Existing Conditions and Facility Evaluations

POWDER MILL FISH HATCHERY FEASIBILITY STUDY

New Hampshire Fish and Game Department

August 24, 2022

Contents

Figures

This page is intentionally left blank.

1 Powder Mill Fish Hatchery

Powder Mill at a Glance

- Constructed in 1947
- Source Water gravity flow
- Receives fish at 200-300 per lb
- Produces 110,000 pounds of fish annually
- Stocks out between end of March to early July

Powder Mill State Fish Hatchery is located in the Town of New Durham on the southern tip of Merrymeeting Lake in Strafford County, New Hampshire. Originally constructed in 1947, the hatchery was updated in the early 1970s and again in the early 1990s with new rearing units. The hatchery occupies approximately 20 acres of state-owned land and consists of 101 exterior ponds and raceways, a fish spawning/incubation building, three storage sheds, a main garage and one residence. Historically, the station has produced Brown Trout, Rainbow Trout, Steelhead Trout, Brook Trout, tiger trout, and landlocked Atlantic Salmon. The hatchery produces over 110,000 pounds (lbs) of fish annually that are stocked in public waters throughout the state. Fish at 200-300 fish per lb. arrive by the end of March through April and stock out by the end of June through early July the following year from the Sea Coast to the Maine border.

1.1 Existing Facility Summary

NHDES has authorized the Powder Mill facility to discharge the hatchery effluent through Outfall Number 001 and 002 (shown in Figure 1-1, Figure 1-2, and Figure 1-3) to Merrymeeting River with specified discharge limits effective from January 1st, 2021 to December 31st, 2025 (Permit No. NH0000710).

The existing site plan, process flow diagram, and hydraulic profile shown in Figure 1-1, Figure 1-2, and Figure 1-3 respectively, illustrate the hatchery boundary, approximate topography and general hatchery infrastructure. The study drawings were developed using digitized (i.e., traced) Computer Aided Drafting (CAD) techniques and map overlay technology. The drawing is a to-scale representation of hatchery resources for planning purposes only.

Water is supplied to the hatchery by gravity flow from Merrymeeting Lake (1,111 surface acres) located just north of the facility. The New Hampshire Fish and Game Department (NHFGD) owned, earthen-type dam was rebuilt in 1983 and has a concrete spillway. NHF&G operates the dam and the NH Department of Environmental Services (NHDES) maintains the dam. The NHFGD owns the water rights to Merrymeeting Lake and is authorized to divert 4,500 gallons per minute (gpm) or 7,258 acre-feet per year. The lake level changes throughout the year due to environmental conditions and hatchery use. Average summer lake drawdown is about one foot.

Flow enters the facility at the north end and drains to two series of raceways. Flow is also directed to the Hatch House. Raceways E through G drain to a lake overflow channel and remain separate from the rest of the facility. Raceways A through D drain to a series of ponds from the Show Ponds, Woods Ponds, Bass Ponds, and finally to the Circular Tanks. There is also a fresh water supply line that drains straight to the Bass Ponds and Circular Tanks. Outflow from the circular ponds currently in use drains to a filter bag for solids removal prior to discharging to Merrymeeting Creek (see Figure 1-1).

