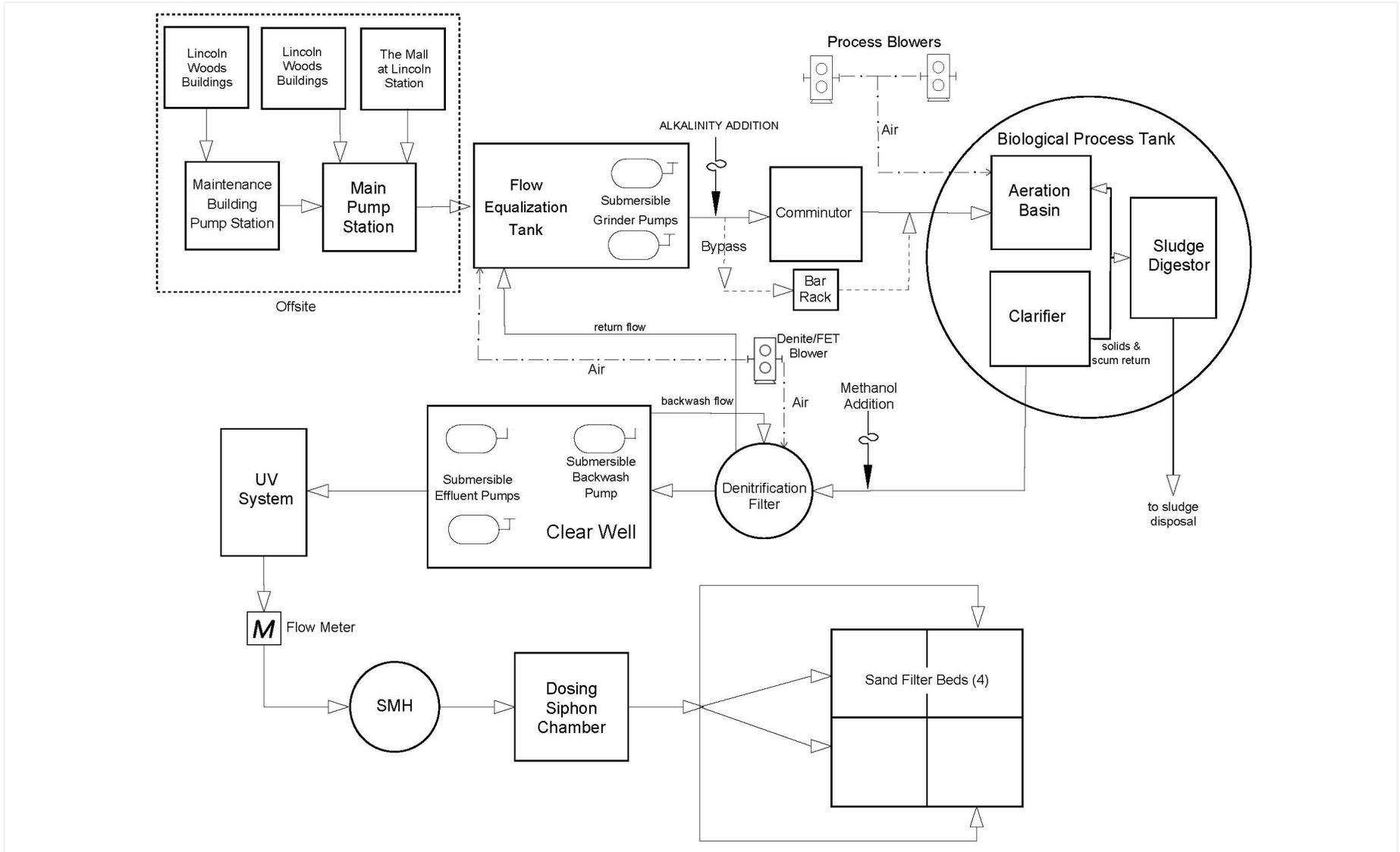
Wastewater first enters the WWTP through the underground flow equalization tank (FET). The tank is constructed entirely of concrete and has 2 aluminum access hatches. The FET has the capacity to hold 16,400 gallons of wastewater but has a current working capacity of 10,000 gallons. The purpose of the FET is to provide additional holding volume to allow the plant to feed wastewater at a more consistent, slower rate to the process tank, so it is not overloaded. The tank provides a location for larger, heavier solids to settle to the bottom and not continue to the process downstream. The tank contains two submersible chopper pumps each with a capacity of 75 gallons per minute and 3 HP motors that are mounted on a slide rail system to allow for easy access and maintenance. The pumps chop solids into smaller pieces and pump the liquid to the process tank. The tank is currently operating with only one pump, as one is currently out of service for maintenance. The tank can also be aerated by use of the denitrification blower which assists in keeping the stored liquid from going anaerobic/septic and negatively affecting the downstream secondary treatment process.

The tank operates automatically on float type level switches and has controls located in a wooden shed adjacent to the FET tank. One pump was replaced in 2009 and the second pump was replaced in 2018. These types of pumps typically have an operating life of 20 years. The concrete around the hatch is cracked with some pieces breaking off. The interior of the tank has some accumulated solids. The FET was installed in 2003 and is in fair condition. The concrete should last at least 60 years and can be increased by regular maintenance and repair. Protective coatings can be applied to the interior walls if needed to increase life expectancy of the concrete. The tank should be regularly pumped out to remove accumulated solids and decrease the chance of corrosion on the interior walls and process upsets. It is likely required bi-annually at a minimum. MassDEP small WWTF guidelines recommend having 50% of permitted effluent flow available as FET volume. The existing tank working volume is slightly under that recommendation but could be increased. There is no backup to the pressure transducer control system.

2.2.3 Comminutor/Process Tank Inlet

Wastewater is pumped from the FET to the Comminutor and through a V-notch weir plate prior to entering the aeration tank. The Comminutor is like the chopper pump in that its purpose is to chop larger solids into smaller pieces before they enter the process tank. The weir plate is part of a small steel structure that also comprises a bar rack and stop plate that are not currently in use. The Comminutor has a capacity of 450,000 gallons per day with a 3 HP motor. The Comminutor runs but does not work well according to the operator of the WWTP. Over time, the grinding teeth of the equipment can wear down, no longer providing the chopping service intended. The Comminutor was replaced in 2008 and typically has a useful life of 20 years. The equipment is in fair condition, with an operating motor, but the internal cutters likely need to be replaced. It is likely more economic to replace the entire unit. The steel inlet structure is in fair condition.

Figure 2-1 Process Flow Schematic



2.2.4 Process Tank

Wastewater flows from the inlet channel into the steel process tank. The circular process tank consists of a 53,500-gallon aeration tank on the outside two-thirds of the tank, a 7,600-gallon sludge digester on the remaining outside third of the tank, and a 10,600-gallon secondary clarifier that is 15 feet in diameter on the inside of the tank. The flow first enters the aeration basin where organic matter present in the wastewater is broken down and consumed by bacteria. The bacteria require air to live and reproduce. The air is provided by process blowers in the WWTP building, which goes through piping out to the tank, down to the floor, and is discharged through diffusers at the bottom that allow the oxygen to be transferred to the water. This is the process by which BOD is reduced in the wastewater. Ammonia is also converted to Nitrate in this part of the process. From the aeration tank, flow proceeds to the clarifier. A clarifier is essentially a large tank that allows heavier solids to settle to the bottom, like the FET. These solids particles floc (come together) in the wastewater and as time passes, settle to the bottom as they become heavier. There is a rotating scraper arm that pushes settled solids to a sump where the solids are returned to the beginning of the aeration tank to seed the process and some is removed to the digester to prevent the continuous buildup of these solids. The sludge digester provides a holding tank for these removed solids. Air is provided to the sludge digester to keep the solids from going septic, which can cause odor issues. Currently, the contract operator is wasting solids by vacuum truck and withdrawing liquid from the aeration tank on a regular basis.

The process tank is from the original 1975 construction. The tank was emptied, cleaned, sand blasted, and repainted in 2015. This can significantly increase the lifespan of the steel. While the tank was empty, the air diffuser piping in the aeration portion of the tank was replaced. It is unclear when the clarifier scraper mechanism was last replaced, it is likely original to the 1975 construction. A steel tank typically has a useful life of 60 years, which can be increased through regular maintenance and repair, such as repainting. The aeration and clarifier portions of the tank do not significantly impact the life of the tank, but the sludge digester portion of the tank can reduce the lifespan due to the production of hydrogen sulfide gas which reacts with water to produce sulfuric acid that can corrode the steel. This can be reduced by aerating the tank, regularly cleaning accumulated solids, and repainting the walls regularly. Since the 2015 repairs, the tank appears to be in good condition. The grating and handrails around the tank are also in good condition. The clarifier mechanism has a typical useful life of 20 years and is likely in need of replacement.

The aeration blowers located within the treatment building were replaced in 2009. The positive displacement blowers operate at 204 cubic feet per minute (cfm) at 6 pounds per square inch (psi). They have a typical useful life of 20 years. They are in sound-attenuated enclosures, which also adds a level of protection for the motors. As such, they appear to be in good condition.

2.2.5 Denitrification Filter

Clarified effluent flows out of the clarifier to the denitrification (denite) sand filter. The denite filter removes additional remaining solids that may be present in the wastewater and is also aerated through the denite blower. The aeration and detention time within the filter further push the nitrogen cycle to convert the Nitrate to Nitrogen gas, which releases to the atmosphere. This is how Total Nitrogen is reduced in the wastewater. The water flows by gravity through the filter and once the filter becomes clogged with solids, pressure increases within the filter cell and the wastewater rises to a level high enough to activate the float switches. This then triggers an automatic backwash system. Water from the Clear Well is used to backwash the filter to reduce solids buildup. The solids-laden water is returned to the FET. From the denite filter, wastewater flows into the Clear Well. Over time, the sand in the filter will need to be replaced.

The denitrification filter was constructed in the 2003 upgrade and is accessed through a manhole cover to the below-grade concrete structure, which houses the filter sand. The operator indicates that the filter works well but can sometimes run into issues. The denitrification filter is in good condition. The sand has a typical life span of 30 years. The life span of the filter's concrete structure is 60 years.

The denite filter has a positive displacement blower rated at 90 cfm at 8 psi. The typical useful life of this blower is 15 to 20 years. The blower is located outside, within a wooden shed. The blower is protected from rain, but not temperature. The blower's lifespan is therefore reduced by its environment. The blower is in poor condition. When it is replaced, it should be relocated inside the WWTP building to provide better protection. Alternatively, a better enclosure, such as fiberglass, could be provided with passive ventilation in the existing location.

2.2.6 Effluent Clear Well

The wastewater flows from the denitrification filter to the underground concrete Clear Well structure. The structure has a total volume of 6,800 gallons, consisting of backwash volume of 3,400 gallons and dosing volume of 3,400 gallons. The dosing volume is stored above the backwash volume within the Clear Well structure. The effluent Clear Well serves both to store the final effluent and to use the effluent as backwash to clean the denitrification filter, when needed. The submersible backwash pump within the chamber operates on a float type level switch within the denite filter, being called to run based on specific water level.

The structure was constructed in 2003. There is one aluminum hatch providing access to the Clear Well, and it is in fair condition. The estimated life span is 60 years for the structure. The backwash pump operates at 281 gpm at 36 feet of total dynamic head (TDH). The pump was installed in 2003 and has a typical useful life of 20 years. There are two submersible effluent pumps in this structure as well. The pumps have a capacity of 281 gpm at 36 feet of total dynamic head. These pumps were installed in 2003 and have a typical useful life of 20 years. There is one new effluent pump in the WWTP building, ready to be installed when necessary.

2.2.7 Disinfection

Wastewater is pumped from the Clear Well by the effluent pumps to the ultraviolet disinfection unit that is located inside of the WWTP building. The in-line UV system replaced the original chlorine system in 2007. The system is designed to disinfect the effluent flow using low-pressure, high-intensity ultraviolet light. Since installation the unit has not been replaced, but requires regular maintenance including bulb and ballast replacement. The UV disinfection system is in good condition. The life span of the disinfection system is 15 to 20 years.

2.2.8 Dosing Siphon Chamber

Wastewater continues from the UV disinfection system to the 1,650-gallon dosing siphon chamber. This chamber fills with the final effluent wastewater and discharges the flow to the sand beds. Effluent is discharged once the chamber has become full enough for pressure to activate the siphon. The structure was constructed in 1975. There are two manhole access covers for the underground concrete structure. The chamber is in good condition. Its life span is estimated to be 60 years.

2.2.9 Effluent Disposal

Once the siphon has been activated, effluent flows to one of four sand beds. The beds are original to the 1975 construction. Flow is controlled through buried gate valves that can be opened or closed to direct flow to the sand beds. The sand beds act as a media filter before the treated effluent is leached into the groundwater system. Two of the sand beds are in use at one time and they are alternated monthly through manual valve adjustment. The effluent sand beds are each 50' x 55' and have a capacity of 2.5 gallons per square foot. Raking of the sand beds is recommended to be completed monthly to keep plant growth to a minimum and a new layer of Title 5 sand should be provided every 8 to 10 years. There is currently a black plastic tarp for plant growth prevention; however, many weeds and other plants have grown on top. The effluent disposal sand beds are currently in fair condition but should be maintained to remove the plant growth.

2.2.10 Chemical Storage and Feed Systems

The biological treatment process requires carbon for the bacteria to convert influent Ammonia to Nitrate to Nitrogen gas. As BOD is consumed in the aeration tank, there is less carbon available at the end of the process in the denite filter to provide the final conversion from Nitrate to Nitrogen gas. As such, methanol (supplemental carbon) is used to provide the needed carbon for the process. Methanol is dosed prior to the denite filter.

A storage building was constructed in the 2003 upgrade and is located to the right of the treatment building's entrance. There are three 55-gallon drums of methanol located inside the building with three LMI peristaltic feed pumps. The building is a prefabricated fiberglass structure and is in good condition. The storage drums are replaced with new drums as they empty. The original methanol feed pumps dosed 1.3 gallons per hour of methanol at 300 psi. The Operator reported that the pumps were too large and they encountered problems that stopped them from working. A smaller pump was installed on the outside wall in an attached enclosure that doses 2 gallons per hour at 50 psi in 2016. The life span of the feed pumps is estimated to be 5 to 10 years, depending on how often they are used. The original pumps are no longer used. They should be removed, and the new smaller pump should be moved inside the enclosure. An additional pump should be provided so there is a backup in case of failure. The smaller pump is in fair condition.

2.3 Instrumentation Evaluation

Instrumentation at the offsite pump stations and the WWTP is very basic. The facilities have general alarms with dial-out capabilities that alert TCB staff and the Contract Operator. The Maintenance Building Pump Station has local alarming only. The general alarms do not provide information on what has failed, just that there is a problem that needs to be addressed. At the WWTP, the alarms are in zones, to assist in narrowing down where the problem is, but still does not provide exact information regarding the type of alarm/problem.

Instrumentation at the WWTP includes one flow meter (effluent meter located in the building), dissolved oxygen probes in the aeration tanks, several float switches throughout the tankage, and several pressure switches. These instruments assist the Operator in effectively running the process and provide automatic control of pumping equipment. The instruments typically do not have a long design life, 5 to 10 years depending on their location and how harsh the environment is. Regular maintenance and calibration are required to ensure the instrumentation operates properly and the process is not interrupted. Locations such as the pump station wet wells, FET, and sludge digester require more maintenance as the environments are harsher on the equipment. Instrumentation at the facility is adequate to assist the operator in running the process. More sophisticated instrumentation can be added to prevent process issues, but the addition of these can increase the complexity of the operation and require additional maintenance.

2.4 Electrical Evaluation

Power at the facility is provided by a solar array that was constructed in 2016. It is reported that extra power is rarely required for the facility but can be provided by the grid, if needed. Backup emergency power is also provided in the event of a power loss of the solar array and the grid by an onsite generator. The generator was originally installed in 2003 and was replaced in 2019. The generator is 150-kW, can power the entire facility, and has an 80-gallon diesel fuel belly tank. Upon power loss, the generator is activated through an automatic transfer switch. The estimated life of the generator is 30 years, and the switchgear is 20 years. Both are in very good condition. The solar field is estimated to last 30 years. The solar array and associated new electrical equipment are in good condition.

2.5 HVAC Evaluation

HVAC at the WWTP consists of electrical unit heaters and ventilation fans in the building. There are two ventilation fans, one is currently out of service and not usable. There are two electrical unit heaters in the building that are showing signs of corrosion and are in poor condition. The Operator reports that heating in the winter is not an issue but cooling in the summer is. The blowers discharge a lot of heat that is not dissipated in the building by the ventilation fans. Cooling should be evaluated for the building to protect the blowers and electrical equipment located within the building. Typically, ventilation fans have a design life of 10 to 15 years and unit heaters have a design life of 15 years.

2.6 Building Evaluation

The WWTP building houses the electrical controls, blowers, UV disinfection, and effluent in-line flow meter. The building has records storage, a bathroom, a “slop-sink” for operator use, a sump pump, and a wastewater ejector pump station for the bathroom. The building has a Town water connection with a flow meter and a backflow preventer for process use throughout the site. The building is not heavily used for the treatment system. The building is original to the 1975 construction. The exterior of the building is in poor condition with damage to the siding apparent. The roof appears to be in fair condition, but the age is not known. The exterior door to the building is in poor condition. The interior of the building is in poor condition and is not up to current building or mechanical codes. The walls are sheet rocked and painted with many sections that are cracked and crumbling, with holes throughout. There is a concrete slab foundation that runs through the entire building with no evidence of major damage but does have minor cracking. The building requires a complete renovation or tear-down and rebuild in the near future.

3

Section 3 Existing Plant Recommendations and Estimated Costs

3.1 Introduction

The purpose of this section is to provide recommendations with estimated costs for near-term, short-term, and long-term improvements to the existing WWTP based on operating data, site visit observations, typical design life of equipment and structures, and notes from the WWTP operator. This was accomplished by creating an equipment list, attached in Appendix C, that lists all the assets at the WWTP and establishes an asset management plan based on when the equipment was installed/replaced and its typical service life. Additionally, notes from operators and engineering judgement was used to develop additional immediate improvements that are required at the plant. It is important to note that these recommendations are for the current plant and do not address capacity increases.

Planning-level capital costs have been estimated for the recommended upgrades and are presented in each subsection. The costs were developed using standard cost estimating procedures consistent with industry standards utilizing recent, similar unit cost information, as necessary. Inflation to project year was included at a 3% per year rate.

3.2 Near-Term Improvements (0-5 years)

Near-term improvements to the WWTP and offsite pump stations are based on criticality, design life, and current condition. The following list comprises the list of improvements recommended for an improvements project year of 2025.

Remote Pump Stations

- Replace Maintenance Building Pump Station and Main Pump Station pumps. Grinder pumps are recommended.
- Install ventilation and odor control system within Maintenance Building. This station is problematic but likely cannot be changed unless a new one is constructed outside of the building.

WWTP

- Replace Comminutor. May not be required if grinder pumps are used in remote Main and Maintenance Building pump stations and FET.
- Replace clarifier mechanism.
- Replace denite blower. Consider constructing new fiberglass enclosure to replace wooden structure.
- Replace denite backwash and effluent pumps in Clear Well.
- Replace UV system.
- Remove unused methanol feed pumps, replace smaller pump, and add one additional smaller pump inside enclosure.
- Replace WWTP building with code-compliant new building, including better HVAC system. New building should provide a better storage space for records retention and include a computer operator station for improved operation and control of the plant.

3.2.1 Cost Estimate

Table 3-1 provides a planning level cost estimate for the recommended near-term improvements.