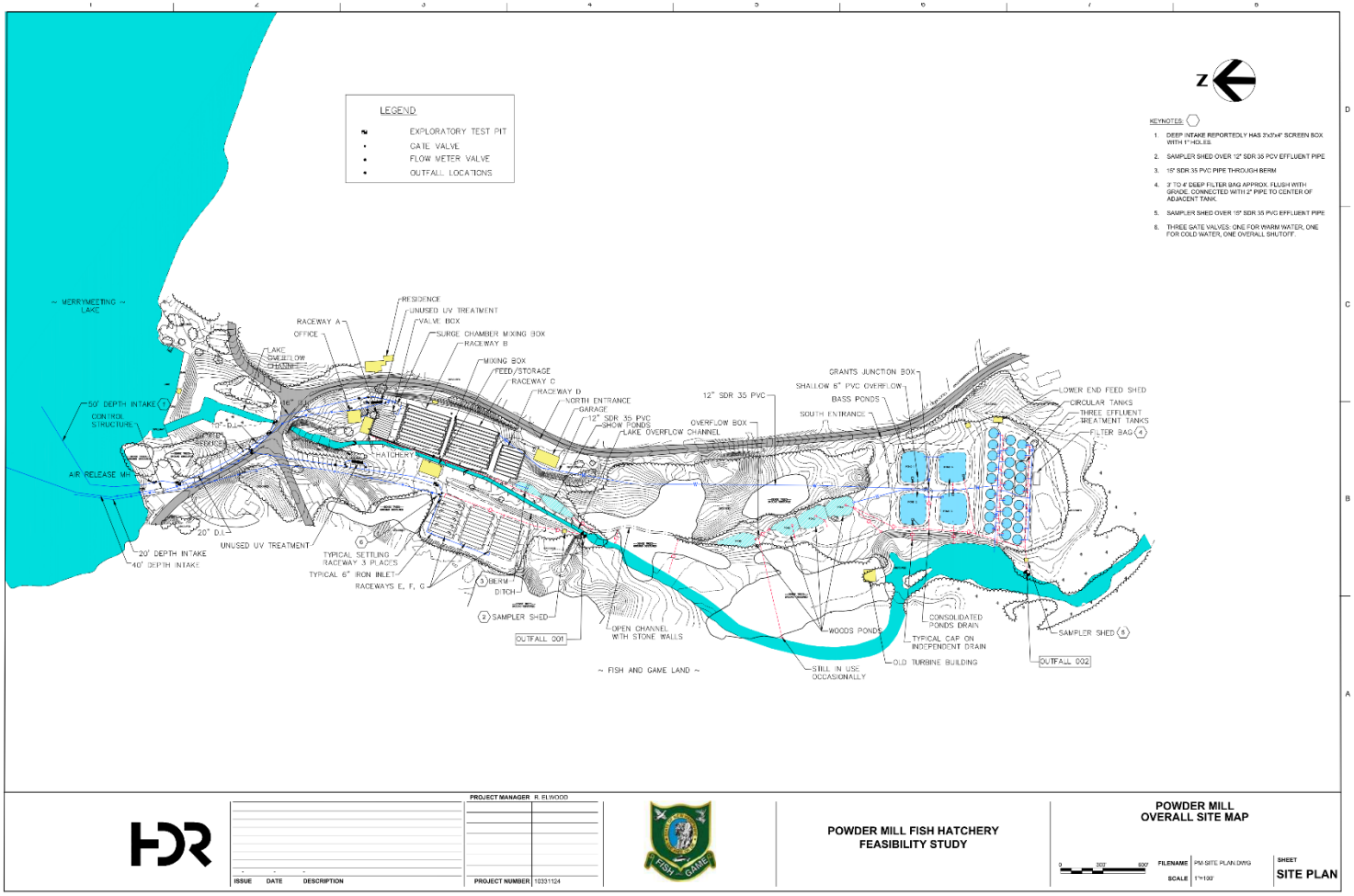

Figure 1-1: Existing Powder Mill Site Plan

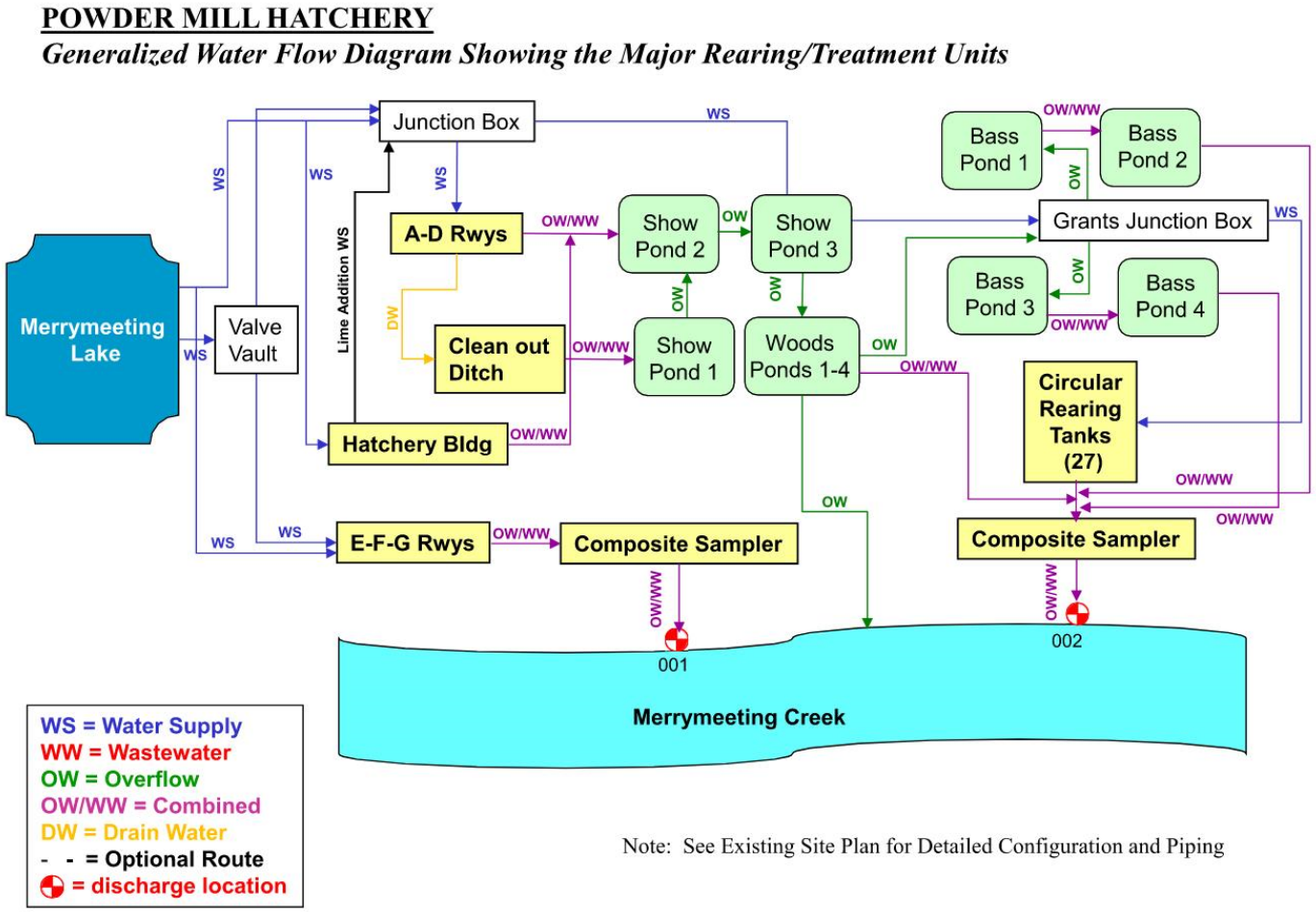

Figure 1-2: Powder Mill Process Flow Diagram

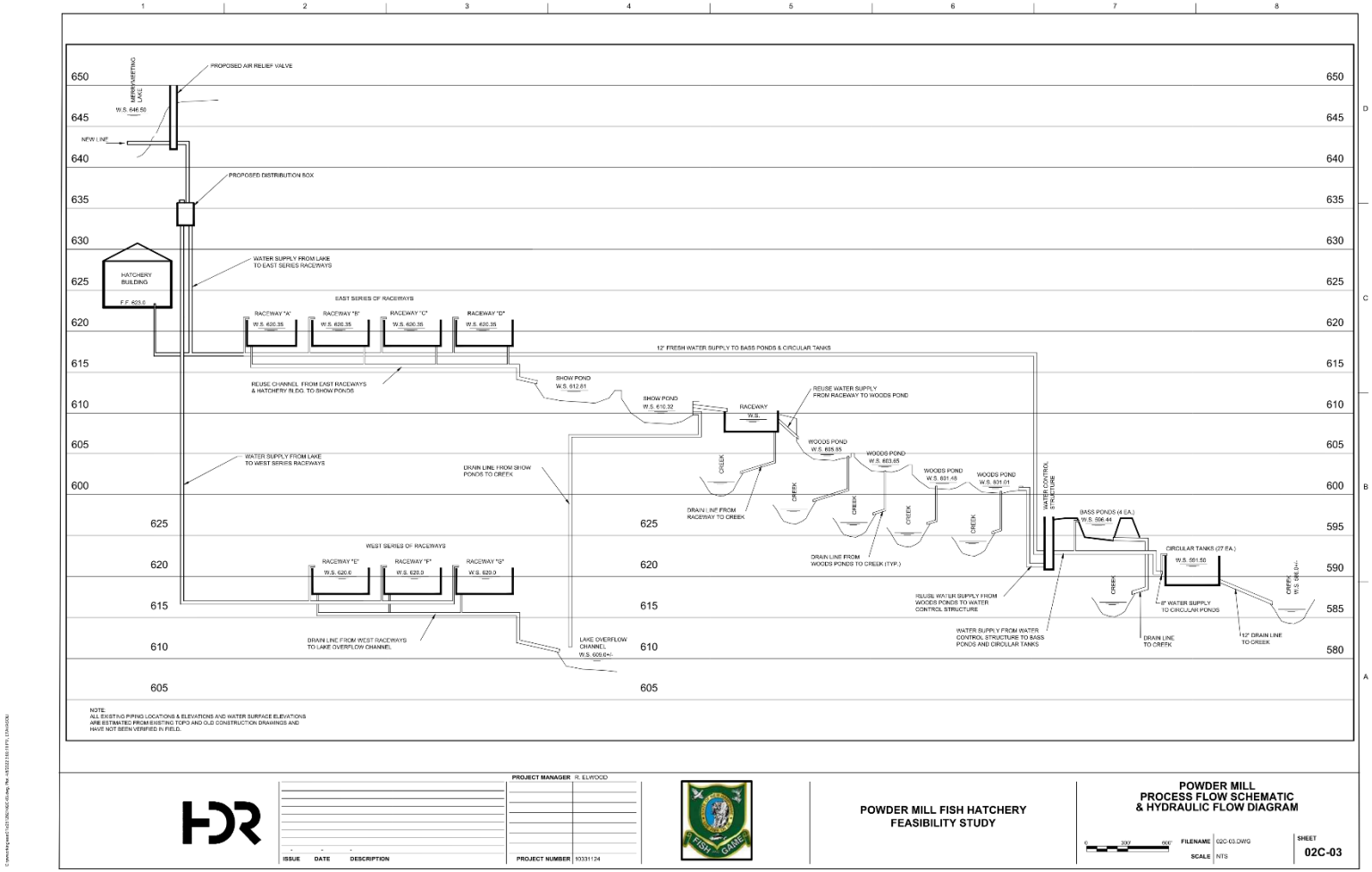

Figure 1-3: Powder Mill Hydraulic Profile

1.2 Condition Assessment

A condition assessment field visit was performed by HDR on May 3, 2022. The team of engineers included process, mechanical, structural, electrical, and architectural disciplines. The goal of the condition assessment was to understand the remaining useful life of the existing facilities, understand deficiencies inherent in the existing design, and develop an understanding of whether existing facilities that are in poor condition can be rehabilitated or require complete replacement. The sections below review the conditions of the hatchery as witnessed on-site as well as through discussions with hatchery staff.

1.2.1 Wastewater Treatment Best Management Practices

In recent years the quiescent zones in the raceways have been vacuumed clean, generally weekly by a portable vacuum (see Figure 1-4), as are all the raceways used for clarification and 25-ft circular tanks that are utilized for production. This procedure was implemented to reduce the amount of phosphorous in the hatchery effluent. The contents of the portable tank containing the vacuumed solids is emptied into either Tank 1 or Tank 3 of the temporary wastewater treatment system (discussed later in the report) which function as a primary clarifier. Sometimes the vacuumed solids are also directly land applied to nearby farmland.

The process of manual vacuuming is very labor intensive and physically demanding on hatchery staff. Given the extremely low level of phosphorus allowed in the effluent, solids should ideally be collected and extracted from the tank as quickly as possible using an automated process. Quick removal of the solids should help reduce the possibility of phosphorus in solid form from becoming soluble, and therefore harder to remove from the effluent.

Figure 1-4: Portable Vacuum

1.2.2 General Site Conditions

The site is broken into two sections by north and south with the Hatch House, raceways, and Show Ponds in the northern section and the Woods Ponds, Bass Ponds, and circular rearing tanks in the south. Several entrances to the facility are present on the north side. Two connecting service entrances serving as the main entrance and parking for staff and visitors. One service entrance serves the back side of the Hatchery Headquarters (Office Building), and another entrance provides access to Raceways E, F, and G. One entrance provides access to the southern half of the facility.

1.2.2.1 Predator Control System

Fish predators include herons, osprey, eagles, king fishers and mink. Bird netting is used on Raceway B and C, attached to the abandoned aeration piping. Bird netting is also used on raceway E, F, and G attached to the 12' security fence. Most of the largest Show Pond has waist-high, vertical netting as do the Woods Ponds and the channel leading to them. The 25-ft-diameter circular tanks have waist-high vinyl fencing.