Table 3-1 Recommended Near-Term Improvements Cost Estimate

Recommended Improvement	Estimated Cost
Maintenance Building Pump Station Pumps	\$14,200
Main Pump Station Pumps	\$14,200
Maintenance Building Pump Station - Ventilation and Odor Control	\$20,000
Comminutor	\$12,100
Clarifier Mechanism	\$43,200
Denite Blower	\$7,400
Denite Backwash Pump	\$7,400
Denite Effluent Pump	\$7,400
UV System	\$7,400
Methanol Feed Pumps	\$5,600
WWTP Building	\$261,400
TOTAL	\$380,300

3.3 Short-Term Improvements (5-15 years)

Short-term improvements to the WWTP and remote pump stations are primarily based on design life. The following list comprises the short-term improvements recommended for a project year of 2035:

- Replace one FET grinder pump
- Replace process blowers
- Replace denite filter sand

Cost Estimate

Table 3-2 provides a planning level cost estimate for the recommended short-term improvements.

Table 3-2 Recommended Short-Term Improvements Cost Estimate

Recommended Improvement	Estimated Cost
FET Grinder Pump	\$9,400
Process Blowers	\$69,600
Denite Filter Sand	\$42,200
TOTAL	\$121,200

3.4 Long-Term Improvements (20-30 years)

Long-term improvements to the WWTP and remote pump stations are primarily based on equipment/systems design life. The following list comprises the long-term improvements recommended for an improvement project year of 2050:

- Replace Maintenance Building Pump Station in its entirety. This should be constructed exterior to the building as a new pump station.
- Replace Main Pump Station in its entirety.
- Replace FET grinder pump.
- Replace process tank, internal piping and diffusers and influent structure. Alternative treatment should be considered for this project.
- Replace effluent dosing pump.
- Evaluate sand disposal beds and potentially replace sand.
- Replace electrical equipment, including solar panels, transformer, generator, and automatic transfer switch.

3.4.1 Cost Estimate

Table 3-3 provides a planning level cost estimate for the recommended long-term improvements.

Table 3-3 Recommended Long-Term Improvements Cost Estimate

Recommended Improvement	Estimated Cost
Maintenance Building Pump Station	\$452,600
Main Pump Station	\$555,400
FET Grinder Pump	\$12,400
Process Tank (Aeration tank, Clarifier, internal piping, aeration diffusers & influent structure)	\$513,700
Effluent Dosing Pumps	\$12,400
Sand Bed Sand	\$234,500
Solar Panels, Transformer, Generator, Switchgear	\$344,800
TOTAL	\$2,125,800

3.5 Additional Considerations (30+ Years)

Additional considerations for planning purposes include concrete structure replacement. These structures typically last 60 years and can have their life extended with diligent cleaning and re-coating but should be evaluated in year 2065.

3.5.1 Cost Estimate

Table 3-4 provides a planning level cost estimate for additional considerations. These costs have a significant amount of inflation (3%/year) due to the extended project year.

Table 3-4 Additional Considerations Cost Estimate

Recommended Improvement	Estimated Cost
Flow Equalization Tank	\$211,900
Denitrification Filter Structure	\$171,000
Clear Well	\$145,500
Dosing Siphon Chamber	\$71,500
Effluent Overflow Tank	\$95,700
TOTAL	\$695,600

4

Section 4 WWTP Performance

4.1 Design Flows and Loads

The Lincoln Woods WWTP services the Lincoln Woods Apartments, which consists of a total of 18 buildings with 125 units, totaling 222 bedrooms, as well as the commercial properties at The Mall at Lincoln Station located adjacent to the apartments. The Mall includes a Post Office, bank, restaurant, several shopping stores, and a grocery store, totaling 35,500 square feet of commercial space.

Table 4-1 shows the original design conditions of the WWTP, including parameters such as flow, BOD, TSS, ammonia, nitrate, and total nitrogen. The original design was for the residential units only.

Typically, WWTPs are designed to meet the conditions outlined in a discharge permit issued by the regulatory authority. The discharge permit takes into account where the wastewater is being discharged to, surface water versus groundwater, and if the receiving body is particularly sensitive. In most cases, groundwater discharge permits are concerned with biochemical oxygen demand (BOD), total suspended solids (TSS), and Total Nitrogen (TN). BOD is a value used to define how much oxygen is required by the bacteria present in wastewater to break down organic material. TSS is a value used to indicate how “clean” a wastewater is, how much can settle out in a quiescent environment such as a clarifier, and how “clean” the effluent is so it doesn’t impact receiving waters or clog the void spaces in the final sand beds at the Lincoln Woods WWTP. Nitrogen is a concern for groundwater discharges because too much nitrogen can impact drinking water sources and be harmful to humans. In general, incoming wastewater contains a very high majority of Ammonia-based Nitrogen whereas the effluent contains a majority nitrate as oxygen is added and the nitrogen compounds react and change. The WWTP process is designed based on an estimated maximum flow and typically utilizes relevant historical wastewater data (if available) or established textbook values for influent parameters such as BOD, TSS, and Ammonia based on the source of the wastewater (Residential, Commercial, Industrial, Mixed, etc.). This dictates the size of tanks and capacity of equipment such as blowers and pumps.

Table 4-1 Original Design Conditions – 1975

Component	Influent	Effluent
Average Daily Flow (gpd)	22,200	26,000
Peak Daily Flow (gpd)	88,800	26,000
Total BOD ₅ (mg/L / lbs./day)	595 / 110	30.0 mg/L
Total Suspended Solids (TSS)	-	30.0 mg/L
Nitrate	-	10.0 mg/L
Total Nitrogen	-	10.0 mg/L

4.2 Current Flows and Loads

WP reviewed monthly and daily discharge monitoring reports (DMRs) issued by the WWTP to MassDEP and other plant data for the analysis period from January 2018 to June 2021. The results are summarized in Table 4-2. This data is used to establish the incoming wastewater strength and volume, treatment plant ability to process the incoming wastewater to meet the effluent permit requirements, and effluent values to establish the historical performance and ability to meet permit. The full range from minimum to maximum day is important to establish the level of variability of incoming wastewater and plant performance.

- Minimum Month – This is the minimum 30-day rolling average during the analysis period
- Maximum Month – This is the maximum 30-day rolling average during the analysis period
- 5th Percentile Daily – This is used to evaluate a more-typical minimum day value, as the minimum month or daily condition can be skewed due to erroneous mechanical or process failure
- 95th Percentile Daily – This is used to evaluate a more-typical peak daily value, as the maximum month or daily condition can be skewed due to erroneous mechanical or process failure
- Annual Average – This is the average of all data for the entire period

Table 4-2 Flows and Loads Summary, January 2018 – June 2021

Parameter	Flow (gpd)	BOD (mg/L)		TSS (mg/L)		Ammonia (mg/L)	Nitrate (mg/L)	TN (mg/L)
		Inf	Eff	Inf	Eff	Inf	Eff	Eff
Minimum Month	4,830	164	0.2	22	2.0	15	0.6	1.8
Maximum Month	19,440	2,400	123	7,780	101	72	19.6	23.0
5 th Percentile	4,500	-	-	-	-	-	-	-
95 th Percentile	15,790	-	-	-	-	-	-	-
Annual Average	9,960	399	26	387	9	1.9	2.7	9.3

For the above table, daily values of BOD, TSS and TN are not available as the discharge permit only requires the facility to monitor these parameters on a monthly basis.

It is important to note that the influent characteristics of the wastewater are consistent with a medium-strength residential wastewater. In general, the average BOD and TSS values are typical of a residential waste and the ammonia concentration is low. TKN is not measured in the influent but could be a better indicator of influent nitrogen than ammonia, due to the organic component. It is also important to note that COVID-19 impacted the data set, as can be seen after March 2020. The pandemic and resulting shutdown forced many people to stay home, increasing the residential flows and loads but decreasing the commercial flows and loads, especially restaurants that were shut down (or only open for take-out service).

4.2.1 WWTP Performance

WWTP performance is typically defined as the ability of the plant to meet its discharge permit limits. It is measured by the ability of the plant to remove incoming wastewater BOD and TSS and expressed as a percent removal. The plant averaged 94% removal of BOD and 95% removal of TSS during the analysis period as shown in Table 4-3. In general, based on the influent TSS and BOD and the permitted discharge requirements, the facility needs to remove approximately 90-92 percent of BOD and TSS to maintain permit compliance. On average, the plant is performing well, and the history of any poor performance has been largely due to mechanical failures within the process.

Table 4-3 Yearly Summary of WWTP BOD and TSS Removal Percentage, January 2018 – June 2021

Parameter/Year	Yearly Percent Removal		
	Minimum	Average	Maximum
BOD			
2018	69	94	100
2019	73	91	100
2020	68	95	100
2021 ¹	87	97	100
2018-2021 Average	68	94	100
TSS			
2018	53	92	100
2019	73	95	99
2020	91	96	99
2021 ¹	96	99	100
2018-2021 Average	53	95	100

Note:

1. Data from January 2021 to June 2021

4.3 Current Operation and Maintenance Costs

The operation and maintenance costs of the WWTP are split into subcategories. The operations costs consist of electricity (more or less none for Lincoln Woods due to use of solar array system), fuel, operator salaries, chemical usage, lab fees, alarm response costs, sludge removal, engineering fees, and wastewater/treatment plant fees (such as GWDP fees). Maintenance costs consist of operator labor for normal equipment maintenance such as changing oil, parts and equipment replacement, and repair labor required outside of normal maintenance. The data was provided by TCB and limited by their record keeping and labeling.

Tables 4-4 and Table 4-5 show the breakdown of the operation and maintenance subcategory costs. The operation and maintenance summary costs for the analysis period are in Table 4-6.

Table 4-4 Operation Cost Summary, January 2018 – June 2021¹

Year	Fuel	Eng. Fees	Lab Fees	Chemical Usage	Alarm Response	Sludge Removal	Operator Salary	Contracted Operations	Treatment Plant Fees	Other
2018	\$398	\$800	\$8,865	\$10,254	\$3,249	-	\$11,293	-	\$1,266	-
2019	\$436	\$1,800	\$9,573	\$7,006	\$855	\$1,210	\$17,856	\$744	\$15,107	\$7,894
2020	-	\$1,920	\$8,482	\$2,416	\$2,280	-	\$19,784	\$744	\$4,181	\$2,635
2021	\$775	\$560	\$5,803	\$2,248	\$1,995	-	\$11,459	-	\$5,288	\$900

Note:

1. Data from January 2021 to June 2021

Table 4-5 Maintenance Cost Summary, January 2018 – June 2021¹

Year	Labor	Parts/Equipment	Repairs
2018	\$1,910	\$4,567	\$3,527
2019	\$190	\$6,250	\$154
2020	-	\$4,082	-
2021	-	\$841	\$779

Note:

1. Data from January 2021 to June 2021

Table 4-6 Operation and Maintenance Cost Summary, January 2018 – June 2021¹

Year	Operation Cost	Maintenance Cost	Total
2018	\$36,125	\$10,004	\$46,129
2019	\$62,481	\$6,594	\$69,075
2020	\$42,441	\$4,082	\$46,523
2021	\$29,028	\$1,620	\$30,648

Note:

1. Data from January 2021 to June 2021

Based on the above annual costs, the WWTP is generally low-cost to operate compared to other small WWTFs. This is due in part to a near-zero cost for electrical operations due to the solar array providing power for the entire plant. Typically, electrical costs make up a large percentage of the annual operations cost of a WWTP. The contract operations are also on the low side, due to the low overhead of WWEM and how efficiently they run their operation.

4.4 Capacity Analysis

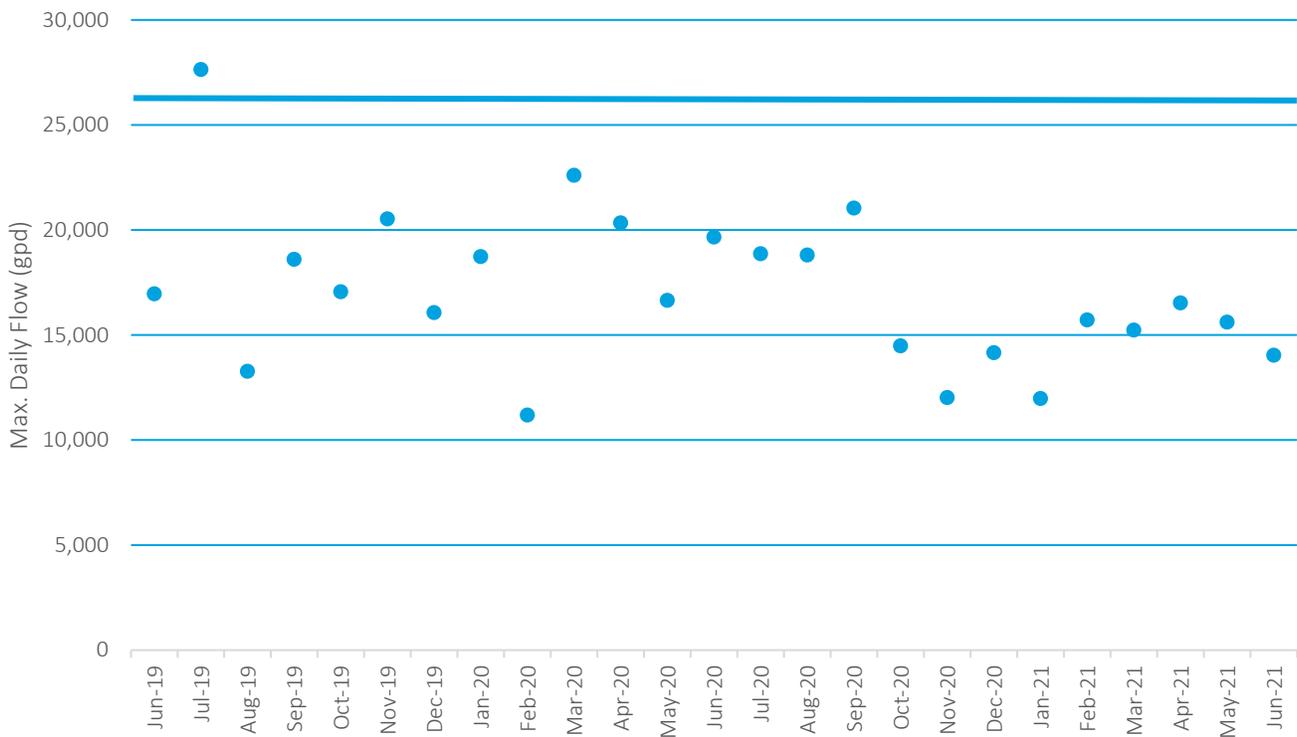
The hydraulic, or flow, capacity of a treatment plant is determined by the maximum it can discharge. For Lincoln Woods, the maximum permitted effluent flow capacity of the WWTP is 26,000 gpd. WP analyzed the effluent flows from January 2018 to June 2021 to determine the amount of capacity that the treatment plant has available. MassDEP defines the current used capacity with two components. The first component is the existing flows recorded at the WWTP and the second component is the amount of flow that would be treated at the WWTP if the sewer service area was fully “built-out”. In the case of Lincoln Woods, the build-out flow would be due to any housing units that were vacant during the analysis period and any commercial property unused at The Mall. MassDEP requires that the current used capacity at the WWTP be calculated by using 24 months of consecutive data, establishing the maximum daily flow during each of those months, and averaging the value. Adding the two components will result in the current used capacity, which can then be subtracted from the total available capacity (26,000 gpd established by GWDP) to give available capacity for potential sewer service area expansion. The available capacity can be utilized in the future for expansion in the surrounding area, new units at the housing community, or changes to The Mall.

Aside from permitted flow capacity, total available treatment capacity of the equipment and unit processes and effluent disposal capacity of the sand beds is an important metric to evaluate and is analyzed below.

4.4.1 Current Used Capacity

The current used flow capacity of the WWTP is determined according to MassDEP standards. The average of the maximum daily flow of each month of the past 2 years reflects the current used capacity of the plant. The 2-year time span used was June 2019 to June 2021 since this is the most recent available data. The maximum daily flow for each month of this analysis period is shown in Figure 4-1. The average is 17,110 gpd.

Figure 4-1 Maximum Daily Flow Per Month, June 2019 – June 2021



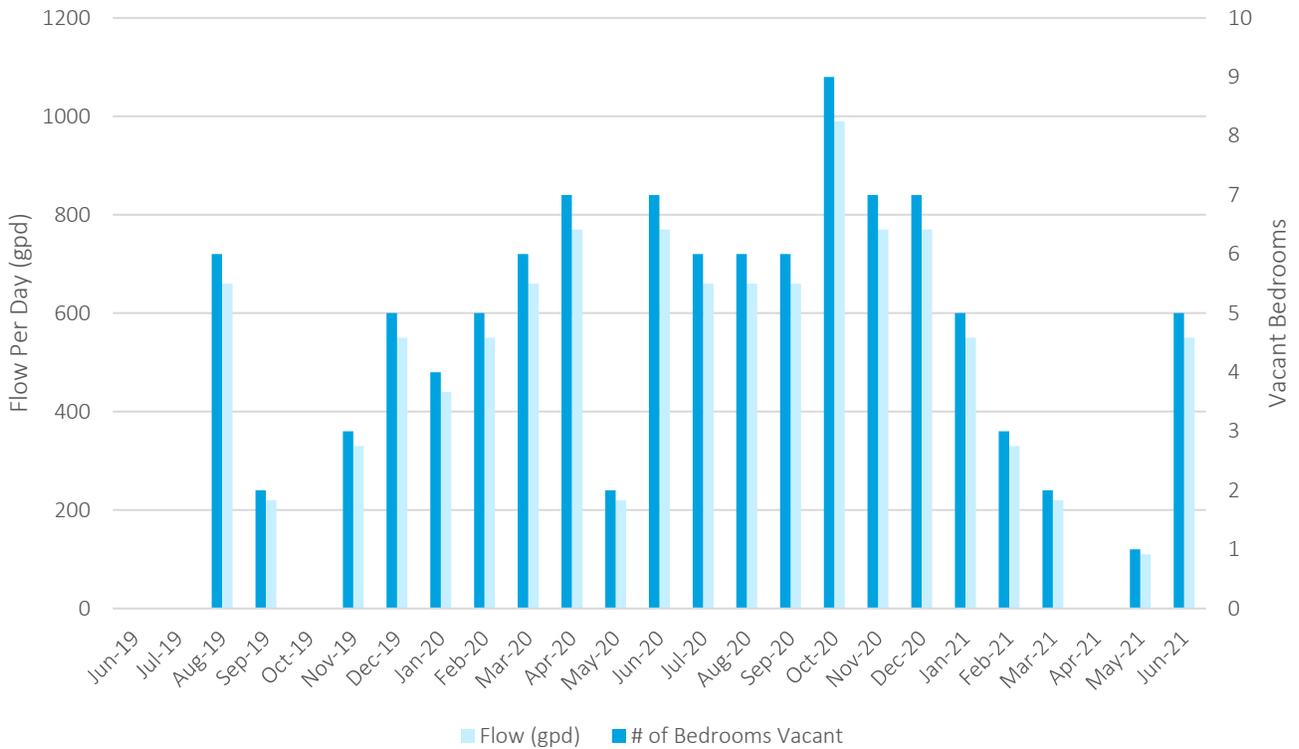
Note:

1. Permitted Maximum Day Flow, 26,000 gallons per day

4.4.2 Build-out Capacity

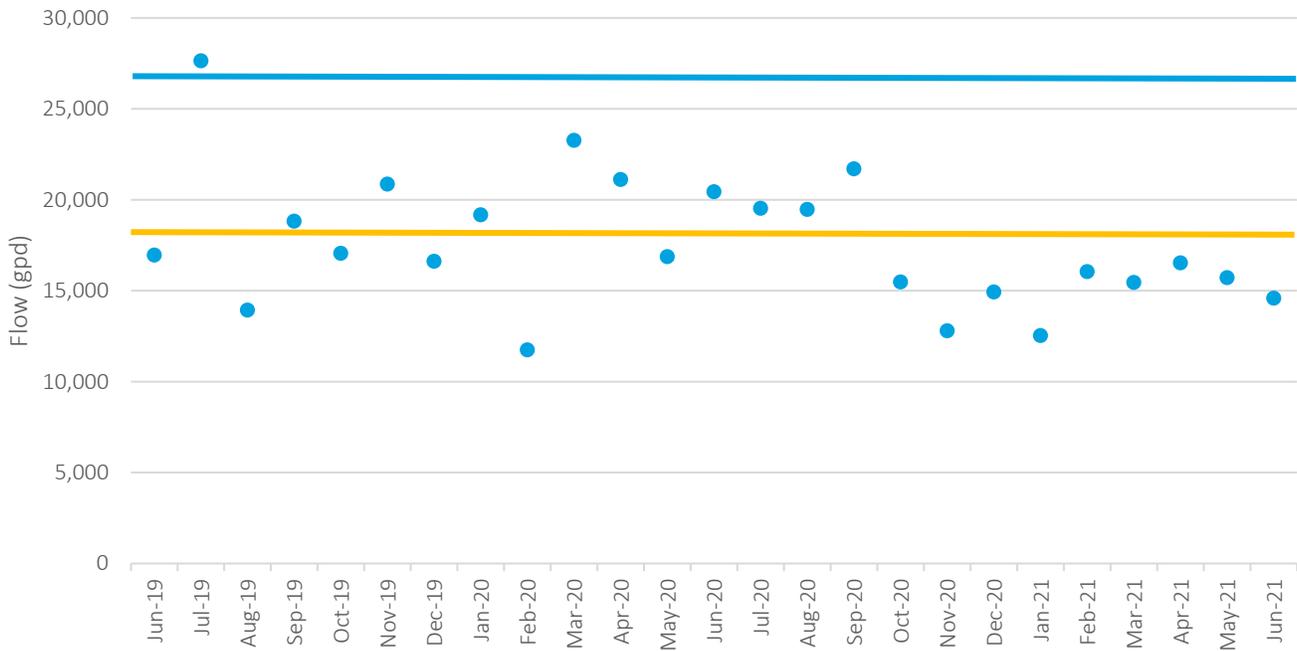
The build-out capacity is dependent on the historical vacancy of the Lincoln Woods apartments and any commercial property unused at The Mall during the analysis period. For example, the analysis period selected includes months where COVID-19 impacted businesses at The Mall, specifically closing the restaurant for a period of time. Build-out flow is the amount of expected flow that would be produced by the vacant units in the Lincoln Woods apartments if fully occupied and by the commercial properties should they be fully operational. The amount of flow that would be generated by each unit was estimated using state Title 5 guidelines of 110 gpd per bedroom. Vacancy data (total bedrooms) on a monthly basis was obtained from TCB. Figure 4-2 displays the number of vacant units and resulting estimated wastewater flow per day during the analysis period. A portion of flow for the closed restaurant was also added as build-out based on historical averages when it was open (approximately 500 gpd).

Figure 4-2 Build-out Flow from Apartments



The buildout flow is added to the average of the 24 maximum daily flow for months recorded at the WWTP to establish the current used capacity. Figure 4-3 displays the additional flow to be included in the current used capacity of the WWTP. Averaging these values and adding the portion for the restaurant closure results in a current used capacity of 18,070 gpd.

Figure 4-3 Current Used Capacity with Added Build-out Flow



Note:

1. — Permitted Maximum Day Flow, 26,000 gallons per day
2. — Total Used Capacity, 18,070 gallons per day

4.4.3 Expansion Alternatives

The amount of flow capacity that is available at the treatment plant is determined by subtracting the current and build-out flow from the permitted flow of 26,000 gpd. With an average used current capacity of 18,070 gpd, the current available capacity at the plant is 7,930 gpd. This unused flow capacity was analyzed to establish expansion/change-of-use alternatives for The Mall. The Town is interested in options available for Commercial and Residential additions to The Mall. In order to establish alternatives for unused capacity allocation, WP analyzed the historical metered wastewater usage of The Mall (currently Commercial properties only) to establish an average flow contribution to the WWTP. This is shown in Figure 4-4.

Figure 4-4 Total Monthly Mall Flows

The average wastewater flow contribution of The Mall is approximately 1,795 gpd. This includes data when the restaurant was closed due to COVID-19, so it was increased by 500 gpd based on historical restaurant flow between February 2019 and February 2020. The resulting Mall flow totals 2,295 gpd. This is used as a baseline for future percentage increases in commercial property flow within The Mall (10, 25, 50, 100% increase), with the remainder of flow being allocated to an increase in residential properties, expressed as a total number of equivalent bedrooms that could be constructed. This is accomplished by taking the 7,930 gpd of available capacity, subtracting the commercial flow allocation, and dividing the remainder by the MassDEP-required 110 gpd/bedroom.

The possible alternatives for commercial and residential expansion within The Mall are summarized in Table 4-7. The percentage increase refers to the historical baseline commercial flow of 2,295 gpd.

Table 4-7 The Mall Expansion Alternatives

Parameter	10% Increase	25% Increase	50% Increase	100% Increase
Commercial Flow (gpd)	230	570	1,150	2,295
Residential Flow (gpd)	7,700	7,360	6,780	5,640
Number of Bedrooms ¹	70	66	61	51

Note:

1. 110 gpd/bedroom, rounded down

Based on Town input, Wright-Pierce investigated the difference between the MassDEP-required 110 gpd/bedroom requirement and the specific value that could be calculated for Lincoln Woods. In order to complete this analysis, Wright-Pierce collected monthly occupancy data from TCB, total WWTP flow per month, and total Mall flow per month. The data is summarized in 8.

Table 4-8 Lincoln Woods Specific Per Bedroom Flow Rate, January 2019 – June 2021

Date	Total Occupied Bedrooms	WWTP Monthly Flow (gal)	The Mall Monthly Flow (gal)	Lincoln Woods Monthly Flow (gal)	Lincoln Woods Daily Flow ¹ (gpd)	Estimated Bedroom Flow Rate ² (gpd/br.)
January 2019	213	189,258	46,741	142,517	4,597	22
February 2019	219	154,503	84,285	70,218	2,508	11
March 2019	219	153,771	77,351	76,420	2,465	11
April 2019	222	265,720	64,976	200,744	6,691	30
May 2019	222	284,077	69,033	215,044	6,937	31
June 2019	222	302,316	157,786	144,530	4,818	22
July 2019	222	324,306	76,041	248,265	8,009	36
August 2019	216	251,841	85,298	166,543	5,372	25
September 2019	220	325,188	81,304	243,884	8,129	37
October 2019	222	351,597	61,898	289,699	9,345	42
November 2019	219	343,088	73,434	269,654	8,988	41
December 2019	217	289,202	61,029	228,173	7,360	34
January 2020	218	299,336	70,770	228,566	7,373	34
February 2020	217	222,259	52,785	169,474	6,053	28
March 2020	216	307,611	25,187	282,424	9,110	42
April 2020	215	375,967	29,485	346,482	11,549	54
May 2020	220	366,445	43,099	323,346	10,431	47
June 2020	215	361,068	33,809	327,259	10,909	51
July 2020	216	354,065	40,814	313,251	10,105	47
August 2020	216	365,237	43,154	322,083	10,390	48
September 2020	216	344,520	44,985	299,535	9,984	46
October 2020	213	339,198	25,652	313,546	10,114	47
November 2020	215	280,473	37,609	242,864	8,095	38

Date	Total Occupied Bedrooms	WWTP Monthly Flow (gal)	The Mall Monthly Flow (gal)	Lincoln Woods Monthly Flow (gal)	Lincoln Woods Daily Flow ¹ (gpd)	Estimated Bedroom Flow Rate ² (gpd/br.)
December 2020	215	282,317	42,744	239,573	7,728	36
January 2021	217	288,121	33,705	254,416	8,207	38
February 2021	219	278,739	35,542	243,197	8,686	40
March 2021	220	323,546	47,002	276,544	8,921	41
April 2021	222	281,062	28,290	252,772	8,426	38
May 2021	221	314,565	48,529	266,036	8,582	39
June 2021	217	340,529	32,806	307,723	10,257	47
Average	218 (98% occupancy)	298,664	55,171	243,493	8,005	37

Note:

1. Monthly flow divided by number of days in the month
2. Daily flow divided by number of occupied bedrooms

It is important to note that during COVID-19, the residential flow from Lincoln Woods increased significantly. The average per bedroom flow rate is significantly lower than 110 gpd/bedroom, averaging at 37 gpd/bedroom for the data set. WP followed up this analysis with an interview with MassDEP to review the flow rate to be used for planning purposes. MassDEP confirmed that for planning and design purposes, 110 gpd/bedroom must be used. MassDEP has acknowledged for decades that the flow rate of 110 gpd/bedroom is considered a conservative maximum flow rate but still requires its use.

4.4.4 WWTP Design Capacity

This section reviews the maximum design capacity (not permitted flow capacity) for the unit processes, equipment, and effluent disposal at the WWTP and recommendations for improvements should they be needed. This includes both hydraulic (flow) and treatment capacity. The analysis follows the flow path at the WWTP. The analysis reviews existing capacity and identifies deficiencies should flow be increased above the permitted 26,000 gpd. It is important to note that MassDEP guidelines require redundant treatment processes over 40,000 gpd. Currently, redundancy is not required but is recommended to assist in operation of the facility.

There is one flow equalization tank which is sized for a working volume of 10,000 gpd, with a maximum capacity of 16,400 gallons. MassDEP small WWTF guidelines require FET volume to be 50% of the permitted flow (which is 26,000 gpd for Lincoln Woods WWTP). The total volume of the tank is sufficient for the current effluent discharge limit of 26,000 gpd, but the current working volume (based on pumping set points) is not 50% of the permitted flow. Volume would not be sufficient for an increase in flow capacity over 32,000 gpd. In addition, the tank does not have redundancy in terms of storage volume or pump controls. This is currently not required but would make operation of the WWTP easier and reduce the potential of process upsets.

An increase in FET size, an additional tank, and two additional structures should be constructed to assist in process control and capacity. The two additional structures would include an influent diversion structure to direct flow to one of the two tanks and the other structure would be a valve vault on the discharge end of the tanks where the pumps would be located. This would allow for additional flow equalization capacity and would allow the operator to maintain pumps and clean the tanks more efficiently. The two grinder pumps in the FET are sized for 75 gpm, or 108,000 gpd. These are sufficient to meet an increase in flow capacity for the WWTP. The deficiency in this system can be seen in the return to compliance letter completed, which outlines that many of the permit violations have occurred when there have been mechanical failures in the pumps or level controls in this tank. In lieu of adding a second tank, a backup control system could be added for less cost, which would assist in preventing some of the permit violations that have occurred historically. However, a second tank would help in reducing solids buildup.

The existing comminutor is sized for 450,000 gpd of flow throughput. This equipment is sufficiently sized for current flows and an increase in flow capacity. It currently does not function as intended and should be replaced.

The combined biological process tank was originally designed to treat 53,700 gallons of flow, hydraulically. The tank is large enough to provide a hydraulic residence time of one day at that flow, which is recommended by extended aeration system design standards. However, the tank is also limited by its ability to treat the influent organic (BOD) load. This is based on the volume of air that can be provided, oxygen transfer efficiency in the tank, and the strength of the incoming wastewater (BOD). Based on the existing size of the blowers and the arrangement of the diffusers in the aeration tank, the system can treat 122 pounds of BOD per day. Pounds of BOD is calculated by the following equation:

$$\text{Lbs}_{\text{BOD}} = \text{Flow (gpd)} * \text{BOD}_{\text{Concentration}} (\text{mg/L}) * 8.34 (\text{lbs./gal}) / 1,000,000$$

Therefore, in order to calculate the maximum flow that can be treated, we show:

$$\text{Flow (gpd)} = 122 \text{ Lbs}_{\text{BOD}} / \text{BOD}_{\text{Conc.}} / 8.34 * 1,000,000$$

As the BOD concentration increases, less flow can be treated. Based on the values shown in Table 4-2, the influent BOD concentrations vary significantly at the WWTP. This is due in part to mechanical failures that occurred during the analysis period and the location of influent sampling. The average influent BOD concentration of 400 mg/L is likely higher than it should be, as typical medium strength residential flow is normally between 200-300 mg/L. There is some commercial flow from the Mall that would change the expected range, but based on the sources, the restaurant is the only source that would have a higher concentration expected (due to grease and food waste) as compared to normal residential concentrations. At 400 mg/L the flow that can be treated at the WWTP is 36,500 gpd. For reference, the CDM report analyzed an average influent BOD concentration of 190 mg/L for their analysis period, which was prior to the restaurant construction in the Mall. Influent BOD concentration from February 2019 to February 2020, when the restaurant at the Mall was operating, is fairly consistent and averages at 365 mg/L. Using this concentration, 40,000 gpd should be able to be treated by the existing system. The blowers can provide 200 cfm of air at 6 psi of back pressure. This is sufficient to treat the influent BOD.

The clarifier portion of the treatment process includes a 15-foot diameter, 8-foot-deep tank, with a volume of 10,600 gallons. Clarifier capacity is measured by surface overflow rate (gpd/sq. ft.). Best practices for clarifiers are typically based on 10-foot side water depths, minimum. MassDEP guidelines require that clarifiers be designed so that surface overflow rates do not exceed 300 gpd/sq. ft. at average design flow at a 10-foot sidewater depth. For a shallower clarifier, the rates would be lower. As the clarifier for the Lincoln Woods WWTP is significantly shallower, it is challenging to determine the maximum capacity. Surface overflow rate is determined using flow (gpd) and the clarifier surface area ($\pi d^2/4$). The surface area is approximately 177 sq. ft. Table 4-9 summarizes the surface overflow rates for the flow data in Table 4-2 and the flows calculated above for the aeration capacity at the WWTP.

Table 4-9 Clarifier Surface Overflow Rates Versus Flow

Parameter	Flow (gpd)	Surface Overflow Rate (gpd/sq. ft.)
Minimum Month	4,830	27
Maximum Month	19,440	110
5 th Percentile	4,500	25
95 th Percentile	15,790	89
Annual Average	9,960	56
Permitted Flow	26,000	147
Aeration Flow Capacity, 400 mg/L BOD	36,500	207
Aeration Flow Capacity, 375 mg/L BOD	40,000	226

Currently, surface overflow rates are generally within good operational values. As more flow is added, the surface overflow rate will approach the recommended maximum of 300 gpd/sq. ft., which is based on a deeper clarifier and likely would not be recommended for a shallower clarifier.

It is important to note that there is no redundancy for any portion of the biological process tank. If there is a failure or the need to take equipment/systems out of service, there is no backup to treat incoming wastewater and if the storage volume in the FET is not sufficient to store wastewater until the tank can be brought back online, wastewater would need to be pumped and trucked as liquid to another treatment plant, assuming one is available. This would be a very costly endeavor. Currently, this is not required, but would be triggered as a regulatory requirement should flow exceed 40,000 gpd.

The sludge digester (holding tank) provides 7,600 gallons of storage. It is likely sufficient to waste and store excess solids from the process tank, however more frequent disposal is likely required to perform optimally, which is not currently being done. The amount of storage volume desired depends on sludge generated and how frequently a plant desires to hold the sludge before bringing in a truck to pump out and dispose of it. The larger the tank, the longer the sludge “sits”, which will eventually cause odor issues as it is an open tank. The tank size is sufficient for the existing design and current conditions.

The denitrification filter is sized for 26,000 gpd of flow. There is no backup filter available. If the WWTP were to be expanded hydraulically, an additional filter will need to be constructed. In addition, as there is no backup, when the sand needs to be replaced or if something were to fail in the filter, the facility would not be able to achieve permit effluent limits. In addition to nitrogen removal, it is also likely that the filter performs a bulk of the TSS removal for the facility, as the clarifier is likely not performing optimally due to its design (shallow sidewater depth).

The effluent clear well is sized for the existing denitrification filter. If an additional filter were to be added to increase capacity, the clear well volume will need to be increased.

The UV disinfection system has a capacity of 40,000 gpd, which would need to be replaced and increased should it be desired to treat more flow.

The four sand beds are approximately 52.5 feet by 50 feet each (2,625 square feet). This equates to a total surface area of 10,500 square feet. Capacity of the beds is dependent on the percolation rate as determined by a percolation or infiltration test. Table 4-10 shows loading rates for an open sand bed as established by MassDEP in their Small WWTF Guidelines.

Table 4-10 Design Loading Rate (gpd/sq. foot), Open Sand Beds

Test Method	Percolation Rate (Min/in)				
	Less than 2	2 to 5	5 to 10	10 to 20	Greater than 20
Percolation	5	5	4	2	0.3
Infiltration	5	5	4.5	3	0.3

Based on the permitted capacity of 26,000 gpd and the total surface area of 10,500 square feet, the loading rate equates to 2.5 gpd/sq. ft. The original percolation rate for the beds is unknown. Based on the above table, as much as 52,000 gpd could be disposed if testing shows a percolation rate of 0-5 min/in. Regardless, the beds are 50 years old, and the original rate would likely no longer be valid. It is recommended that infiltration testing be performed in the beds to understand what the current percolation rate is, which would allow an exact flow capacity to be determined. In any case, should the WWTP flow capacity be increased over the permitted 26,000 gpd, there are

other processes which would limit that as stated above. However, it does appear that there is space availability at the WWTP site to construct additional structures and additional disposal beds. The fence would need to be moved to the property limits to accommodate new structures. It is important to note that MassDEP will likely require some reserve disposal capacity be constructed if any changes were to be made to the existing disposal beds or new ones constructed. Currently there is no reserve capacity at the WWTP, and permit renewals have been grandfathered out of the reserve area standard.

It is recommended that infiltration testing be conducted in the sand beds to determine the current capacity for effluent disposal. This will drive whether expansion over the permitted 26,000 gpd can occur utilizing these sand beds.

If WWTP flow capacity is increased, the following list summarizes the constraints and changes that would be required to allow for an increase. It is important to note that redundancy is not required unless permitted flow is increased over 40,000 gpd but is recommended to improve operations of the existing facility as shown in Section 3. The following list assumes flow is increased between the existing 26,000 gpd and the regulatory redundancy restriction of 40,000 gpd.