The low netting over Raceways B & C significantly reduces bird predation; but interferes with harvest and somewhat interferes with other operations like feeding. That netting must be taken down seasonally because it cannot carry snow or ice. The high fence of Raceways E, F & G is less obstructive to operations. The overhead portions of that netting too must be taken down seasonally. The low side netting at the Show Ponds and Woods Ponds is only moderately effective.

1.2.2.2 Holding Ponds for Water used for Disease Treatment

The facility currently has no method to contain water that has been treated with antibiotics or other disease treatments, other than pumping and hauling it to the 20-foot-diameter tanks being used for sludge settling and storage.

1.2.2.3 Roads and Parking

The main entrance road to the hatchery is bituminous paved. The gravel main road and main pond road require routine grading maintenance. The roads between the bass ponds and circular units are grass and dirt.

1.2.2.4 Fencing and Security

Entrances to the facility are generally gated or chained overnight but there is no perimeter fencing for the facility. Additionally, there are no overnight staff on site, so security is an ongoing concern.

1.2.2.5 Site Drainage and Flooding

Portions of the hatchery lie within the 100-year floodplain. Appendix J depicts the Flood Insurance Rate Map (FIRM) from the National Insurance Program (Map Number 33017C0085D, effective May 17, 2005). The upper portion of the site is located in Zone A, including all of the Raceways and the Hatch House. This A zone designation is within the 100-year flood zone but no base flood elevations have been determined.

According to the hatchery staff, no flooding problems have occurred at the site. Pond drainage is not impacted by high creek stages and no flooding of the ponds has occurred. Discharge over the dam has flooded the spillway ditch and has come close to the hatchery building but not impaired operations.

1.2.2.6 Domestic Water/Wastewater Systems

The domestic (non-potable) water supply for all on-site buildings is a direct feed from the lake supply to the hatchery. Bottled water is used for consumption. The residence utilizes an artesian well. The residence wastewater is treated through a conventional septic tank and leach field system. The hatchery building is believed to have a septic tank system for domestic wastewater but no documentation of this system is available.

1.2.2.7 Electrical

There are four electrical services to the facility: the main office, storage building, garage, and ponds. Only single-phase service appears to be available nearby. Distribution around the hatchery is primarily overhead. The facility does not have backup power generation. Hatchery staff have determined that backup power is not necessary based on historical operational needs. The facility does not have any instrumentation or control. Hatchery staff have indicated a desire to have monitoring/alarm capability. A new flow meter will be installed in the near future at each outfall.

1.2.2.8 Other Utilities

Propane and heating oil are used for heating various buildings at the site. The site also has phone and internet connectivity.

1.2.2.9 Public Visitation Information & Education Services

The Powder Mill Hatchery does not have an accessible visitor's area or ADA compliant public bathroom. The only bathroom at the entire facility and the visitor's / display area are both currently located in the basement of the Hatchery Headquarters (Office Building). There are no accessible routes from the parking areas to the basement level of the Hatchery Headquarters (Office Building). The current display room is approximately 8'-8" by 10'-0" and is a very tight space for multiple visitors to be in at the same time.

The public has direct access to Raceways A through D, along with the various ponds and circular tanks. There is no fall protection or protective railing to maintain a safe distance for the public around the raceways, or the lake overflow channel.

There is visitor parking located at both the upper and lower ends of the facility. There is a nature trail that connects the two ends, and winds along the various rearing ponds.

1.2.2.10 Old Turbine Building

The Old Turbine Building is a brick masonry structure located along the Merrymeeting River between the Woods Ponds and the Bass Ponds. This building originally housed a water turbine to utilize the water flowing out of the hatchery. The water turbine is no longer in use, and the building is currently used for storage of nets. The building has fallen into disrepair, is currently in poor condition and appears to be unsafe for use. The concrete foundation has large spalls, and the concrete loft slab has large cracks. Most of the glass has broken out of the windows. The roof is covered in moss, and the outer edges are severely rotted. The top of the chimney above the roof is falling apart, and no mortar is visible between the bricks.

1.2.3 Water Supply and Control Structures

The construction of the facility in 1947 included the installation of an asbestos-cement (a.c.) 14" diameter collection and transmission line. This pipeline extends into Merrymeeting Lake to an approximate depth of 40'. A second 14" A.C. supply line was installed in 1972 and supplies water from a depth of 20'. Hatchery staff believe this intake is equipped with a finger screen. These two lines enter a junction box on the southern edge of the lake. Water from the two old intake pipes mixes in this structure. Two pipelines leave the structure, one 10" cast iron (C.I.) that feeds the Westside raceways (Banks E, F & G) and one 14" line feeds the rest of the hatchery. Currently the hatchery only uses the shallower of the two intakes.

In 2007, a 20" pipeline was added extending farther out in the lake reaching approximately a 50' depth and included a lake bottom intake structure constructed of fiberglass grating with 1-11/16" square openings. The 20" pipeline does not connect with the old supply lines at the control structure near the lake. Instead, it splits into a 10" cement-lined ductile iron (CLDI) line to the west side of the facility and a 16" CLDI line to the east.

The west side 2007 10" line enters a UV disinfection systems and flow meters that were also installed in 2007. The existing piping configuration allows for bypass around the UV system. From here, the 10" line runs under the maintenance roadway until it connects with the original 10" cast iron pipe with a 10" tee. Three buried gate valves are installed at this location to provide mixing for temperature control. The original 10" cast iron pipe discharges at the northwest corner of Raceways E, F, and G above the water line.

The east side 2007 10" line splits near the east side UV system where one branch connects with the existing water line as well as the water supply line to the Hatch House. Valving in this area allows for both upper and lower water supply lines to supply raw water to the Hatch House, the UV System, or the UV system bypass line. The bypass line and the UV system effluent recombine before entering a junction chamber which then feeds the east side raceways.

The following limitations, deficiencies, and conditions were noted during the on-site condition assessment:

- The conditions of the supply lines have not been determined since they require special inspection procedures to access. However, hatchery staff did not indicate any concerns regarding the existing water supply lines.
- The supply piping on the east side of the facility only allows for the deep water supply to be disinfected through the UV system while the upper water supply bypasses disinfection. Most issues with communicable fish diseases are noted by hatchery staff to come from the upper-level water supply. However, hatchery staff have noted that the upper level water supply is rarely used.
- The supply piping on the west side of the facility does not allow for disinfected water to supply the Hatch House.
- Neither UV systems are currently in use. Hatchery staff report that these systems were not in operation very long after installation due to the energy required to run them and the associated increase in utility bills. Hatchery staff also noted that the systems are thought to be undersized. The racks of UV lamps are in dry storage.
- The hatchery staff is unaware if the water meters in front of the UV systems are in working condition.

- No influent flow metering exists at the facility that can meter the entire flow sent to either the east or west side of the facility.

1.2.4 Hatch House

The Hatchery House contains 10 circular rearing units with corrugated galvanized steel walls (see **Error! Reference source not found.**). Each tank is 5' diameter x 2.6' sidewall depth with an operating water depth of 1.58'. The source water flow rate to each tank was historically 10 gpm. A few of the round tanks are being used to dissolve lime to raise the pH of the water leaving the building and going to the Show Ponds which can also feed the Bass Ponds and the lower circular tanks. Typically, 50 pounds of lime are added twice daily.

There are six stacks of tray incubators with 8 trays in each stack. The incubators and circular rearing units in the hatch house have not been used since salmon was raised at the facility. Hatchery staff report that salmon rearing was suspended at Powder Mill as an operational modification to reduce the levels of phosphorus in the effluent.

1.2.4.1 Process

Lime addition in the Hatch House was implemented as part of the facilities 2021 NPDES permit. The permit contained a new requirement that limited the reduction in pH through the facility to 0.5 S.U. While the east side of the hatchery can meet this requirement without lime addition, the west side of the hatchery requires it. The existing circular rearing tanks and associated equipment in the Hatch House designed for rearing fish were repurposed by hatchery staff to dissolve bulk lime for addition to the facility. This existing equipment is less than ideal for this purpose.

Figure 1-5: Hatch House

1.2.4.1 Structural

The Hatchery Headquarters is a timber frame structure on a concrete slab and masonry block foundation. The condition of the foundation, slab and walls were fair to good condition with no identified maintenance or operational concerns identified by the staff.

1.2.4.2 Architectural

The Hatchery Headquarters consists of the hatchery / indoor rearing area on the ground level, with an attic space above used for miscellaneous storage. This building is only open to the hatchery staff, and not intended for public use or access.

- Floors: The floor is a concrete slab with a raised concrete pad under the rearing units. Both the concrete floor and pad appear to be in good condition. There is a narrow 21” wide walkway between the south wall and the raised slab.
- Walls: The walls consist of a 30” high CMU base with wood framed walls sitting on the CMU base. The interior finish of the walls appears to be asbestos paneling. The exterior of the walls are finished with wood siding. The walls appear to be in good condition. None of the walls appear to be insulated.
- Windows: The windows are wood frame single pane windows, consisting of a mix of double hung and fixed. The windows appear to be the original windows, with aluminum storm windows added to the outside of the double hung windows. No issues regarding the operation of the windows were reported, but the lack of insulation was noted as an issue during the winter. However, the temperature requirements of the fish are currently met.
- Ceiling: The ceiling is approximately 8’-9” above the finished floor and is comprised of asbestos panels with wood trim mounted to the underside of the wood floor joists for the attic. There is a wood access hatch near the northwest corner to provide access to the attic. The ceiling panels appear to be in generally good condition.
- Doors: The Hatch House has two access doors. The primary access door is located near the southern end of the east wall. The secondary access door is located near the west end of the north wall. The doors are approximately 21” above the floor slab and have concrete stairs leading up to the doors. The doors appear to be in fair condition.
- Attic Space: The attic is an uninsulated open space used for miscellaneous storage. The attic is accessed via a wood ships ladder. No issues with the attic were identified.
- Roof: The roof is a sloped roof with asphalt shingles. The roof appears to be in fair condition. No evidence of leaking was observed, and no leaking was reported.

1.2.4.3 HVAC & Plumbing

The Hatch House is served by a standalone propane heater designed to maintain the area between 50 and 55 degrees Fahrenheit. The heater is fed via a propane line along the wall behind the unit that goes outside to a vertical propane tank. The heater exhausts into a cinder block chimney adjacent to the heater chassis up through the roof of the building.

There is no means of cooling or dehumidification within the facility. Windows appear to be operable so natural ventilation can occur from opening windows.

1.2.4.4 Electrical

Electricity to the Hatch House is sub-fed from the nearby Office Building. A single-phase 240/120V circuit is routed from a 100A, 2P feeder breaker in the Office Building main distribution panel 'MDP'. The circuit is routed in metal conduit surface-mounted to the building exterior, before transitioning underground to the Hatch House.

The Hatch House has a 240/120V, 100A load center that distributes power to lighting and receptacles. There are no other significant loads in the building. The panelboard is NEMA 1 with no cover and is not properly rated for the wet/damp environment.

Lighting in the building is provided by surface-mounted fluorescent fixtures. The fixtures have no lens or other means of physical protection. The fixtures are not rated for the wet/damp environment.

The lights are turned on/off by the circuit breaker in the load center; there is no light switch. Breakers are not intended to be used for frequent switching; safe operational life may be significantly reduced. There is no current lighting control system, although this has been expressed as a desired functionality. An obsolete lighting control time clock is located on the wall.