- Flow Equalization Tank (FET) volume will need to be increased should flow exceed 30,000 gpd. This could be accomplished by replacing the tank or increasing the depth of the existing tank.
 - Increasing depth of the existing tank can be done, up to a point, through increasing the height of the walls. This would be the easiest and lowest-cost change. Replacing the entire tank with a larger one is a more difficult and costly undertaking as it would involve excavation, new concrete tank, piping, and moving the pumps and controls. The old tank could be used as a backup during cleaning and/or maintenance.
- The existing biological process (aeration tank) can treat a maximum of 122 pounds of Biochemical Oxygen Demand (BOD). This is based on the height and volume of the tank, current blower size, and the diffuser type and arrangement in the tank. Additional aeration capacity or better oxygen transfer is required to treat more BOD. Based on the analysis above, for current BOD concentrations, which is likely skewed due to process upsets, 36,500 gpd (based on 400 mg/L influent concentration of BOD) can be treated and 40,000 gpd (375 mg/L of BOD) is likely achievable with proper operation of the system.
- The clarifier performance is limited by its depth and how much flow it sees. As flow increases, performance is reduced. However, for this WWTP, the performance of the clarifier is not as important as in other WWTPs because the downstream denitrification filter removes solids and BOD. Additional flow to the clarifier is not recommended without increasing the depth but flows up to 40,000 gpd can be conveyed through the clarifier.
- Denitrification filter cannot treat more than 26,000 gpd and would need to be replaced for an increase in flow.
 - This is the current and most important limiting factor. Locating a new filter is difficult on the existing small footprint of the WWTP site, especially if additional disposal beds are desired for an increase in flow disposal capacity. The project would involve finding a location for the filter, excavation, cost of the concrete structure, sand media, piping, and other necessary ancillary items.
- Increase in clearwell volume is required to treat more than 26,000 gpd. Tank volume is based on backwash requirements for the denitrification filter and if the denitrification filter is increased in size, additional flow would be required to adequately flush the filter.
 - Additional volume could be added easily at a reasonably low cost by increasing the height of the tank. A replacement tank, similar to replacing the FET tank, would be more costly and difficult to implement.

- Existing sand bed capacity is unknown. Testing is recommended to understand if more than 26,000 gpd of treated effluent can be disposed. If testing shows existing beds cannot handle more than 26,000 gpd or desired flow increase, additional disposal area will be required.
 - Increasing flow capacity would require a permit modification and acceptance through MassDEP. Additional area could be accomplished through a sub-surface leaching field rather than or in addition to additional open sand beds. There is some space on the existing parcel, including the solar array location. Additionally, the Town of Lincoln owns the abutting land (Conservation), and a portion could potentially be used for sub-surface disposal with limited above-grade impacts/limitations. Locating and adding additional effluent disposal would require hydrogeological and geotechnical investigations and testing be done prior to design and construction. Once approved, the additional area would need to be designed/constructed and new piping designed/constructed to connect into the existing effluent piping at the dosing siphon chamber. It is likely that a permit modification to increase flow would trigger a requirement for some reserve disposal capacity be added.

Table 4-11 summarizes the bulleted list.

Table 4-11 Existing WWTP Constraints Regarding Increasing Capacity

Process/Equipment	Existing Capacity	Deficiency	Recommendations	Magnitude of Change
Flow Equalization Tank	Volume – 10,000 gallons working, 16,600 gallons total Pumping – 108,000 gpd	Volume should be 50% of effluent permit flow Pumping OK	Increase working volume of existing tank to at least 13,000 gallons, an increase in volume would be required should disposal exceed 30,000 gpd	Increasing working volume – easy solution Increasing overall tank volume – easy to add height and modify piping or to add a new, larger tank
Comminutor	450,000 gpd	No flow deficiency	None	None
Biological Process - Aeration	Flow – 53,700 gallons available, treatment depends on BOD concentration BOD Treatment – 122 lbs./day	Flow limited by incoming wastewater strength / operation of FET	Better operation of FET	Up to 40,000 gpd, easy changes to operate FET better and add backup controls to the FET pumps
Biological Process - Clarifier	Unknown	Shallow depth of tank, lack of operating data	Collect operational data	Clarifier performance can be sub-optimal due to denitrification filter, operational data is easy to collect
Sludge Holding	7,600 gallons	None	None	None
Denitrification Filter	26,000 gpd	Cannot process more than 26,000 gpd	Increase size if more flow desired	Difficult and costly to replace filter. Likely easier to construct a new filter and abandon/demo old filter
Effluent Clear Well	6,800 gallons	Sized for existing denitrification filter	Increased volume if more flow desired	Easy to increase volume or construct new tank
UV Disinfection	40,000 gpd	None	Larger system if more flow desired	Easy to replace unit
Sand Beds – Effluent Disposal	10,500 sq. ft., 2.5 gpd/sq. ft.	Actual loading rate unknown, no reserve capacity	Percolation / Infiltration Testing Reserve area constructed Expand beds if more flow desired and testing determines beds are flow-limited	Testing easy to accomplish Room for reserve area difficult on existing site but can be done Increasing capacity difficult

4.4.5 User Fee Structure

Part of this evaluation included analyzing the fee structure between the Lincoln Woods Apartments and The Mall at Lincoln Station. The original agreement from 1998 between the apartments and The Mall is included in Appendix B. The agreement stipulates that The Mall is responsible for a share of costs incurred by Lincoln Woods to operate and maintain the WWTP, including normal operating costs, maintenance costs, and upgrades to the facility. The cost burden to The Mall was established to be a percentage basis, as determined by flow usage. This is accomplished by use of flow meters on The Mall buildings and comparing to the overall totalized flow at the WWTP to establish a percent use by The Mall. The Mall is then billed based on that percentage. In WPs opinion this is a fair and equitable arrangement.

The Mall’s historical percentages of flow for the analysis period are summarized in Figure 4-5 and Table 4-12 below.

Figure 4-5 WWTP Total Monthly Flow vs. Percentage of Mall Flow

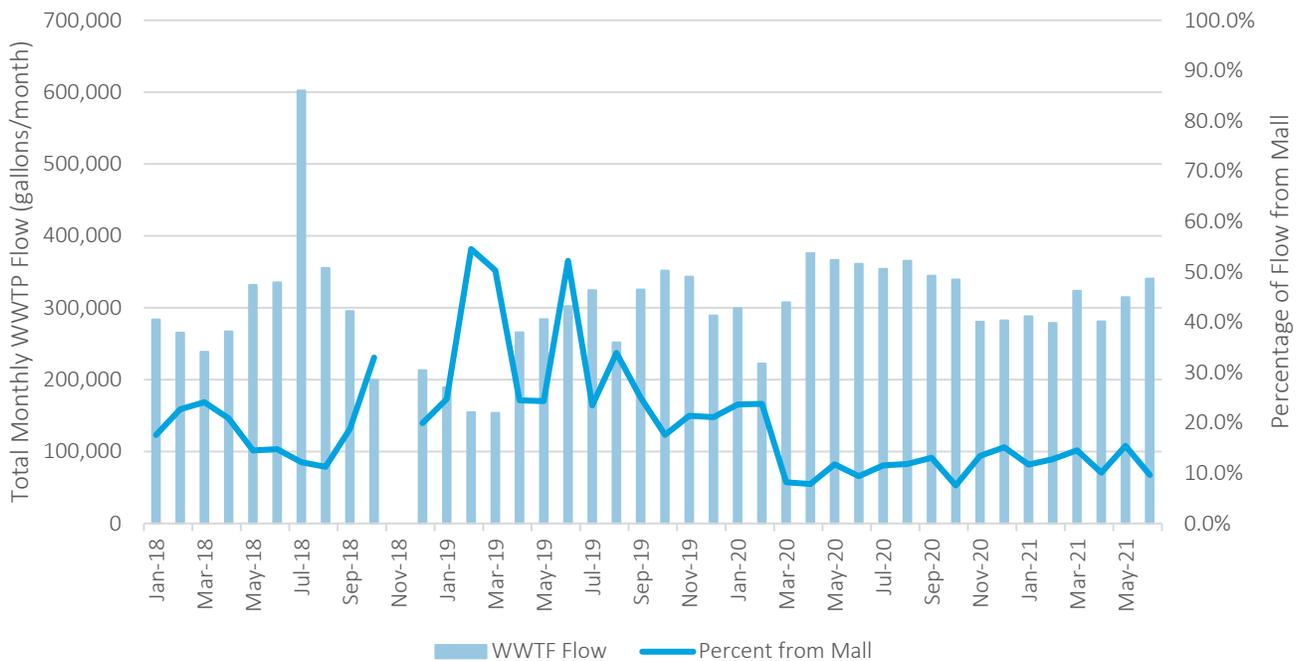


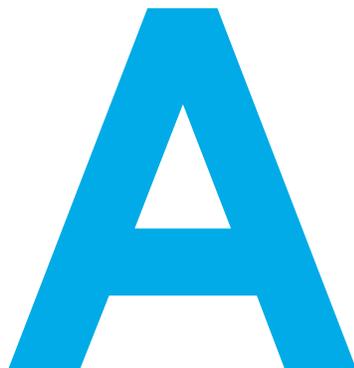
Table 4-12 Historical Mall Usage, Percentage of Overall Monthly Flow to WWTP

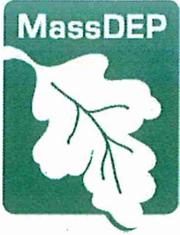
Date	Average WWTP Monthly Flow (gallons/month)	Average Mall Monthly Flow (gallons/month)	Percent of Overall WWTP Flow
2018	282,275	53,193	19.1%
2019	269,572	78,265	31.1%
2020	324,875	40,841	13.1%
2021	304,427	37,646	12.4%
Monthly Average	293,982	54,606	19.8%
Monthly Maximum	602,084	157,786	54.6%
Monthly Minimum	153,771	25,187	7.6%

Note:

1. Data from January 2021 to June 2021

The above table shows that when the restaurant in the Mall was in operation pre-COVID shutdown, the percent of overall flow to the WWTP was almost double the normal average.





Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Northeast Regional Office • 205B Lowell Street, Wilmington MA 01887 • 978-694-3200

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

December 15, 2017

New Lincoln Woods LLC
c/o Monica Luchini
50 Wells Road
Lincoln, MA, 01773

Re: GROUNDWATER DISCHARGE PERMIT RENEWAL NO. 3-4
50 Wells Road, Lincoln
MassDEP Transmittal No. X274018

Dear Ms. Luchini:

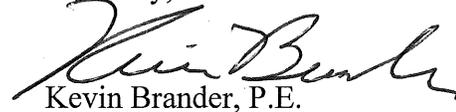
In response to your application for a renewal permit to discharge into the ground a treated effluent from a wastewater treatment facility located at 50 Wells Road, Lincoln and after due public notice, I hereby issue the attached final permit. The public notice appeared in the Environmental Monitor on November 8, 2017.

No comments objecting the issuance or terms of the permit were received by the Department during the public comment period. Therefore, in accordance with 314 CMR 2.08, the permit becomes effective the date of issuance.

Parties aggrieved by the issuance of this permit are hereby advised of their right to request an Adjudicatory Hearing under the provisions of Chapter 30A of the Massachusetts General Laws and 314 CMR 1.00, Rules for the Conduct of Adjudicatory Proceedings. Unless the person requesting the adjudicatory hearing requests and is granted a stay of the terms and conditions of the permit, the permit shall remain fully effective.

If you have any questions, please contact David R. Butler of my staff at (978) 694-3242.

Sincerely,

A handwritten signature in black ink, appearing to read "Kevin Brander".

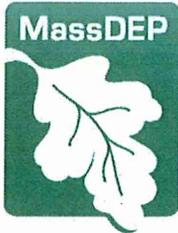
Kevin Brander, P.E.

Section Chief

Wastewater Management Section

KB/drb

cc: Todd Chaplin, Mount Hope Engineering (via email)
Lincoln Board of Health (via email)
MassDEP/BRP/Wastewater Permitting Program/Groundwater/Boston (via email)
Julianne Ture, MassDEP/Boston (via email)



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

One Winter Street Boston, MA 02108 • 617-292-5500

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

INDIVIDUAL GROUNDWATER DISCHARGE PERMIT

Name and Address of Applicant: New Lincoln Woods LLC c/o Monica Luchini, 50 Wells Road,
Lincoln, MA 01773

Date of Application: May 08, 2017

Application/Permit No.: X274018/3-4

Date of Issuance: December 15, 2017

Date of Expiration: December 15, 2022

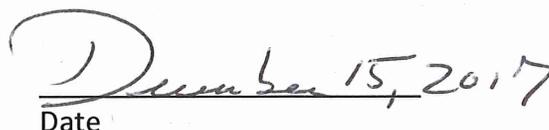
Effective Date: December 15, 2017

AUTHORITY FOR ISSUANCE

Pursuant to authority granted by Chapter 21, Sections 26-53 of the Massachusetts General Laws, as amended, 314 CMR 2.00, and 314 CMR 5.00, the Massachusetts Department of Environmental Protection (the Department or MassDEP) hereby issues the following permit to: New Lincoln Woods LLC, a 222 bedroom residential facility, (hereinafter called "the permittee") authorizing discharges to the ground from the onsite wastewater treatment facility located at Lincoln Woods Housing, 50 Wells Road, Lincoln, MA, such authorization being expressly conditional on compliance by the permittee with all terms and conditions of the permit hereinafter set forth. The wastewater treatment plant also services facilities at the adjacent 34,155 square foot commercial development at Lincoln Mall under legal agreement between the parties.


Kevin Brander, P.E.

Section Chief
Wastewater Management Section


Date

I. SPECIAL CONDITIONS

A. **Effluent Limits**

- 1) The permittee is authorized to discharge into the ground from the wastewater treatment facilities for which this permit is issued a treated effluent whose characteristics shall not exceed the following values:

<u>Effluent Characteristics</u>	<u>Discharge Limitations</u>
Flow	26,000 gpd
Biochemical Oxygen Demand (5 day at 20°C) (BOD ₅)	30.0 mg/l
Total Suspended Solids (TSS)	30.0 mg/l
Total Nitrogen (NO ₃ +NO ₂ +TKN)	10.0 mg/l
Nitrate-Nitrogen (NO ₃)	10.0 mg/l
Oil & Grease	15.0 mg/l
Fecal Coliform	200/100ml

- a) The pH of the effluent shall not be less than 6.5 nor greater than 8.5 at any time or not more than 0.2 standard units outside the naturally occurring range.
- b) The discharge of the effluent shall not result in any demonstrable adverse effect on the groundwater or violate any water quality standards that have been promulgated.
- c) The monthly average concentration of BOD and TSS in the discharge shall not exceed 15 percent of the monthly average concentrations of BOD and TSS in the influent into the permittee's wastewater treatment facility.
- d) When the average annual flow exceeds 80 percent of the permitted flow limitations, the permittee shall submit a report to the Department describing what steps the permittee will take in order to remain in compliance with the permit limitations and conditions, inclusive of the flow limitations established in this permit.

B. Monitoring and Reporting

- 1) The permittee shall monitor and record the quality of the **influent** and the quality and quantity of the **effluent** prior to discharge to the leaching facilities according to the following schedule and other provisions:

INFLUENT:

<u>Parameter</u>	<u>Minimum Frequency of Analysis</u>	<u>Sample Type</u>
BOD ₅	Monthly	24-hr composite
TSS	Monthly	24-hr composite
Total Solids	Monthly	24-hr composite
Ammonia-Nitrogen	Monthly	24-hr composite

EFFLUENT:

<u>Parameter</u>	<u>Minimum Frequency of Analysis</u>	<u>Sample Type</u>
Flow	Daily	Min-Max-Average
pH	Daily	Grab
Nitrate-Nitrogen (NO ₃)	Weekly	24-hr composite
Total Nitrogen (NO ₃ +NO ₂ +TKN)	Weekly	24-hr composite
BOD ₅	Monthly	24-hr composite
TSS	Monthly	24-hr composite
Fecal Coliform	Monthly	Grab
Oil & Grease	Monthly	Grab
Total Phosphorus (as P)	Quarterly	Grab
Orthophosphate	Quarterly	Grab
Volatile Organic Compounds	Annually	Grab

(USEPA Method No. 624)

- a) After one full year of monitoring the Total Phosphorus and Orthophosphate results, the Department may determine, upon the request of the permittee, that the frequency of monitoring may be reduced if, in the judgment of the Department, the results of the sampling indicate that existing phosphorus levels will not adversely impact downgradient receptors. If the Department reduces the frequency of monitoring for Total Phosphorus and Orthophosphate, the Department reserves the right to resume more frequent monitoring if the Department determines that phosphorus levels are impacting downgradient receptors.

- 2) The permittee shall monitor, record, and report the quality of water in the approved upgradient monitoring well, MW-ES-3, and the downgradient monitoring wells, MW-GZA-1, MW-SHA-1 and MW-SHA-2, as shown on the approved plan entitled *Lincoln Woods, Lincoln, Massachusetts*, prepared by Environmental Sciences Services, Inc., and dated October 14, 1994, according to the following schedule and other provisions:

Note: UG: Upgradient well DG: Downgradient well

<u>Parameter</u>	<u>Minimum Frequency of Analysis</u>
Static Water Level	Monthly
Specific Conductance	Monthly
pH	Monthly
Nitrate-Nitrogen (NO₃)	Quarterly
Total Nitrogen (NO₃+NO₂+TKN)	Quarterly
Total Phosphorus	Semiannually
Orthophosphate	Semiannually
Volatile Organic Compounds (USEPA Method No. 624)	Annually

- a) Static Water Level shall be expressed as an elevation and shall be referenced to the surveyed datum established for the site. It shall be calculated by subtracting the depth to the water table from the surveyed elevation of the top of the monitoring well's PVC well casing/riser.
- b) After one full year of monitoring the Total Phosphorus and Orthophosphate results, the Department may determine, upon the request of the permittee, that the frequency of monitoring may be reduced if, in the judgment of the Department, the results of the sampling indicate that existing phosphorus levels will not adversely impact downgradient receptors. If the Department reduces the frequency of monitoring for Total Phosphorus and Orthophosphate, the Department reserves the right to resume more frequent monitoring if the Department determines that phosphorus levels are impacting downgradient receptors.
- 3) Any grab sample or composite sample required to be taken less frequently than daily shall be taken during the period of Monday through Friday inclusive. All composite samples shall be taken over the operating day.
- 4) The permittee shall submit all monitoring reports within 30 days of the last day of the reporting month. Reports shall be on an acceptable form, properly filled and signed and shall be sent to: the Deputy Regional Director, Bureau of Water Resources, Department of Environmental Protection, Northeast Regional Office, 205B Lowell Street, Wilmington, MA, 01887, and to the Department of Environmental Protection, Bureau of Water Resources, Wastewater Management Program, One Winter Street/5th Floor, Boston, MA 02108, and to the Lincoln Board of Health, Town Hall, Lincoln, MA 01773.

- a) Submission of monitoring reports in electronic format is available through eDEP and serves as data submission to both the Regional and Boston offices. Effective December 2, 2017, all discharge monitoring reports must be submitted through eDEP. To register for electronic submission go to:
<http://www.mass.gov/eea/agencies/massdep/service/online/edep-online-filing.html>

C. Financial Assurance Mechanisms

- 1) The permittee shall establish and maintain a financial assurance mechanism that provides for the continued availability of an immediate repair and replacement account. The immediate repair and replacement account shall contain adequate funds to correct any unanticipated problem immediately so that any disruption of operation is minimized, and a violation of the terms and conditions contained in the permit does not occur. To create an immediate repair and replacement account, the permittee shall deposit at least 25% of the estimated construction cost of the PWTF into an interest bearing escrow account in accordance with the financial assurance mechanism and 314 CMR 5.15.
 - a) For purpose of the financial assurance mechanism requirement, the estimated construction cost of the wastewater treatment facility shall include the cost of constructing the wastewater treatment plant, collection system, associated mechanical equipment, but not including the land, ground and disposal area.
- 2) The permittee shall meet the obligation to establish the required financial assurance mechanism by using Department-approved form documents and shall submit said Department-approved form documents to the Department for its review and approval as follows:
 - a) A permittee that constructs the wastewater treatment facility after the issuance of the Individual permit may submit the financial assurance mechanism(s) to the Department for its review and approval no later than ninety (90) days prior to the start-up (clear water test) of the facility. Such a permittee shall not operate the facility unless and until the Department has approved the required financial assurance mechanism, the financial assurance mechanism is in full force and effect, and the permittee has made all contributions required thirty (30) days prior to the start-up (clear water test) of the facility; or,
 - b) A permittee with a wastewater treatment facility in existence prior to the submission of the individual permit renewal application may submit the financial assurance mechanism to the Department for its review and approval no later than ninety (90) days from the effective date of this permit.
- 3) The permittee shall maintain the current form documents evidencing the required financial assurance mechanism approved by the Department. The permittee shall

perform all its obligations under the required financial assurance mechanism as approved by the Department.