The facility does not have backup power generation. Hatchery staff have determined that backup power is not necessary based on historical operational needs.

The facility does not have any instrumentation or control. Hatchery staff have indicated a desire to have monitoring/alarm capability. A new flow meter is being installed in the near future at the each outfall.

1.2.5 Raceway A

Due to the deteriorating structure of these ten raceways (each 5' wide and 35' long, shown in Figure 1-6), only three are used for rearing fish, and only for a few months. Flow is in a serpentine pattern at approximately 150 gpm from the east side raceways' surge box. There are cleanout flumes connected at both ends of the raceways with stop logs in them. These end cleanout flumes and the last A-Raceway discharge into a reuse flume common to B, C and D-Raceways that flows to the Show Ponds. There are slots in the walls for stop logs for individual raceway level control and slots for fish screens.

1.2.5.1 Structural

At the time of inspection, Raceway A was not in service. The concrete walls and floor of the 10 raceways are in serious condition, with heavy spalling, cracking and efflorescence throughout. There is erosion of the walls of the upper four raceways, with exposed aggregate/loss of paste to a depth of up to 1/4". The tops of the walls separating the raceways are cracked and spalled, with deterioration getting worse from east to west. The southerly end walls have been labeled "Keep Off" and painted with yellow warning stripes to keep people from standing on them due to their heavy spalling condition. Repair of the concrete in Raceway A is not likely worth the effort; if Raceway A was to be brought into service again, a complete reconstruction or replacement with more efficient structures would be more prudent. The raceways were built with the east end higher than the west end, so that gravity allows flow to zigzag through the raceways and outlet into a discharge channel at the west end.

Figure 1-6: Raceway A

1.2.5.2 Electrical

There is no electrical power or lighting at Raceway A. Note that there are two large floodlights mounted near the top of the Office Building that may be able to illuminate Raceway A. The lights are not currently used and may be inoperable.

1.2.6 Raceway B & C

Flow is in a serpentine pattern in these 8’ wide, 50’ long raceways (shown in Figure 1-7) at approximately 800 gpm in B and 600 gpm in C from a common aqueduct fed by the east side raceways’ surge box. There are cleanout flumes connected at both ends of the raceways with stop logs with stop plates in them. These end cleanout flumes and the last raceway of each group, discharge into a reuse flume common to B, C and D-Raceways that flows to the Show Ponds. There are slots in the walls for stop logs for individual raceway level control and slots for fish screens. There is also a pipe from each end cleanout flume to a main cleanout flume common to B, C and D raceways that is piped to the river channel. This cleanout system is not used due to recent effluent restrictions and leakage from the adjacent river channel.

These raceways have abandoned aeration piping. This abandoned piping does not detract from the function of the raceways and is not inhibiting any operations. Netting is stretched over the tops of the raceways on knee-high, vertical support pipes.

Figure 1-7: Raceway B

1.2.6.1 Structural

The concrete is of more recent construction than Raceway A and is in fair condition, with surface cracks in the channel walls and efflorescence every 10 feet or so along their length. The cracks are not full depth, and there is little to no spalling of concrete surfaces. There is moderate surface erosion of the raceway walls below normal water flow levels. The depth of loss is approximately 1/8" on average. There are expansion joints formed into the walls of the raceways near the raceway midpoints. Full depth cracks have formed at several of the expansion joints, but the waterstops cast into the joints appear to be sound.

1.2.6.2 Electrical

Raceways B and C currently have pedestal-mounted receptacles and start/stop controllers for the purposes of plugging in aerators for the raceways. Electrical power is routed in conduit embedded in the structural concrete. The conduit and equipment is moderately deteriorated due to age and environment. The receptacles are currently not used, and there are no future plans that will require them.

There is no lighting at Raceways B and C.

1.2.7 Raceway D

Flow is in serpentine pattern at approximately 300 gpm in these 8' wide, 50' long raceways (see Figure 1-8), fed by a pipe from an aqueduct fed by the east side raceways' surge box. There are two drain/cleanout plugs in at the end of each raceway. One is piped underground to a main reuse flume that leads to the Show Ponds and the other is piped underground to a main cleanout flume

beside the river channel. Normally only the plug in the last raceway leading to the main reuse flume is open.

1.2.7.1 Process

The cleanout plugs are not removed due to recent effluent restrictions and leakage from the adjacent river channel. For bird predation deterrence, pole-supported cables span over the raceways, high enough to walk under. Netting spans some of the poles like side curtains. These features are shown in Figure 1-8 though they are difficult to see.

1.2.7.1 Structural

The concrete is in worse shape than Raceways B and C and is in fair condition, with surface cracks in the channel walls and efflorescence every 3-5 feet along their length. The cracks are not full depth, and there is little to no spalling of concrete surfaces. There is minor surface erosion of the raceway walls below normal water flow levels. The depth of loss is 3/8” on average. The Raceway D concrete is a prime candidate for rehabilitation, including sealing of existing cracks, repair of spalled areas and applying a protective liner to the bottom and walls of the raceways.

Figure 1-8: Raceway D

1.2.7.2 Electrical

There is no electrical power or lighting at Raceway D.

1.2.8 Raceway E, F, & G

Raceways E, F & G were added in 1972. Each group has ten 8’ wide, 50’ long raceways, see Figure 1-9. They do not have aeration systems but do have power distribution. These raceways utilize about 1,000 gpm of water or 328 gpm per bank. They are vacuumed cleaned one to two times per week or as needed. Flow pattern through each group is serpentine serial and the last raceway in each group is currently used for settling waste.

These raceways have their own buried 12-inch-diameter a.c. drain pipe to the river flume. Recently a section of SDR 35 PVC pipe through a concrete vault was added with a tap with an automatic sampler and shed above. A flanged electromagnetic water meter has been purchased and will be added. Each group of raceways is mostly surrounded with 10’ high chain link fence with cable supported netting spanning across to deter predation. The netting over the top is taken down for the winter. The raceways have fish screens and stop logs for level control. Each group has one 6” diameter water supply above water surface with a buried valve.

Figure 1-9: Raceways E, F, & G

1.2.8.1 Structural

The concrete in Raceways E, F, and G is in fair to poor condition, with erosion of concrete surfaces of the bottom and walls of the raceways and intermittent spalls in the raceway walls. The spalls are up to 1” deep and the full width of the top of the interior walls, and up to 4” deep locally at the ends of the walls. Facility staff has performed concrete patching at some of the more extensive spalls in Raceway G. Soft water conditions have exacerbated the surface erosion of the raceways below normal water line of the walls. The depth of concrete loss is 1/8” to 1/4", resulting in exposed aggregate. The concrete condition makes the rearing units difficult to clean and causes fin erosion to the fish. There are expansion joints at the midpoint of the interior and exterior raceway walls,

some of which have opened up significantly, potentially allowing water to leak outside the facility. It was observed that water was bubbling up below the headwall of a stormwater structure and running into a stormwater swale to the east of Raceway E. The source of the water bubbling into the swale was likely leaks from the walls or slabs of Raceways E, F and G or their inlet piping.

1.2.8.2 Electrical

Lighting at Raceways E, F, and G is provided by two pole-mounted area luminaires. Light levels are insufficient for night-time operations. Lighting provides some amount of security and anti-predation.

1.2.9 Show Ponds

A couple of small earthen ponds (Show Ponds) are immediately south of Raceway D. Water flows serially through the Show Ponds. The supply water for these ponds is from the Hatch House and Raceways A through D by way of the main reuse flume and a pipe from that flume.

The smaller upper pond was recently divided with a berm mid-length and the original discharge piping was extended with SDR 35 PVC across the upper half, see Figure 1-10. The upper half was membrane lined and was going to be used to settle waste from the main cleanout flume. However, due to the excessive infiltration of river water into the cleanout flume the project was abandoned.

The larger lower pond is pale colored from lime sediment coming from the Hatch House. The lower pond has structures for subdividing it into thirds, but only the lower structure is used (the upper structure is incomplete or partially removed) such that the upper two-thirds serves as one pond, which has waist-high vertical netting. The lower third serves as another pond, separated by fish screens and weir boards. At the time of inspection, fish were only in this last pond and consisted of yearling and older fish, see Figure 1-11. These ponds are only cleaned occasionally when small piles of fish waste develop after several months of operation.

Figure 1-10: Show Ponds

1.2.9.1 Structural

As noted above, only one of the lower pond structures for subdividing it into thirds is used while the other two are incomplete or partially removed. This structure is made with concrete, fish screens, weir boards, and a metal walkway. This structure is in fair condition with minor surface cracks and spalls.

Figure 1-11: Show Ponds

1.2.9.2 Electrical

There is no electrical power or lighting at the show ponds.

1.2.10 Lake Overflow Channel

There is a lake overflow channel at the dam that impounds Merrymeeting Lake that carries flows from the lake through the center of the hatchery to its outlet near Outfall 001. This channel is considered to be the Merrymeeting River. From just below the dam spillway, under Merrymeeting Road, and just upstream of Raceway A the channel is natural. At this point the channel transitions to a concrete floor and vertical concrete walls. The concrete channel terminates just downstream of Outfall 001. The river streambed and banks are natural from the end of the concrete channel until the junction with Marsh Pond. Hatchery personnel noted that DES has indicated that the overflow channel may be undersized for design flood levels.

1.2.10.1 Structural

The structural condition of the concrete lake overflow channel is deteriorated, particularly the section between Raceway D and where the concrete channel terminates. Multiple expansion joints in the easterly vertical walls of the channel have separated, allowing a section of the wall to rotate inward

toward the channel, see Figure 1-12. The wall is 8” thick and has rotated by as much as 6” inward at the top, so that it is no longer plumb. The rotated joints allow for water leakage to and from the channel. There is also settlement of the eastern wall of the channel in the sections that have rotated, resulting in the floor of the channel no longer being level. At the time of inspection, the water level in the channel was deeper along the easterly wall than along the westerly wall. There was an excavated area behind the easterly wall that exposed a buried pipe adjacent to the outside of the wall. The open excavation revealed that there does not appear to be a heel on the back of the vertical channel walls. Any modification to or rehabilitation of the concrete bypass channel must include replacement of the section of rotated easterly wall.

Figure 1-12: Lake Overflow Channel

1.2.11 Woods Ponds

An open channel, generally about 5’ wide and walled with stone, carries Show Pond water serially hundreds of feet south to the Woods Ponds. About a hundred feet upstream of the Woods Ponds there is a structure with a bar screen, stop logs, passive aeration screen and side overflow weir to release water if the bar screen clogs. Water flows serially through the Woods Ponds, shown in Figure 1-13. The first pond is separated from the other three by a gravel road with piping under it,

with a screened structure on the upstream end and a stop log structure on the downstream end. The other three ponds are separated by fish screens.

Figure 1-13: Woods Ponds

Each pond could historically drain directly to Merrymeeting River but now there is a common drain that drains to the Bass Ponds and Circular Tanks before being discharged to Outfall 002. The last Woods Pond has a second screened outlet structure with piping to the Bass Ponds.

1.2.11.1 Structural

The walls of the Woods Ponds are a combination of earth and dry-laid stone. The inlet walls for the first Woods Pond are dry-laid stone and are in fair to good condition. The discharge from Woods Pond 1 travels through a concrete outlet box that is covered with timber planking. The concrete of the outlet box is in poor condition, with cracking, efflorescence and spalling on the corners and edges up to 3” deep and full width. There are existing concrete repairs at some of the larger spalls of the Woods Pond outlet box, see Figure 1-14. The concrete outlet box at Woods Pond 1 should be rehabilitated.