- 4) Once established and funded, the permittee shall keep an amount equal to at least 25% of the estimated construction cost of the PWTF in the immediate repair and replacement account and shall replenish the account within 90 days of any disbursement.
- 5) On or before January 31st of each year, the permittee shall submit an annual financial report identifying the initial and current balance in the immediate repair and replacement account and confirming the continuing availability of the funds in said account for the purposes specified in the permit and 314 CMR 5.15. Said report shall be prepared in accordance with generally accepted accounting principles. Reports pertaining to the required financial assurance mechanism(s) shall be sent to the Wastewater Management Section Chief at the appropriate Regional Office.

D. Supplemental Conditions

- 1) The permittee shall notify the Department at least thirty (30) days in advance of the proposed transfer of ownership of the facility for which this permit is written. Said notification shall include a written agreement between the existing and new permittees containing a specific date for transfer of permit, responsibility, coverage and liability between them.
- 2) A staffing plan for the facility shall be submitted to the Department once every two years and whenever there are staffing changes. The staffing plan shall include the following components:
 - a) The operator(s)'s name(s), operator grade(s) and operator license number(s);
 - b) The number of operational days per week;
 - c) The number of operational shifts per week;
 - d) The number of shifts per day;
 - e) The required personnel per shift;
 - f) Saturday, Sunday and holiday staff coverage;
 - g) Emergency operating personnel
- 3) The permittee is responsible for the operation and maintenance of all sewers, pump stations, and treatment units for the permitted facility, which shall be operated and maintained under the direction of a properly certified wastewater operator.
- 4) Operation and maintenance of the proposed facility must be in accordance with 314 CMR 12.00, "Operation and Maintenance and Pretreatment Standards for Wastewater

Treatment Works and Indirect Discharges", and, 257 CMR 2.00, "Rules and Regulations for Certification of Operators of Wastewater Treatment Facilities".

- a) The facility has been rated (in accordance with 257 CMR 2.00), to be a Grade 4-M facility. Therefore, the permittee shall provide for oversight by a Massachusetts Certified Wastewater Treatment plant operator (Chief Operator) Grade 4 or higher. The permittee will also provide for a backup operator who shall possess at least a valid Grade 3 license.
 - b) The date and time of the operator's inspection along with the operator's name and certification shall be recorded in the log book on location at the treatment facility. All daily inspection logs consistent with the O&M Manual requirements shall be kept at the facility for a period of three (3) years.
 - c) Records of operation of wastewater treatment facilities or disposal systems required by the Department shall be submitted on forms supplied by the Department or on other forms approved by the Department for such use. Monthly reports shall be certified by the wastewater treatment plant operator in charge and shall be included in the discharge monitoring reports submitted each month.
- 5) If the operation and maintenance of the facility is contracted to a private concern, the permittee shall submit a copy of the contract, consistent with what is required by the approved Operation & Maintenance manual and signed only by the contractor, to the appropriate MassDEP Regional Office within thirty (30) days of permit issuance. Along with the contract, a detailed listing of all contract operation obligations of the proposed contractor at other facilities shall also be submitted.
 - 6) Any additional connections to the sewer system, beyond the 222 bedrooms at the Lincoln Woods Housing Facility and the adjacent 34,155 square foot commercial development at Lincoln Mall, shall be approved by MassDEP and the local Board of Health prior to the connection.
 - 7) All tests or analytical determinations to determine compliance with permit standards and requirements shall be done using tests and procedures found in the most recent version of *Standard Methods for the Examination of Water and Wastewater* and shall be performed by a Massachusetts Certified laboratory.
 - 8) The permittee shall notify the MassDEP Northeast Regional Office, in writing, within 24 hours of the following events:
 - a) Any interruption of the treatment system operation, other than routine maintenance.
 - b) Final shutdown of the treatment system.

- 9) The permittee shall contract to have any and all solids and sludges generated by the treatment system for which this permit is issued removed off site by a properly licensed waste hauler for disposal at an EPA/MassDEP approved facility. The name and license number of the hauler along with the quantity of wastes removed and the date(s) of removal shall be reported by the permittee in writing to the appropriate MassDEP Regional Office.
- 10) Simultaneously with the next permit renewal application in 2022, the permittee shall submit two reports to the Department for its review and approval:
 - a) An engineering report, prepared by a registered professional engineer, that outlines in sufficient detail what modifications (if any) to the facility or other changes are required to insure that the facility can remain in compliance with its GWDP and other applicable requirements through the next 5 year permit term until 2027 and beyond; and
 - b) A financial plan that contains the cost estimates for implementing the facility modifications or other changes identified in the engineering report, and describes and demonstrates, how and when the permittee will finance the needed facility modifications or other changes.
- 11) In the event that effluent limits are not met, or the discharge is determined to impair groundwater quality in accordance with 314 CMR 5.16(1), the permittee may be obligated to modify, supplement or replace the permitted treatment process so as to ensure that the discharge does not impair the ability of the groundwater to act as an actual or potential source of potable water.
- 12) Pursuant to M.G.L. Chapter 21A, section 18(a), and 310 CMR 4.03, holders of this Permit may be subject to annual compliance assurance fees as assessed each year on July 1st and invoiced by MassDEP. Failure of the Permit holder to pay applicable annual compliance assurance fees shall result in the automatic suspension of the permit by operation of law under the statute. If fee non-payment continues for sixty days or more, MassDEP has the statutory option of revoking the Permit, denying any other pending permit applications filed by the Permit holder or taking other enforcement action. Permit holders are required to notify MassDEP in writing if they wish to relinquish or transfer a permit. Failure to do so will result in the continued assessment of fees.
- 13) By January 31 of each year, the permittee shall provide a listing of current tenants at the Lincoln Mall property which are connected to the permittee's wastewater treatment works. Any industrial wastewater generated by tenants or the Mall property shall not pass through the treatment works or interfere with the operation or performance of the treatment works.

E. Appeal Rights

During the thirty (30) day period following issuance of this permit, a Notice of Claim for an Adjudicatory Appeal may be sent by any person aggrieved (the "Petitioner") by the issuance to:

Case Administrator
Office of Appeals and Dispute Resolution
Department of Environmental Protection
One Winter Street/2nd Floor
Boston, MA 02108

310 CMR 1.01(6)(b) requires the Notice of Claim to: include sufficient facts to demonstrate aggrieved person status; state the facts which are grounds for the appeal specifically, clearly and concisely; and, state relief sought. The permit shall become or remain effective at the end of the 30 day appeal period unless the person filing the Notice of Claim requests, and is granted, a stay of its terms and conditions. If a permit is modified under 314 CMR 2.10, only the modified terms and conditions may be subject to an Adjudicatory Appeal. All other aspects of the existing permit shall remain in effect during any such Adjudicatory Appeal.

Per 310 CMR 4.06, the hearing request to the Commonwealth will be dismissed if the filing fee is not paid. Unless the Petitioner is exempt or granted a waiver, a valid check payable to the Commonwealth to Massachusetts in the amount of \$100.00 must be mailed to:

Commonwealth of Massachusetts
Department of Environmental Protection
P.O. Box 4062
Boston, MA 02211

The filing fee is not required if the Petitioner is a city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority effective January 14, 1994, or any municipal housing authority; or, per MGL 161A s. 24, the Massachusetts Bay Transportation Authority. The Department may waive the adjudicatory hearing filing fee for a Petitioner who shows that paying the fee will create an undue financial hardship. A Petitioner seeking a waiver must file, along with the hearing request, an affidavit setting forth the facts believed to support the claim of undue financial hardship.

II. GENERAL PERMIT CONDITIONS

The following conditions from 314 CMR 5.16 apply to all individual and general permits:

(1) No discharge authorized in the permit shall cause or contribute to a violation of 314 CMR 4.00: *Massachusetts Surface Water Quality Standards*. Upon promulgation of any amended standard, the permit may be modified to comply with such standard in accordance with the procedures in 314 CMR 2.10: *Modification, Suspension, Revocation and Renewal of Permits and General Permit Coverage* and 314 CMR 5.12. Except as otherwise provided in 314 CMR 5.10(3)(c), 310 CMR 5.10(4)(a)2. and 314 CMR 5.10(9), no discharge authorized in the permit shall impair the ability of the ground water to serve as an actual or potential source of potable water. Evidence that a discharge impairs the ability of the ground water to serve as an actual or potential source of potable water includes, without limitation, analysis of samples taken in a downgradient well that demonstrates one or more exceedance of the applicable water quality based effluent limitations set forth in 314 CMR 5.10. In those cases where it is shown that a measured parameter exceeds the applicable water quality based effluent limitations set forth in 314 CMR 5.10 at the upgradient monitoring well, evidence that a discharge impairs the ability of the ground water to serve as an actual or potential source of potable water is deemed to exist if a measured parameter in any downgradient well exceeds the level of that same measured parameter in the upgradient well for the same sampling period. A statistical procedure approved by the Department shall be used to determine when a measured parameter exceeds the allowable level.

(2) Duty to Comply. The permittee shall comply at all times with the terms and conditions of the permit, 314 CMR 5.00, M.G.L. c. 21, §§ 26 through 53, and all applicable state and federal statutes and regulations.

(3) Standards and Prohibitions for Toxic Pollutants. The permittee shall comply with effluent standards or prohibitions established by § 307(a) of the Federal Act, 33 U.S.C § 1317(a), for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

(4) Proper Operation and Maintenance. The permittee shall at all times properly operate and maintain all facilities and equipment installed or used to achieve compliance with the terms and conditions of the permit, 314 CMR 12.00: *Operation and Maintenance and Pretreatment Standards for Wastewater Treatment Works and Indirect Discharges*, and 257 CMR 2.00: *Certification of Operators of Wastewater Treatment Facilities*. All equipment shall be maintained in an acceptable condition for its intended use.

(5) Duty to Halt or Reduce Activity. Upon reduction, loss, or failure of the treatment facility, the permittee shall, to the extent necessary to maintain compliance with its permit, control production, discharges, or both, until the facility is restored or an alternative method of treatment is provided. A permittee may not raise as a defense in an enforcement action that it

would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of the permit.

(6) Power Failure. In order to maintain compliance with the effluent limitations and prohibitions of the permit, the permittee shall either:

- (a) provide an alternative power source sufficient to operate the wastewater control facilities; or
- (b) halt, reduce or otherwise control production or all discharges upon the reduction, loss, or failure of the primary source of power to the wastewater control facilities.

(7) Duty to Mitigate. The permittee shall take all reasonable steps to minimize or prevent any adverse impact on human health or the environment resulting from non-compliance with the permit. Additionally, the permittee shall take all necessary steps to prevent an operational upset of the PWTF or POTW.

(8) Duty to Provide Information. The permittee and any operator of the permitted facility shall furnish to the Department within a reasonable time as specified by the Department any information which the Department may request to determine whether cause exists for modifying, suspending, revoking and reissuing, or terminating the permit, or to determine whether the permittee is complying with the terms and conditions of the permit.

(9) Inspection and Entry. The permittee shall allow the Department or its authorized representatives to:

- (a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records required by the permit are kept;
- (b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit;
- (c) Inspect at reasonable times any facilities, equipment, practices, or operations regulated or required under the permit; and
- (d) Sample or monitor at reasonable times for the purpose of determining compliance with the terms and conditions of the permit.

(9A) The permittee shall physically secure the treatment works and monitoring wells and limit access to the treatment works and monitoring wells only to those personnel required to operate, inspect and maintain the treatment works and to collect samples.

(9B) The permittee shall identify each monitoring well by permanently affixing to the steel protective casing of the well a tag with the identification number listed in the permit.

(10) Monitoring. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. Monitoring must be conducted according to test procedures approved under 40 CFR Part 136 unless other test procedures are specified in the permit.

(11) Recordkeeping. The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and all records of all data used to complete the application for the permit, for a period of at least five years from the date of the sample, measurement, report or application. This period may be extended by request of the Department at any time. Records of monitoring information shall include without limitation:

- (a) The date, exact place, and time of sampling or measurements;
- (b) The individual(s) who performed the sampling or measurement;
- (c) The date(s) analyses were performed;
- (d) The individual(s) who performed the analyses;
- (e) The analytical techniques or methods used; and
- (f) The results of such analyses.

(12) Prohibition of Bypassing. Except as provided in 314 CMR 5.16(13), bypassing is prohibited, and the Department may take enforcement action against a permittee for bypassing unless:

- (a) The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
- (b) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if the permittee could have installed adequate backup equipment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
- (c) The permittee submitted notice of the bypass to the Department:
 1. In the event of an anticipated bypass, at least ten days in advance, if possible; or
 2. In the event of an unanticipated bypass, as soon as the permittee has knowledge of the bypass and no later than 24 hours after its first occurrence.

(13) Bypass not Exceeding Limitations. The permittee may allow a bypass to occur which does not cause effluent limitations to be exceeded, but only if necessary for the performance of essential maintenance or to assure efficient operation of treatment facilities.

(14) Permit Actions. The permit may be modified, suspended, or revoked for cause. The filing of a request by the permittee for a permit modification, reissuance, or termination, or a notification of planned changes or anticipated non-compliance does not stay any permit condition.

(15) Duty to Reapply. If the permittee wishes to continue an activity regulated by the permit after the expiration date of the permit, the permittee must apply for and obtain a new permit. The permittee shall submit a new application at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Department in writing.

(16) Property Rights. The permit does not convey any property rights of any sort or any exclusive privilege.

(17) Other Laws. The issuance of a permit does not authorize any injury to persons or property or invasion of other private rights, nor does it relieve the permittee of its obligation to comply with any other applicable Federal, State, or local law, or regulation.

(18) Oil and Hazardous Substance Liability. Nothing in the permit shall be construed to preclude the institution of any legal action or relieve the permittee of any responsibilities, liabilities, or penalties to which the permittee is or may be subject under § 311 of the Federal Act, 33 U.S.C. § 1321, and M.G.L. c. 21E.

(19) Removed Substances. Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed in a manner consistent with applicable Federal and State laws and regulations including, but not limited to, the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26 through 53 and the Federal Act, 33 U.S.C. § 1251 *et seq.*, the Massachusetts Hazardous Waste Management Act, M.G.L. c. 21C, and the Federal Resource Conservation and Recovery Act, 42 U.S.C. § 6901, *et seq.*, 310 CMR 19.000: *Solid Waste Management* and 310 CMR 30.000: *Hazardous Waste*.

(20) Reporting Requirements.

(a) Monitoring Reports. Monitoring results shall be reported on a Discharge Monitoring Report (DMR) at the intervals specified in the permit. If a permittee monitors any pollutant more frequently than required by the permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR. Beginning on December 2, 2017, a permittee shall submit all DMRs electronically, using the electronic reporting system designated by the Department. A permittee may seek a waiver of this requirement by submitting a written request for the Department's approval.

(b) Compliance Schedules. Reports of compliance or non-compliance with, or any progress reports on interim and final requirements contained in any compliance schedule in the permit shall be submitted no later than 14 days following each schedule date.

(c) Planned Changes. The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility or activity which could significantly change the nature or increase the quantity of pollutants discharged. Unless and until the permit is modified, any new or increased discharge in excess of permit limits or not specifically authorized by the permit constitutes a violation.

(d) Anticipated Non-compliance. The permittee shall give advance notice to Department of any planned changes in the permitted facility or activity which may result in non-compliance with permit requirements.

(e) 24 Hour Reporting. The permittee shall report any non-compliance which may endanger health or the environment. Any information shall be communicated orally within 24 hours of the time the permittee becomes aware of the circumstances. A

written submission shall also be provided within five days of the time the permittee becomes aware of the circumstances. The written submission shall contain: a description of the non-compliance, including exact dates and times, and if the non-compliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the non-compliance. The following shall be included as information which must be reported within 24 hours:

1. Any unanticipated bypass which exceeds any effluent limitation in the permit; and
2. Any violation of a maximum daily discharge limitation for any of the pollutants required by the permit to be reported within 24 hours.

(f) Other Non-compliance. The permittee shall report all instances of non-compliance not reported under 314 CMR 5.16(20)(a), (b), or (e) at the time monitoring reports are submitted. The reports shall contain the information listed in 314 CMR 5.16(20)(e).

(g) Toxics. All manufacturing, commercial, mining, or silvicultural dischargers must notify the Department as soon as they know or have reason to believe:

1. That any activity has occurred, or will occur, that would result in the discharge of any toxic pollutant listed in 314 CMR 3.17: *Appendix B - Toxic Pollutants* not limited by the permit, if that discharge will exceed the highest of the following notification levels:
 - a. 100 micrograms per liter (100 ug/l);
 - b. 200 micrograms per liter (200 ug/l) for acrolein and acrylonitrile, 500 micrograms per liter (500 ug/l) for 2,4-dinitrophenol, and for 2-methyl-4,6dinitrophenol, and one milligram per liter (1 mg/l) for antimony;
 - c. Five times the maximum concentration value reported for that pollutant in the permit application; or
2. That they have begun or expect to begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant which was not reported in the permit application.

(h) Indirect Dischargers. All Publicly Owned Treatment Works shall provide adequate notice to the Department of the following:

1. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to § 301 or § 306 of the Federal Act, 33 U.S.C. § 1311 or 1316, if it were directly discharging those pollutants; and
2. Any substantial change in the volume or character of pollutants being introduced into the POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

(i) Information. Where a permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit the relevant facts or correct information.

(j) The permittee shall notify the department in writing within seven days of any change in contract operators.

(21) Signatory Requirement. All applications, reports, or information submitted to the Department shall be signed and certified in accordance with 314 CMR 3.15: *Signatories to Permit Applications and Reports* and 5.14.

(22) Severability. The provisions of the permit are severable. If any provision of the permit, or the application of any provision of the permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of the permit, shall not be affected thereby.

(23) Reopener Clause. The Department reserves the right to make appropriate revisions to the permit to establish any appropriate effluent limitations, schedules of compliance, or other provisions, as authorized by the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26 through 53, or the Federal Act, 33 U.S.C. § 1251 *et seq.*, to bring all discharges into compliance with these statutes.

(24) Approval of Treatment Works. All discharges and associated treatment works authorized in 314 CMR 5.00 shall remain in compliance with the terms and conditions of the permit. Any modification of the approved treatment works shall require written approval of the Department prior to the construction of the modification.

(25) Transfer of Permits.

(a) RCRA Facilities. Any permit which authorizes the operation of a RCRA facility subject to the requirements of 314 CMR 8.07: *Standards for all other RCRA Facilities* shall be valid only for the person to whom it is issued and may not be transferred.

(b) Transfers by Modification. Except as provided in 314 CMR 5.16(25)(a) and (c), a permit may be transferred by the permittee to a new permittee if the permit has been modified or revoked and reissued in accordance with 314 CMR 5.12(2), or a minor modification is made to identify the new permittee in accordance with 314 CMR 5.12(3) and (4).

(c) Automatic Transfers. For facilities other than Privately Owned Wastewater Treatment Facilities (PWTs) that treat at least some sewage from residential uses, hospitals, nursing or personal care facilities, residential care facilities, or assisted living facilities, PWTs that have been required to establish, fund and maintain financial assurance mechanism(s) pursuant to 314 CMR 5.15(6), and RCRA facilities subject to the requirements of 314 CMR 8.07: *Standards for all other RCRA Facilities*, a permit may be automatically transferred in accordance with 314 CMR 5.12(5).

(26) Permit Compliance Fees and Inspection Information. Except as otherwise provided, any permittee required to obtain a ground water discharge permit pursuant to M.G.L. c. 21, § 43, and 314 CMR 5.00 shall submit the annual compliance assurance fee established in accordance with M.G.L. c. 21A, § 18 and 310 CMR 4.00: *Timely Action Schedule and Fee Provisions*, as

provided in 314 CMR 2.12: *Applications, Fees and Inspection Information*. The requirement to submit the annual compliance fee does not apply to any local government unit other than an authority. Any permittee required to obtain a ground water discharge permit pursuant to M.G.L. c. 21, § 43 and 314 CMR 5.00, may be required to submit inspection information annually, as provided in 314 CMR 2.12.



Massachusetts Department of Environmental Protection
One Winter Street, Boston MA 02108 • Phone: 617-292-5751
Communication For Non-English Speaking Parties - 310 CMR 1.03(5)(a)



1 English:

This document is important and should be translated immediately. If you need this document translated, please contact MassDEP's Diversity Director at the telephone numbers listed below.



2 Español (Spanish):

Este documento es importante y debe ser traducido inmediatamente. Si necesita este documento traducido, por favor póngase en contacto con el Director de Diversidad MassDEP a los números de teléfono que aparecen más abajo.



3 Português (Portuguese):

Este documento é importante e deve ser traduzida imediatamente. Se você precisa deste documento traduzido, por favor, entre em contato com Diretor de Diversidade da MassDEP para os números de telefone listados abaixo.



4(a) 中國（傳統） (Chinese (Traditional)):

本文件非常重要，應立即翻譯。如果您需要翻譯這份文件，請用下面列出的電話號碼與 MassDEP 的多样性總監聯繫。



4(b) 中国（简体中文） (Chinese (Simplified)):

本文件非常重要，应立即翻译。如果您需要翻译这份文件，请用下面列出的电话号码与 MassDEP 的多样性总监联系。



5 Ayisyen (franse kreyòl) (Haitian) (French Creole):

Dokiman sa-a se yon bagay enpòtan epi yo ta dwe tradui imedyatman. Si ou bezwen dokiman sa a tradui, tanpri kontakte Divèsite Direktè MassDEP a nan nimewo telefòn ki nan lis pi ba a.



6 Việt (Vietnamese):

Tài liệu này là rất quan trọng và cần được dịch ngay lập tức. Nếu bạn cần dịch tài liệu này, xin vui

lòng liên hệ với Giám đốc MassDEP đa dạng tại các số điện thoại được liệt kê dưới đây.



7 ប្រទេសកម្ពុជា (Kmer (Cambodian):

ឯកសារនេះគឺមានសារៈសំខាន់និងគួរត្រូវបានបកប្រែភ្លាមៗ ប្រសិនបើអ្នកត្រូវបានបកប្រែ
ឯកសារនេះសូមទំនាក់ទំនងឆ្លោកជំនាយក MassDEP នៅលេខទូរស័ព្ទដែលបានរាយខាងក្រោម។



8 Kriolu Kabuverdianu (Cape Verdean):

*Es documento é importante e deve ser traduzido imediatamente. Se bo precisa des documento
traduzido, por favor contacta Director de Diversidade na MassDEP's pa es numero indicode li
d'boche.*



9 Русский язык (Russian):

Этот документ является важным и должно быть переведено сразу. Если вам нужен этот
документ переведенный, пожалуйста, свяжитесь с директором разнообразия MassDEP по
адресу телефонных номеров, указанных ниже.



10 العربية (Arabic):

هذه الوثيقة الهامة وينبغي أن تترجم على الفور. اذا كنت بحاجة الى هذه الوثيقة المترجمة، يرجى الاتصال مدير التنوع في
MassDEP على أرقام الهواتف المدرجة أدناه.



11 한국어 (Korean):

이 문서는 중요하고 즉시 번역해야 합니다. 당신이 번역이 문서가 필요하다면 아래의 전화
번호로 MassDEP의 다양성 감독에 문의하시기 바랍니다.



12 հայերեն (Armenian):

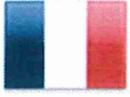
Այս փաստաթուղթը շատ կարևոր է եւ պետք է թարգմանել անմիջապես. Եթե Ձեզ
անհրաժեշտ է այս փաստաթուղթը թարգմանվել դիմել MassDEP բազմազանությունը
տնօրեն է հեռախոսահամարների թվարկված են ստորև.



13 فارسی (Farsi (Persian):

این سند مهم است و باید فوراً ترجمه شده است.

اگر شما نیاز به این سند ترجمه شده، لطفاً با ما تماس تنوع مدیر MassDEP در شماره تلفن های ذکر شده در زیر.



14 Français (French):

Ce document est important et devrait être traduit immédiatement. Si vous avez besoin de ce document traduit, s'il vous plaît communiquer avec le directeur de la diversité MassDEP aux numéros de téléphone indiqués ci-dessous.



15 Deutsch (German):

Dieses Dokument ist wichtig und sollte sofort übersetzt werden. Wenn Sie die Übersetzung von diesem Dokument benötigen, wenden Sie sich bitte bei der/dem Diversity Director MassDEP an die unten aufgeführten Telefonnummern.



16 Ελληνική (Greek):

Το έγγραφο αυτό είναι σημαντικό και θα πρέπει να μεταφραστούν αμέσως. Αν χρειάζεστε αυτό το έγγραφο μεταφράζεται, παρακαλούμε επικοινωνήστε Diversity Director MassDEP κατά τους αριθμούς τηλεφώνου που αναγράφεται πιο κάτω.



17 Italiano (Italian):

Questo documento è importante e dovrebbe essere tradotto immediatamente. Se avete bisogno di questo documento tradotto, si prega di contattare la diversità Direttore di MassDEP ai numeri di telefono elencati di seguito.



18 Język Polski (Polish):

Dokument ten jest ważny i powinien być natychmiast przetłumaczone. Jeśli potrzebujesz tego dokumentu tłumaczone, prosimy o kontakt z Dyrektorem MassDEP w różnorodności na numery telefonów wymienionych poniżej.



19 हिन्दी (Hindi):

यह दस्तावेज महत्वपूर्ण है और तुरंत अनुवाद किया जाना चाहिए. आप अनुवाद इस दस्तावेज़ की जरूरत है, नीचे सूचीबद्ध फोन नंबरों पर MassDEP की विविधता निदेशक से संपर्क करें.



Massachusetts Department of Environmental Protection
 Bureau of Water Resources – Wastewater Management Program
GROUNDWATER DISCHARGE PERMIT PROGRAM
NOTICE OF NONCOMPLIANCE (NON)
 M.G.L. c.21 §§ 26-53, 314 CMR 5.00

Enforcement Notice:
 000010488

For violation of Effluent Limitations and/or Water Quality Standards

ATTENTION: Permittee/Owner/Operator:

A General Information:

PERMITTEE NAME: New Lincoln Woods LLC DATE: 2/26/2021
 PERMITTEE ADDRESS: 50 Wells Road GW PERMIT #: 3-4
 CITY/TOWN: Lincoln, MA 01773

B Location Where Noncompliance Occurred: Date Noncompliance Occurred:

Lincoln Woods Housing, 50 Wells Road, Lincoln, MA January 1, 2019 – November 30, 2020

C Description of Violations under M.G.L. c. 21 §§ 26 through 53 and 314 CMR 5.00

The Department of Environmental Protection (MassDEP), Wastewater Management Program records indicate that your facility is in violation of the following checked (X) requirements:

- Groundwater Discharge Permit # 3-4, Part A, Effluent Limits for the following parameter(s)*:
BOD, Flow, Nitrate, Total Nitrogen
**Please refer to the attached data table print out for the sample results for these parameters.*
- 314 CMR 5.16(2), Duty to comply: "The permittee shall comply at all times with the terms and conditions of the permit, 314 CMR 5.00, M.G.L. c. 21, §§ 26 through 53 and all other state and federal statutes and regulations."

D Corrective Actions to Take and Deadline for Taking Such Actions

- Within 30 days of receiving this NON you must take **ALL** the following actions:
- Prepare a Return to Compliance (RTC) plan that sets forth how you will bring the facility into compliance and the specific timeframe when this will be done. Please refer to the checked items on the attached **Return to Compliance list** for the items your RTC plan must contain at a minimum.
 - Submit the RTC plan to the MassDEP Northeast Regional Office, 205 B Lowell Street, Wilmington, MA **and** to the DEP Boston Office, Wastewater Management Program, One Winter Street/5th Floor, Boston, MA 02108.
 - Begin implementation of the RTC plan recommendations in accordance with its deadlines and timeframes, unless otherwise directed by the Department.

E Important Information

If the required actions are not completed by the deadlines specified above, an administrative penalty may be assessed for every day after the date of this Notice that the noncompliance occurs or continues. The Department reserves its rights to exercise the full extent of its legal authority in order to obtain full compliance with all applicable requirements, including, but not limited to, criminal prosecution, civil action including court-imposed civil penalties, or administrative action, including administrative penalties imposed by the Department.

If you have any questions about this NON please contact Dave Butler at David.R.Butler@mass.gov.


 Rachel Freed, Deputy Regional Director

Issuance/ DATE MAILED: February 26, 2021 CERTIFIED MAIL#: 7019 0700 0000 2743 3133

Enc. RTC List & Data Printout
 CC: Lincoln BOH
 Wastewater Environmental Management
 File: NERO Enforcement Docs

Return To Compliance Plan

As response to this notice of noncompliance (NON), you are required to submit a return to compliance (RTC) plan that sets forth how you will bring your facility into compliance and the specific timeframe when this will be done. DEP suggests your RTC plan include at a minimum the following checked items/information requests:

- Identification of the owner of the facility.
- Identification of the operator of the facility, including the license number, address, phone number, and grade level of the operator(s).
- Discussion of the status of the contract, if the facility has a contract operator.
- Identification of the consulting engineer.
- Date of last facility inspection by your operator.
- Review and discussion of all violations.
- Evaluation of influent flow and sources. Are conventional pollutants entering the system at higher concentrations than previously assumed? Are other pollutants contrary to the requirements of your sewer use regulations being discharged to your system?
- Plan for increased sampling (effluent and/or monitoring wells) to confirm the magnitude and duration of the violation(s). As an example, the plan may call for increasing the sampling of monitoring wells for parameter X from quarterly to monthly. Plan should include submission of these sampling results to DEP.
- Detailed response of planned actions to correct the identified violations. Include a discussion of whether problems can be corrected either by improved operation & maintenance (O&M) or by modifications to the treatment works.
- Schedule to correct the violations. Note that any modifications to the treatment works, including new equipment, will require DEP approval of plans and specifications prior to implementation. O&M improvements can typically be implemented immediately.
- Plan for any additional work, such as follow-up sampling, to confirm that the violations have been corrected.
- Discussion of the current status of escrow and capital recovery accounts to finance immediate and long-term repairs/replacement of facility components.

The RTC plan must be submitted to the Department within the timeline stated in the NON. The plan will be deemed approved, with implementation of its recommendations to commence as proposed, unless otherwise informed by the Department.

Permit: 3
 Facility Name: LINCOLN HOMES
 TOWN: LINCOLN
 Basin: CHAR

Monthly Maximum Data Report

Dec 01, 2019 through Nov 30, 2020

Contaminant	Sample Location	Permit Version	Permit Limit	Req:	Dec 2019	Jan 2020	Feb 2020	Mar 2020	Apr 2020	May 2020	Jun 2020	Jul 2020	Aug 2020	Sep 2020	Oct 2020	Nov 2020
-------------	-----------------	----------------	--------------	------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------

Flow (gpd)	Effluent Point	4	26,000	D	16,063(31)	18,231(31)	11,189(29)	22,600(30)	44,240(30)	16,651(31)	19,666(30)	18,864(31)	42,218(31)	21,041(30)	44,685(31)	12,021(30)
------------	----------------	---	--------	---	------------	------------	------------	------------	------------	------------	------------	------------	------------	------------	------------	------------

pH (s.u.)	Influent Point	4	NR	D	7(16)	6.7(20)	7(19)	7.2(22)	6.9(20)	6.8(20)	6.7(21)	6.9(22)	7.1(21)	7.1(21)	7.6(22)	7.6(19)	
	Effluent Point	4	RO	D	7.3(18)	7.1(21)	7.4(19)	7.3(22)	7.8(21)	7.5(20)	7(22)	7.1(22)	7.2(21)	7.1(21)	7.4(22)	7.5(19)	
	ESS(UG)	4	RO	M	6.5	6.57	6.53	6.56	6.58	6.64	6.48	6.52	6.53	6.53	6.38	6.44	6.42
	GZA1(DG)	4	RO	M	6.88	6.79	6.73	6.64	6.7	6.72	6.68	6.8	6.79	6.79	DRY	7.01	7.08
	SHA1(DG)	4	RO	M	6.89	6.91	6.88	6.9	6.95	7.05	6.96	6.89	6.89	6.86	6.85	6.87	6.79
	SHA2(DG)	4	RO	M	6.82	6.82	6.88	6.85	6.89	6.89	6.86	6.84	6.87	6.95	6.91	7.05	7.1

BOD (mg/l)	Influent Point	4	RO	M	210	495	555	364	291	333	441	346	308	306	368	300
	Effluent Point	4	30	M	6.3	15.9	8.4	17.4	11.2	ND	ND	ND	ND	ND	ND	96

TSS (mg/l)	Influent Point	4	RO	M	240	160	343	145	102	66	199	186	89	115	137	78
	Effluent Point	4	30	M	2	4	2	6	4.5	ND	ND	ND	ND	ND	ND	7

Total Solids (mg/l)	Influent Point	4	RO	M	550	700	890	540	770	650	960	800	620	520	640	570
---------------------	----------------	---	----	---	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Ammonia-N (mg/l)	Influent Point	4	RO	M	14.7	50	59.3	50.1	42.8	48.2	50.9	45.3	46.9	48.2	43.2	55.6
------------------	----------------	---	----	---	------	----	------	------	------	------	------	------	------	------	------	------

Nitrate-N (mg/l)	Effluent Point	4	10	W	1.06(3)	7.14(4)	7.06(4)	2.25(4)	3.68(4)	0.677(4)	1.04(4)	0.9(4)	1.11(4)	8.96(4)	9.26(4)	15.4(4)
	ESS(UG)	4	10	Q	1.11	1.11	1.11	1.11	1.11	0.87	0.87	0.809	0.809	0.809	0.809	7.32
	GZA1(DG)	4	10	Q	6.07	6.07	6.07	6.07	6.07	2.77	2.77	3.45	3.45	3.45	5.78	5.78
	SHA1(DG)	4	10	Q	1.46	1.46	1.46	1.46	1.46	2.02	2.02	2.92	2.92	2.92	3.94	3.94
	SHA2(DG)	4	10	Q	3.27	3.27	3.27	3.27	3.27	1.47	1.47	1.91	1.91	1.91	2.26	2.26
	Total Nitrogen(NO3+NO2+TKN) (mg/l)	Effluent Point	4	10	W	3.7(4)	9.23(4)	9.3(4)	10.4(4)	6.67(4)	8.64(4)	4.22(4)	16.8(4)	14.2(4)	9.87(4)	10.2(4)

Total Nitrogen(NO3+NO2+TKN) (mg/l)	Effluent Point	4	RO	Q	3.7(4)	9.23(4)	9.3(4)	10.4(4)	6.67(4)	8.64(4)	4.22(4)	16.8(4)	14.2(4)	9.87(4)	10.2(4)	15.4(4)
	ESS(UG)	4	RO	Q	1.11	1.11	1.11	1.11	1.11	0.87	0.87	0.809	0.809	0.809	0.809	7.32
	GZA1(DG)	4	RO	Q	6.07	6.07	6.07	6.07	6.07	2.77	2.77	3.45	3.45	3.45	5.78	5.78
	SHA1(DG)	4	RO	Q	1.46	1.46	1.46	1.46	1.46	2.02	2.02	2.92	2.92	2.92	3.94	3.94

SHA2(DG)	4	RO	Q	3.27	3.27	3.27	3.27	3.27	1.47	1.47	1.91	1.91	1.91	2.26	2.26
----------	---	----	---	------	------	------	------	------	------	------	------	------	------	------	------

Permit: 3
 Facility Name: LINCOLN HOMES
 TOWN: LINCOLN
 Basin: CHAR

Monthly Maximum Data Report

Dec 01, 2019 through Nov 30, 2020

Sample Location	Permit Version	Permit Limit	Req:	Dec 2019	Jan 2020	Feb 2020	Mar 2020	Apr 2020	May 2020	Jun 2020	Jul 2020	Aug 2020	Sep 2020	Oct 2020	Nov 2020
-----------------	----------------	--------------	------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------

Total Phosphorus as P (mg/l)															
Effluent Point	4	RO	Q												
ES3(UG)	4	RO	SA												
GZA1(DG)	4	RO	SA												
SHA1(DG)	4	RO	SA												
SHA2(DG)	4	RO	SA												

Ortho Phosphate (mg/l)															
Effluent Point	4	RO	Q												
ES3(UG)	4	RO	SA												
GZA1(DG)	4	RO	SA												
SHA1(DG)	4	RO	SA												
SHA2(DG)	4	RO	SA												

Oil & Grease (mg/l)															
Effluent Point	4	15	M	ND											

UV Intensity (%)															
Effluent Point	4	NR	D	100(18)	100(21)	100(19)	100(22)	100(22)	100(22)	100(22)	100(22)	100(21)	100(21)	100(22)	100(19)

Fecal Coliform (/100 ml)															
Effluent Point	4	200	M	ND	40	5	10	60	15	75	ND	ND	ND	5	ND

Static Water Level (Feet)															
ES3(UG)	4	RO	M	193.45	193.85	196.55	193.75	194.35	194.25	192.45	191.95	191.45	191.05	190.75	190.55
GZA1(DG)	4	RO	M	191.37	192.67	192.27	192.87	193.07	193.67	192.17	191.37	190.87	190.87	189.97	189.97
SHA1(DG)	4	RO	M	188.3	189.2	189.2	189.4	189.5	190.27	189.1	188.6	188.2	188	187.8	187.8
SHA2(DG)	4	RO	M	190.72	182.22	192.12	192.42	192.52	193.32	191.82	191.02	190.42	190.02	189.82	189.62

Specific Conductance (umhos/c)															
ES3(UG)	4	RO	M	137	125	127	138	100	98.6	97.1	96.5	96.8	99.9	99.6	96.5
GZA1(DG)	4	RO	M	620	401	355	335	318	523	718	692	732	DRY	713	702
SHA1(DG)	4	RO	M	724	705	701	709	675	671	683	677	678	598	648	672
SHA2(DG)	4	RO	M	721	572	553	496	477	455	497	626	646	623	99.6	628

Total VOC (ug/l)															
Effluent Point	4	RO	A												
ES3(UG)	4	RO	A												
GZA1(DG)	4	RO	A												
SHA1(DG)	4	RO	A												
SHA2(DG)	4	RO	A												

Permit: 3
Facility Name: LINCOLN HOMES
TOWN: LINCOLN
Basin: CHAR

Monthly Maximum Data Report

Dec 01, 2019 through Nov 30, 2020

Contaminant

Sample Location	Permit Version	Permit Limit	Req:	Dec 2019	Jan 2020	Feb 2020	Mar 2020	Apr 2020	May 2020	Jun 2020	Jul 2020	Aug 2020	Sep 2020	Oct 2020	Nov 2020
-----------------	----------------	--------------	------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------

Report Parameters

Permit: 3
Date Range: December 01, 2019 - November 30, 2020
Region: NE



Permit: 3
 Facility Name: LINCOLN HOMES
 TOWN: LINCOLN
 Basin: CHAR

Monthly Maximum Data Report

Dec 01, 2018 through Nov 30, 2019

Sample Location	Permit Version	Permit Limit	Freq:	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019
Flow (gpd)															
Effluent Point	4	26,000	D	15,809(31)	9,881(30)	9,274(28)	13,443(31)	16,443(30)	15,185(31)	16,960(30)	27,643(31)	13,273(31)	18,601(30)	17,054(31)	44,094(30)
pH (s.u.)															
Influent Point	4	NR	D	7.3(19)	7.2(21)	7.2(20)	7.2(20)	7(20)	6.9(22)	6.9(18)	7(21)	6.9(18)	7.1(15)	6.9(23)	7(19)
Effluent Point	4	RO	D	7.4(19)	7.8(21)	7.7(20)	7.6(20)	7.8(21)	7.5(22)	7.1(18)	7.3(21)	7(18)	7.1(17)	7.1(23)	8(19)
ES3(UG)	4	RO	M	6.59	6.53	6.51	6.57	6.54	6.55	6.42	6.39	6.34	6.43	6.41	6.41
GZA1(DG)	4	RO	M	6.74	6.69	6.86	6.92	6.91	6.85	6.87	6.95	6.86	6.88	6.88	6.9
SHA1(DG)	4	RO	M	6.96	6.96	6.98	6.99	7.03	7.04	6.95	6.96	6.91	6.97	6.96	6.86
SHA2(DG)	4	RO	M	6.71	6.69	6.72	6.68	6.69	6.67	6.77	6.82	6.81	6.89	6.91	6.85
BOD (mg/l)															
Influent Point	4	RO	M	705	417	306	455	384	374	375	240	316	332	360	350
Effluent Point	4	30	M	10.1	33.6	28.2	96	45.6	ND	ND	ND	ND	ND	96	74.4
TSS (mg/l)															
Influent Point	4	RO	M	860	245	193	263	128	108	175	202	144	98	98	52
Effluent Point	4	30	M	ND	8	3	5	14.5	ND	ND	ND	ND	ND	4	14
Total Solids (mg/l)															
Influent Point	4	RO	M	1,320	710	680	800	840	630	750	720	760	430	560	570
Ammonia-N (mg/l)															
Influent Point	4	RO	M	45.4	49	51.2	59.3	47.5	54.3	50	27	45	48.5	47.3	49.7
Nitrate-N (mg/l)															
Effluent Point	4	10	W	4.65(4)	3.62(4)	0.59(5)	8.12(3)	ND(4)	ND(4)	ND(4)	ND(4)	ND(4)	15.2(4)	16.4(4)	12.7(4)
ES3(UG)	4	10	Q	1.18	1.18	0.92	ND	ND	ND	ND	ND	1.93	15.2(4)	16.4(4)	1.82
GZA1(DG)	4	10	Q	0.92	0.92	3.67	ND	ND	ND	ND	ND	0.668	ND	ND	3.39
SHA1(DG)	4	10	Q	3.67	3.67	2.31	ND	ND	ND	ND	ND	0.668	ND	ND	ND
SHA2(DG)	4	10	Q	2.31	2.31	2.31	ND	ND	ND	ND	ND	0.668	ND	ND	0.538
Total Nitrogen(NO3+NO2+TKN) (mg/l)															
Effluent Point	4	10	W	6.27(4)	5.88(4)	2.9(5)	14.5(3)	19.4(4)	10.8(4)	2.19(4)	5.97(4)	1.82(4)	15.2(4)	16.4(4)	18.3(4)
ES3(UG)	4	10	Q	1.18	1.18	0.92	ND	ND	ND	ND	ND	1.93	15.2(4)	16.4(4)	1.82
GZA1(DG)	4	10	Q	0.92	0.92	3.67	ND	ND	ND	ND	ND	0.63	ND	ND	3.39
SHA1(DG)	4	10	Q	3.67	3.67	2.31	ND	ND	ND	ND	ND	0.668	ND	ND	ND
SHA2(DG)	4	10	Q	2.31	2.31	2.31	ND	ND	ND	ND	ND	0.668	ND	ND	0.538

Permit: 3
 Facility Name: LINCOLN HOMES
 TOWN: LINCOLN
 Basin: CHAR

Monthly Maximum Data Report

Dec 01, 2018 through Nov 30, 2019

Contaminant	Sample Location	Permit Version	Permit Limit	Freq	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019
-------------	-----------------	----------------	--------------	------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------

Total Phosphorus as P (mg/l)	Effluent Point	4	RO	Q			6.13										
	ES3(UG)	4	RO	SA						7.36							5.39
	GZA1(DG)	4	RO	SA						ND							
	SHA1(DG)	4	RO	SA						1.54							
	SHA2(DG)	4	RO	SA						ND							
				SA						0.851							

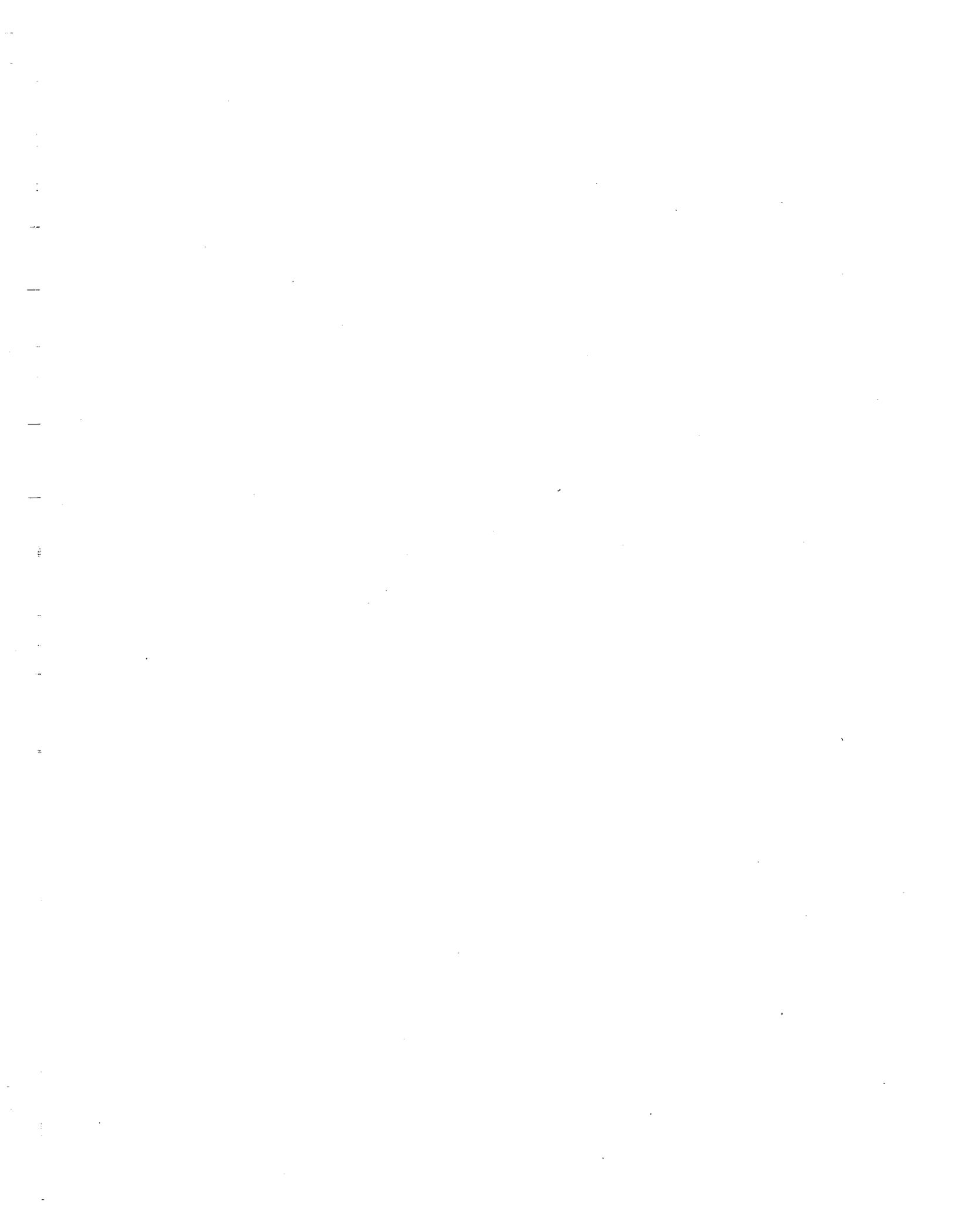
Ortho Phosphate (mg/l)	Effluent Point	4	RO	Q			6.23										
	ES3(UG)	4	RO	SA						6.23							
	GZA1(DG)	4	RO	SA						7.02							5.13
	SHA1(DG)	4	RO	SA						ND							
	SHA2(DG)	4	RO	SA						1.12							
				SA						ND							
				SA						0.745							

Oil & Grease (mg/l)	Effluent Point	4	15	M	M	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Effluent Point	4	NR	D	D	100(19)		100(20)		100(16)	100(18)	100(22)	100(18)	100(17)	100(23)	100(19)	
Fecal Coliform (/100 ml)	Effluent Point	4	200	M	M	ND	10	70	80	170	40	50	4	160	ND	TNTC	5
	Static Water Level (Feet)																

Specific Conductance (umhos/c)	ES3(UG)	4	RO	M	194.45	194.65	194.15	194.85	194.55	194.85	193.45	192.55	192.15	191.85	191.45	192.15
	GZA1(DG)	4	RO	M	193.97	193.77	193.47	193.77	193.57	194.27	192.77	191.97	191.57	191.07	190.77	191.07
	SHA1(DG)	4	RO	M	190.5	190.3	190	190.22	190	190.7	189.4	189	188.7	188.4	188.1	168.2
	SHA2(DG)	4	RO	M	193.72	193.52	193.12	193.32	193.22	194.02	192.42	191.62	199.22	190.72	190.32	190.52
	ES3(UG)	4	RO	M	127	121	127	159	148	157	191	164	155	150	117	158

Total VOC (ug/l)	ES3(UG)	4	RO	M	424	425	464	426	619	427	640	508	631	640	626	585	
	GZA1(DG)	4	RO	M	669	709	710	727	745	743	750	739	712	716	734	727	
	SHA1(DG)	4	RO	M	570	545	530	567	520	444	512	534	809	708	689	NS	
	SHA2(DG)	4	RO	M													
	Effluent Point	4	RO	A													

Total VOC (ug/l)	ES3(UG)	4	RO	A												
	GZA1(DG)	4	RO	A												
	SHA1(DG)	4	RO	A												
	SHA2(DG)	4	RO	A												
	Effluent Point	4	RO	A												



New Lincoln Woods Ground Water Discharge Permit 3-4

Notice-of-Noncompliance dated 2/26/2021

Enforcement Notice 000010488

Return to Compliance Plan

3/14/2021

Discussion of Violations

The March 2019 total nitrogen violation was caused by a failure of the collection arms on the clarifier. Some ice had built up on the surface of the clarifier and caused a coupling to loosen so the upper arm and lower arms were uncoupled. The coupling was repaired. This all occurred in the same week, however the disruption to normal operation caused high nitrogen.

The April 2019 total nitrogen violation (ammonia) was caused by high influent flow into the facility. A pump alternator for the FET pump controls failed. This caused a high-level alarm in the FET. The flow rate from the FET to the aeration tank was increased. This loading and reduced detention time in the aeration tank created a high ammonia concentration in the effluent. The other 3 samplings in April showed that the effluent quality was within the permitted discharge limits for total nitrogen. The pump alternator was removed from the circuit, and the pumps are now alternated manually.

The May 2019 total nitrogen violation (ammonia) was caused by high influent flow into the facility that was due to a scum mat preventing closure of a level switch in the FET. This resulted in a high-level alarm. The feed rate from the FET to the aeration tank was increased. The increased loading and reduced detention time in the aeration tank created a high ammonia concentration in the effluent. The scum mat around the FET float tree was broken up with high pressure water, and the high-level alarm switch was lowered. The other 5 samplings in May were compliant.

The September and October 2019 violations for total nitrogen (nitrate) were caused by unnoticed broken tubing in the methanol feed system. The facility had not needed to add methanol for denitrification for several months beginning in May of 2019. The denitrification was occurring in the aeration basin/clarifier. By the end of September methanol addition was started. The tubing used to deliver methanol to the clarifier effluent broke. The operator was monitoring the denitrification process with effluent nitrate tests and depth of methanol in the barrel. We have modified operations to include a visual check of the tubing that delivers the methanol into the clarifier effluent.

The November 2019 violation for total nitrogen (nitrate) was attributed to a sudden increase of influent flow to the aeration tank and denitrification filter. This sudden increase in flow rate was necessary to maintain a normal level in the FET which went into high-level alarm on November 3. There was also a delay in the operator being notified which exacerbated this problem. The permit holder has since reconfigured the entire alarm monitoring system with new cellular equipment and contracted a new monitoring center. The FET alarm was caused by clogging of the FET pumps.

The facility was maintained in compliance for the next 3 weeks in November 2019, and for the subsequent 7 months into the summer of 2020.

Three flow violations were identified by DEP in April, August and October of 2020. The consulting engineer, Todd Chaplin of Mount Hope Engineering, is responsible for submission of the DMR to eDEP. Mount Hope stated their accountability for these erroneous flow entries into the eDEP system. The operations log correctly showed 14,240, 12,218 and 14,685 gallons all within permit compliance. The flow data entered into eDEP was 44,240, 42,218 and 44,685.

There were four violations of total nitrogen (ammonia) in July and August of 2020. These are attributed to an increase in mixed liquor suspended solids and increasing water temperatures. There was also a high FET level event, and the feed rate needed to be increased. The wasting of sludge was increased and September showed all weeks compliant.

The October and November 2020 total nitrogen (nitrate) and BOD violations were attributed to operations transition as the methanol feed system was put on line after not being required during the warmer months. The treatment system actually alternated between denitrification in the aeration tank/clarifier and needing the filter and methanol feed for denitrification.

Evaluations of Influent Flow and Sources

The permit exceedances for daily flow, as mentioned earlier in this document, were caused by transcription errors and not the result of inflow or infiltration. The system does not have significant flow increases during wet weather events. Laboratory data indicates that the quality of the influent (BOD, TSS, ammonia) is consistent with domestic wastewater. There have been no indications that the biology in the mixed liquor has been negatively affected by the quality or quantity of influent flow, with the exceptions of the circumstances specified above.

Corrective Actions

The two main causes of violations in 2019 and 2020 have been erratic influent flow and high mixed liquor concentrations. The erratic influent flows have been historically caused by FET pump plugging and solids blocking the influent D box and sending too little or too much influent to the aeration basin. A modification was made to the influent D box where the V notch was replaced by a square notch to reduce plugging.

In May of 2019 the permit holder installed new slide rails, brackets and stainless-steel chains on the FET pumps. This has allowed easier de-plugging by the operations staff, and prevented the pumps from becoming disengaged from the discharge piping.

The permit holder had the FET cleaned out in January of 2020 with confined space entry and a high vacuum truck. This also greatly reduced the plugging in the pumps and D box. There is no primary tank on the treatment system so all wastewater solids enter the pump chamber.

The FET shall be cleaned out in the first 6 months of 2021 using a conventional vacuum truck from outside the tank, and the confined space entry and high vacuum truck clean out is advised in 2023.

The mixed liquor suspended solids has been tested twice a month since December 2020. Target values are below 4000 mg/L in the summer months and below 5000 mg/L in the colder months. These values are expected to allow for the assimilation of excess BOD and ammonia if the influent flow rate needs to be increased. The lower mixed liquor values eliminate such possibility of denitrification occurring in the aeration basin/clarifier. This would result in more consistent nitrate removal.

Historically the wasting process has been hampered by dependence of the onsite digester for storage of the wasted solids. This process can be slow and inconsistent due to settling, decanting, and freezing. Starting in December 2020 wasting was improved by having a vacuum truck remove solids directly from the aeration basin.

The increased monitoring of the mixed liquor suspended solids and seasonal operational target values when combined with existing clarifier Sludge Judge and aeration basin Dissolved Oxygen measurements the treatment system will more consistently meet the permitted limits. It is recommended that the monthly gallons wasted and the mixed liquor suspended solids data be added to the monthly engineering report.

Conclusion

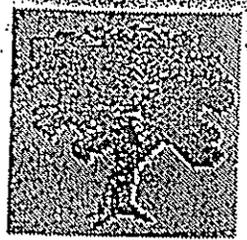
The operational changes outlined above, along with continued up-keep of the system through planned repair and replacement activities will increase compliance. The facility, as currently engineered and operated, has shown long periods of compliance with total nitrogen levels often below 3 mg/L (permitted limit is 10 mg/L).

Each of the exceedances listed in the Notice-of-Noncompliance was followed by a return to compliance within 1 or 2 weeks of the violation. The continued efforts of the permit holder, operator and engineer to apply the corrective actions in this Return to Compliance Plan will result in consistent permit compliance.

Respectfully, Steven Hansen Waste Water Environmental Management Inc

B

Lincoln Homes Corporation
50 Wells Road
Lincoln, Massachusetts 01773
Phone:(781) 259-0150; fax: (781) 259-9730



February 25, 1998

Ms. Alice Warren
Massachusetts Housing Finance Agency
One Beacon Street
Boston, Massachusetts 02108-4805

Dear Alice,

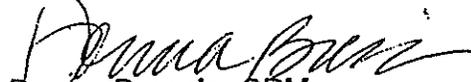
Enclosed please find four original copies of the agreement reached between the Rural Land Foundation and Lincoln Homes Corporation, enabling the RLF to tie in to the Lincoln Woods waste treatment plant.

This agreement was negotiated with the assistance of Rob Tuchmann at Hale & Dorr.

Would you be so kind as to review it, pass it along to whomever might also need to review it at MHFA and let me know if there is any more information you need from us to approve this agreement.

Thanks for your help, Alice.

Sincerely,
BARKAN MANAGEMENT COMPANY


Donna Brescia, CPM
Property Manager

AGREEMENT

AGREEMENT made this 20th day of February, 1998 by and between Lincoln Homes Corporation, a Massachusetts cooperative corporation located at 50 Wells Road, Lincoln, Massachusetts 01773 ("Lincoln Woods") and ~~Resamond DeLott~~ RD Robert DeNormandie, George Fernald, Warren Flint, William King, Thomas Leggat, John Pike and William Russell, Trustees of Rural Land Foundation of Lincoln under an Agreement and Declaration of Trust dated March 20, 1965, recorded with Middlesex South District Registry of Deeds in Book 10833, Page 499, as amended and restated in its entirety in Book 12095, Page 036, with an address c/o Thomas Leggat, The Leggat Company, One Liberty Square, Boston, MA 02109 ("Rural Land").

1. Waste Treatment Plant. Lincoln Woods owns a waste treatment plant, including a lift station and related piping (the "Plant") located at or along a 50-foot wide right of way shown on Plan a of 2, Perimeter Plan, Plan of Land in Lincoln, Massachusetts by Cleverdon, Varney & Pike, Consulting Engineers, Boston, Massachusetts, scale 1" = 100', dated August 2, 1974, recorded with said Deeds in Book 12740 at Page 81. ^{(the "PROPERTY") WJFKSR B} Lincoln Woods is the owner of a housing development located on a portion of Lot 2 shown on said Plan which is served by the Plant.

2. Proposed Connection to the Plant. Rural Land owns a shopping mall located on Lot G shown on Plan b of 2 of the above-referenced plan (the "Mall") which to date has utilized its own on-site septic system. This on-site septic system is

no longer operating efficiently. Consequently, it is proposed that Rural Land connect its sewage line to the existing pumping station for the Plant on the Property, and Lincoln Woods approves such connection, all as contemplated in the right and easement retained by Rural Land, as appurtenant to Lots G and B-1 shown on said Plan b of 2, in the deed dated November 22, 1974 from Rural Land to Lincoln Woods recorded with said Deeds in Book 12,740, Page 88 et seq. Rural Land shall be responsible for obtaining all permits, licenses, authorizations and approvals required of public authorities and for complying with all laws and regulations of public authorities relating to such connection. Rural Land shall be liable and responsible for designing and constructing such connection, including an appropriate flow meter to measure the flow from the Mall and any pumping facilities required for such flow, and paying all liabilities and expenses in connection therewith, including any expenses of Lincoln Woods' reviewing engineers and the engineers responsible for operation of the Plant.

In connection with the design, installation and initiation of service by Rural Land, Rural Land shall submit to Lincoln Woods appropriate plans and specifications for the pipes, connections, pumps, meters, and other equipment to be installed and shall make appropriate revisions as may be reasonably requested by Lincoln Woods and its consultants. Rural Land shall also furnish to Lincoln Woods a list of tenants initially contemplated and the approximate gallonage therefor, to the end that the parties will be assured the expected conditions of operation will be met. The parties shall coordinate initiation of service to minimize operational disruptions.

Any operational deficiencies in the Plant which occur during the first three months of operation shall initially be presumed to have been caused by such connection until a specific cause is determined. Rural Land shall restore to its original condition the land across which the connection is made and any improvements, including pavement thereon. When the connection is completed, the easement therefor shall be a strip of land ten feet in width, the center line of which shall be the center of the installed pipeline, together with land adjacent thereto to the extent required to maintain, repair and replace said connection, all as specified in the easement retained by Rural Land in its above-referenced 1974 deed to Lincoln Woods.

3. Operating Expenses and Overhead of the Plant. From and after the date on which Rural Land completes the connection of the sanitary sewage line from the Mall to the pumping station for the Plant, Rural Land will be liable and responsible to pay Rural Land's Share of all operating expenses relating to the operation of the Plant. Rural Land's Share shall be equal to the percentage which the sewage flow from the Mall constitutes of the total sewage flow to the Plant, as measured in each case by flow meters. Within 90 days after the end of each calendar year the actual gallons of sewage flow from the Lincoln Woods and Rural Land properties shall be calculated, based upon meter readings made at least monthly by the Lincoln Woods maintenance staff and by the Rural Land manager. Until December 31, 1998 of the first stub year of Rural Land's connection to the Plant, Rural Land's Share shall be equal to the percentage which the sewage flow from the Mall bears to the total sewage flow to the Plant as measured by flow meters for the first full month of

operation. At December 31, 1998 and for each calendar year thereafter (and retroactive to the first day of such calendar year) Rural Land's Share shall be the percentage established by the above provided calculation of sewage flow during the prior calendar year. Appropriate adjustments for overpayment or underpayment during the new calendar year prior to the determination of Rural Land's Share for such year shall be made upon such determination.

Operating expenses shall include all costs attributable to the operation and maintenance of the Plant including, without limitation, utilities, maintenance, staff payroll, taxes and benefits, equipment and supplies, real estate taxes, attorneys and consultants fees, engineering vendors, snow removal and testing.

Lincoln Woods will invoice Rural Land monthly for its share of the Plant's costs. Payment for its Share of operating expenses by Rural Land to Lincoln Woods shall be made in equal amounts monthly based on Rural Land's Share for the respective calendar years and annual operating budgets prepared by Lincoln Woods. Adjustments in the monthly payments will be made during the year as a result of changes in said budget or extraordinary expenses incurred. Within 90 days after the end of each calendar year Lincoln Woods will prepare and present to Rural Land a reasonably detailed calculation of the Plant's actual operating expenses and Rural Land shall promptly reimburse any underpayment and any overpayment by Rural Land shall be credited against next owing payments hereunder. Upon request Lincoln Woods shall make available to Rural Land for review at Lincoln Woods'

offices the books and accounts relating to budgeting, operating expenses and payments relating to the Plant.

It is the intention of the parties that Rural Land shall pay its proportionate share of all costs and expenses related to the joint use of the Plant and that each party shall bear the entire cost of any expenses attributable to its particular use of the Plant.

To reimburse Lincoln Woods for its overhead costs in connection with Rural Land's utilization of the Plant, Rural Land will pay to Lincoln Woods at the time of each payment made by Rural Land under this Section 3, an amount equal to 1/12 of the annual overhead rate calculated on the following basis. Based upon actual costs, appropriate adjustments for overpayment or underpayment during the year will be made within 90 days of end of year. The annual overhead rate for the following year will be the previous year's actual rate. The annual overhead rate will be (a) the percentage which the amount of Lincoln Woods sewage treatment plant expenses bears to its overall budget, times (b) Lincoln Woods' total administration costs, times (c) the percent of Rural Land usage of the Plant for the year. (For example, the sewage treatment plant approximate '97 annual expenses were \$55,000; Lincoln Woods' overall budget was \$800,000; hence, $(\$55,000/\$800,000 = 6.875\%)$).

Administrative costs were \$105,000. $(\$105,000 \times 6.875\% = \$7,219)$. Rural Land's estimated usage is 12%. $(\$7,219 \times 12\% = \$866)$ or $(\$866/12 =) \72.00 per month.

4. Capital Expenses and Alterations. Rural Land shall pay for any operational or capital improvements whether or not they are required by the

Department of Environmental Protection ("DEP") to enable Rural Land to tie into the Plant. Rural Land shall pay to Lincoln Woods, Rural Land's Share of capital expense (not relating specifically to particular use of the Plant by either party), including hard and soft costs for repairs, replacements and improvements to the Plant, incurred from and after the date on which Rural Land completes the connection of the sanitary sewage line from the Mall to the pumping station for the Plant, including hereafter incurred costs relating specifically to the connection.

Rural Land's Share shall be the percentage (as calculated in item 3) in effect at the time the bill is submitted to Rural Land (with appropriate "true up" at the end of the calendar year). Such payment shall be made as incurred by Lincoln Woods upon submission to Rural Land of bills therefor, together with reasonable detail showing the amount and nature of the capital expenses incurred. Capital expenses incurred attributable to the particular use by either party shall be borne by such party alone.

5. Rural Land Initial Payment. Upon the execution of this agreement Rural Land is making to Lincoln Woods a payment of \$150,000.

6. Operation of the Plant. The parties agree that the Plant will be operated in accordance with all laws and regulations. Improvements to the Plant required by such laws and regulations or by sound engineering practice will be made with the approval of both parties if they result in extraordinary expenses in excess of \$10,000. The Plant shall be kept in good repair and operating condition and all repairs and improvements shall be of high quality. The parties shall cooperate to cause such repairs and improvements to be made and to obtain all necessary licenses,

permits, approvals and authorizations in connection therewith. Each party shall use due diligence to ensure that no harmful, damaging, hazardous or illegal materials or substances ("hazardous substances") are discharged from the Mall or Lincoln Woods, respectively, into the sewage lines of the Plant.

Rural Land will notify Lincoln Woods of any proposed change in tenants, especially high water users such as a hairdresser, dentist or restaurant.

Specifically, Rural Land will ensure that, for example, no hazardous substances from a hairdressing or a dental practice are discharged into the sewage lines or the Plant. Any tenant handling meat must have installed appropriate grease traps which conform with DEP requirements and be cleaned on such periodic basis as is reasonably required by Lincoln Woods' engineers and use water temperatures sufficiently low to ensure grease does not pass through the traps. The Plant is only for domestic not industrial sewage. Nothing shall be introduced into the system which cannot be effectively treated by the Plant.

Each party indemnifies and holds harmless the other party from and against any damage or expense caused by hazardous substances placed in the sewer line or the Plant from said party's respective property and each party shall be responsible for paying all expenses for investigation, repair and remedy of damages to the Plant caused by any hazardous substances originating from said party's property.

7. Consultation and Decisions. The parties shall work cooperatively regarding the Plant and its operation, repairs and improvements. Each party shall promptly and as completely as possible furnish to the other party such information as

may reasonably be requested in connection with such operation, repairs and improvements and such party's utilization of the Plant. Each party shall keep the other reasonably informed of any information which might affect the operation of the Plant.

8. Change of Circumstance. It is not contemplated that this agreement will be terminated by either party. If there is a substantial change in the circumstances upon which this agreement is based, the parties shall negotiate in good faith to attempt to make reasonable changes in this agreement to equitably reflect the changed circumstances. Such substantial changes may include, without limit, the following: potential limitation of the use of the Plant due to insufficient capacity; change in applicable regulations of the DEP or other agency; and installation of an alternative sewage facility.

9. Assigns. The agreements herein shall be binding upon Rural Land and Lincoln Woods and their respective successors and assigns, as owners and operators of the Mall and the Lincoln Woods housing cooperative, respectively, and shall be for the benefit of and appurtenant to, and binding upon, Lot 2 and Lots G and B-1 shown on the plan referred to above.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed on their behalf by the duly authorized representatives of Lincoln Woods and by two or more Trustees of Rural Land having the authority to execute this Agreement on behalf of all of the Trustees of Rural Land and by a representative

having the authority to execute this Agreement on behalf of the Massachusetts
Housing Finance Agency, all as of the date first set forth above.

LINCOLN HOMES CORPORATION

By: *Manly J. Mauer*

By: *Katherine J. Ramen*

RURAL LAND FOUNDATION OF
LINCOLN

By: *Robert DeNormandie*
Robert DeNormandie

By: *Thomas Leggat*
Thomas Leggat

Massachusetts Housing Finance Agency, the holder of a first mortgage on the
land and improvements owned by Lincoln Woods, hereby consents to the foregoing
Agreement.

MASSACHUSETTS HOUSING
FINANCE AGENCY

By: _____

COMMONWEALTH OF MASSACHUSETTS

Middlesex, ss.

Feb 20, 1998

Then personally appeared the above-named Marilyn Menon and Kathryn Ramon, known to me to be the Clerk and President of Lincoln Homes Corporation, and acknowledged the foregoing instrument to be the free act and deed of said Corporation, before me,

[Signature]
Notary Public
My Commission Expires: 10/20/00

NOTARIAL SEAL

THE COMMONWEALTH OF MASSACHUSETTS

Suffolk, ss.

Feb 23, 1998

Then personally appeared the above-named Robert DeNormandie and Thomas Leggat, known to me to be Trustees of Rural Land Foundation of Lincoln, and acknowledged the foregoing instrument to be their free act and deed as Trustees as aforesaid and not individually, before me,

[Signature]
Notary Public
My Commission Expires: Feb 1, 2002

NOTARIAL SEAL

THE COMMONWEALTH OF MASSACHUSETTS

_____, ss.

_____, 1998

Then personally appeared the above-named _____, known to me to be the _____ of Massachusetts Housing Finance Agency, and acknowledged the foregoing instrument to be _____ free act and deed of said Agency, before me,

NOTARIAL SEAL

Notary Public

My Commission Expires: _____

C

**Lincoln Woods WWTF Evaluation
Existing Equipment and Cost Estimate**

10% 3%

Equipment Name	Equipment Tag	Number of Units	Location	Capacity (ea)	Motor HP	Date Installed / Replaced	Typical Service Life (Years)	Expected Replacement Year	Recommended Project Year	Demo	Unit Replacement Cost	Installation (% of Equipment)	Installation Cost	Total Replacement Cost	Project Multiplier - Contingency (10%)	Project Multiplier - Inflation to Midpoint Construction (3%/yr)	Engineer's Estimate of Construction Cost
Influent Pump Station Wet well - Maintenance		1	Housing Complex - Maintenance Garage		-	1975	60	2035	2050	\$25,000	\$175,000	30%	\$ 52,500	\$ 252,500	\$25,250	\$241,643	\$ 519,400
Influent Pumps - Maintenance		2	Pump Station		-	2003	20	2023	2025	\$500	\$5,000	10%	\$ 500	\$ 11,500	\$1,150	\$1,518	\$ 14,200
Influent Pump Station Wet well - Site		1	Housing Complex - Site		-	1975	60	2035	2050	\$10,000	\$200,000	30%	\$ 60,000	\$ 270,000	\$27,000	\$258,300	\$ 555,400
Influent Pumps - Site		2	Pump Station	75 gal/min	7.5	2009	20	2029	2025	\$500	\$5,000	10%	\$ 500	\$ 11,500	\$1,150	\$1,518	\$ 14,200
Flow Equalization Tank		1	Site	10,000 gallons, 16,400	-	2003	60	2063	2065	\$5,000	\$60,000	30%	\$ 18,000	\$ 83,000	\$8,300	\$120,516	\$ 211,900
Submersible Grinder Pump 1		1	FET	75 gal/min	3	2009	20	2029	2035	\$500	\$5,000	10%	\$ 500	\$ 6,000	\$600	\$2,772	\$ 9,400
Submersible Grinder Pump 2		1	FET	75 gal/min	3	2018	20	2038	2050	\$500	\$5,000	10%	\$ 500	\$ 6,000	\$600	\$5,742	\$ 12,400
Comminutor		1	Site - Biotank influent	450,000 gpd	3	2009	20	2029	2025	\$1,000	\$8,000	10%	\$ 800	\$ 9,800	\$980	\$1,294	\$ 12,100
Bar Rack		1	Site - Biotank influent	-	-	2009	40	2049	2050	\$500	\$5,000	10%	\$ 500	\$ 6,000	\$600	\$5,742	\$ 12,400
Flow Control Box		1	Site - Biotank influent	-	-	2009	40	2049	2050	\$500	\$5,000	20%	\$ 1,000	\$ 6,500	\$650	\$6,221	\$ 13,400
Aeration Tank		1	Site	53,570 gallons	-	1975	60	2035	2050	\$15,000	\$40,000	30%	\$ 12,000	\$ 67,000	\$6,700	\$64,119	\$ 137,900
Clarifier		1	Site	10,600 gallons, 8' swd.	-	1975	60	2035	2050	\$15,000	\$40,000	30%	\$ 12,000	\$ 67,000	\$6,700	\$64,119	\$ 137,900
Digester		1	Site	7,600 gallons	-	1975	60	2035	2050	\$15,000	\$40,000	30%	\$ 12,000	\$ 67,000	\$6,700	\$64,119	\$ 137,900
Aeration Blowers		2	Treatment Building	204 cfm @ 6 psi	10	2009	20	2029	2035	\$500	\$20,000	10%	\$ 2,000	\$ 44,500	\$4,450	\$20,559	\$ 69,600
Aeration Diffusers		60	Aeration Tank	-	-	2015	30	2045	2050	\$25	\$500	20%	\$ 100	\$ 36,025	\$3,603	\$34,476	\$ 74,200
Clarifier Mechanism		1	Clarifier	15-ft diameter	4.46	1975	20	1995	2025	\$5,000	\$25,000	20%	\$ 5,000	\$ 35,000	\$3,500	\$4,620	\$ 43,200
Effluent Storage Overflow Tank		1	Site	5,000 gallons	-	1975	60	2035	2065	\$5,000	\$25,000	30%	\$ 7,500	\$ 37,500	\$3,750	\$54,450	\$ 95,700
Denitrification Filter - sand		1	Denite Filter Manhole	-	-	2003	30	2033	2035	\$1,000	\$20,000	30%	\$ 6,000	\$ 27,000	\$2,700	\$12,474	\$ 42,200
Denitrification Filter - Structure		1	Site	-	-	2003	60	2063	2065	\$2,000	\$50,000	30%	\$ 15,000	\$ 67,000	\$6,700	\$97,284	\$ 171,000
Denitrification/FET Blower		1	Site	90 cfm @ 8 psi	10	2003	15	2018	2025	\$500	\$5,000	10%	\$ 500	\$ 6,000	\$600	\$792	\$ 7,400
Clear Well		1	Site	6,800 gallons	-	2003	60	2063	2065	\$5,000	\$40,000	30%	\$ 12,000	\$ 57,000	\$5,700	\$82,764	\$ 145,500
Backwash Pump		1	Clear Well	281 gpm @ 36"	2	2003	20	2023	2025	\$500	\$5,000	10%	\$ 500	\$ 6,000	\$600	\$792	\$ 7,400
Dosing (Effluent) Pumps		1	Clear Well	281 gpm @ 36"	2	2003	20	2023	2025	\$500	\$5,000	10%	\$ 500	\$ 6,000	\$600	\$792	\$ 7,400
Dosing (Effluent) Pumps		1	Clear Well	281 gpm @ 36"	2	2021	20	2041	2050	\$500	\$5,000	10%	\$ 500	\$ 6,000	\$600	\$5,742	\$ 12,400
RTV System		1	Treatment Building	25 gpm	-	2007	15	2022	2025	\$500	\$5,000	10%	\$ 500	\$ 6,000	\$600	\$792	\$ 7,400
Dosing Siphon Chamber		1	Site	1,650 gallons	-	1975	60	2035	2065	\$2,000	\$20,000	30%	\$ 6,000	\$ 28,000	\$2,800	\$40,656	\$ 71,500
Effluent Disposal (sand beds)		4	Site	2.5 gal/sqft	-	1975	60	2035	2050	\$10,000	\$20,000	30%	\$ 6,000	\$ 114,000	\$11,400	\$109,098	\$ 234,500
Methanol Feed Pumps		2	Site - Chemical Storage	2 GPH @ 50 psi	-	2016	10	2026	2025	\$100	\$2,000	10%	\$ 200	\$ 4,500	\$450	\$594	\$ 5,600
Unused Methanol Feed Pumps		3	Site - Chemical Storage	1.3 GPH @ 500 PSI	-	2003	10	2013	2025	\$0	\$0	0%	\$ -	\$ -	\$0	\$0	\$ -
Methanol Storage		3	Site - Chemical Storage	55 gallons	-	-	-	-	-	\$0	\$0	-	\$ -	\$ -	\$0	\$0	\$ -
Treatment Building		1	Site	-	-	1975	40	2015	2025	\$10,000	\$150,000	30%	\$ 45,000	\$ 205,000	\$20,500	\$27,060	\$ 252,600
Unit Heater		2	Treatment Building	-	-	1990	15	2020	2025	\$500	\$710	10%	\$ 300	\$ 7,100	\$937	\$8,800	\$ 8,800
Standby Generator		1	Site	150 kW	-	2019	30	2049	2050	\$1,000	\$40,000	20%	\$ 8,000	\$ 49,000	\$4,900	\$46,893	\$ 100,800
Standby Generator Switchgear		1	Site	-	-	2019	20	2039	2050	\$500	\$10,000	20%	\$ 2,000	\$ 12,500	\$1,250	\$11,963	\$ 25,800
MCCs & Lighting Panels		1	Treatment Building	-	-	2003	30	2033	2050	\$2,000	\$30,000	30%	\$ 9,000	\$ 41,000	\$4,100	\$39,237	\$ 84,400
Solar Panels		1	Site	-	-	2016	30	2046	2050	\$5,000	\$50,000	20%	\$ 10,000	\$ 65,000	\$6,500	\$62,205	\$ 133,800



600 Federal Street, Suite 2151
Andover, MA 01810
978.416.8000 | www.wright-pierce.com

kevin.olson@wright-pierce.com