Figure 1-14: Woods Pond Outlet Box

1.2.12 Bass Ponds

The lower (southern) portion of the hatchery has four 60’ x 40’ x 4’ deep earthen (clay-lined) Bass Ponds (numbered 1 through 4, shown in Figure 1-15). A T-shaped structure receives reuse water from Raceway C mostly via 12” SDR 35 PVC equipped with a gate valve. The T-shaped structure has buried branch piping to concrete weir boxes between pairs of Bass Ponds and the weir boxes are piped to the four Bass Ponds. This series of structures and piping supplies one of two water supplies for these ponds.

A 1976 drawing indicates a buried 12” RCP supply line from Woods Ponds arriving at a rectangle between the four Bass Ponds, suggesting that the two sources mix in the structure, shown as T-shaped in other drawings. Contrarily a 1957 drawing indicates a 12” transite pipe from the Woods Ponds crosses under the aqueduct supply and is not connected to the T-shaped structure and is instead branched independently to four valves at the four Bass Ponds. Four valve street boxes were observed in the vicinity at the time of inspection.

Recently, shallow 6” PVC overflow pipes were added from Bass Pond 1 to 2 and from 3 to 4. The ponds are being used to settle waste. They originally drained independently to the river but are now connected to a common drain.

Figure 1-15: Bass Ponds

1.2.12.1 Structural

(Note to Reviewer: Structural did not get photos or document the condition of the two water supply control structures in field notes, though field photos from others show two structures, one between the two easterly ponds and one between the two westerly ponds. The easterly structure seems relatively new, and in good condition, and the westerly structure seems more deteriorated. Is there a chance the westerly structure was replaced by the easterly structure?)

Old drawings indicate that all the bass ponds' concrete was installed prior to the 1960's. There is a concrete T-shaped water diversion box near the intersection of the four ponds that is in fair condition. Each pond has a small concrete water supply weir box in each corner and a larger concrete outlet structure inside each central end. All those structures are in poor condition.

1.2.12.2 Electrical

Electricity is provided to the area from a separate utility service from the nearby overhead distribution line. Power is routed overhead on wooden poles to provide area lighting and power to the sampling shack.

1.2.13 Circular Tanks

Just south of the Bass Ponds are twenty-seven (27) circular concrete rearing units (see Figure 1-16). Each rearing unit is 25 feet in diameter and approximately 1.5’ deep with 30” high walls. The twenty-seven tanks are fed by a buried 12” main from the T-shaped structure between the Bass Ponds. The main tees to 8” submains that have buried 2” galvanized supply branches with buried curb-stop valves at each circular tank. The flow into each unit is approximately 18 gpm.

The tanks have 6” drain branches (transite directly under the tanks, clay after weir boxes) to 12’ clay drain mains that drain into the common drain main to the river. Each tank has a side weir box for level control and settling solids. Each weir box receives a drain from a 2’x2’x6” deep screened sump in the tank center. The tanks are cleaned one to two times per week or as needed and most are not in use.

Three tanks near the middle of the south row of nine are currently dedicated to effluent treatment. Vacuumed waste from the rearing units is emptied into the outer two tanks. Overflow pipes (3” diameter) connect the outer tanks to the middle tank and effluent is siphoned from a sand filter in the center to a 15’ x 15’ x 4’ filter bag in the ground 20’ to the south. After 6-8 months use, only a little sand was found in the filter. This year, thirty 600 gallon loads of sludge have been vacuumed out of the outer tanks and hauled and emptied into a town sand pit. This process has been in place for 3 years.

1.2.13.1 Structural

The circular tanks have concrete floors and walls, and concrete outlet structures. The condition of the tanks varies but is typically fair with eroded surfaces below normal water level, exposed aggregate, and moderate cracking and spalling of the tank walls and outlet structures. At the time of inspection only about one third of the tanks contained water and only one had fish in place. Several of the tanks had concrete repairs to the larger spalls on the walls and outlet structures.

Figure 1-16: Circular Tanks

1.2.14 Outfalls

The hatchery has two outfalls:

Outfall 001 receives flow from Raceway E, F & G and has an automatic sampler. A new flow meter is scheduled to be installed this summer.

Outfall 002 is located at the southern-most end of the facility and receives all other rearing flow through a 15" SDR 35 PVC drain. The 15" pipe goes through a concrete vault where there is a tap for insertion of an automatic sampler suction tube and a flow meter will also be added in summer. An automatic sampler resides in a shed above.

1.2.14.2 Architectural

There are sampling sheds located near each of the two outfall locations. Each shed is an insulated wood frame shed structure over an access well to allow monitoring and sampling of the water that is discharging to the Merrymeeting River. Both sheds appear to be in fair to good condition.

The exterior of both sheds is finished with vinyl siding, which appear to be in good to fair condition. Some cracking of the corner trim was observed at Outfall 002.

The finish floor of both sheds is approximately 14 inches above the ground, and there are no steps up to the door. Hatchery staff noted that this is occasionally a tripping hazard as shown in Figure 1-17.

1.2.14.3 Electrical

Electricity is provided to each sampling shed for lighting and receptacles. The service is 120V single-phase. The electrical equipment is adequate for the load and is in good condition.

Figure 1-17: Outfall Sampling Shed

1.2.15 Garages and Storage Areas

Hatchery Headquarters (Office Building)

The main office building (2,026 SF) was constructed in 1947 (see Figure 1-18). The wood and concrete building consists of three floors of operable space. The top floor includes a break room with kitchen and laboratory. The main floor serves as a garage and storage area while the basement contains a bathroom with shower, changing/boot room, one room visitor center, and a furnace/utility/storage room. An underground storage tank (UST) leak detection system is installed for the USTs located adjacent to the building.

Chemical Storage Building (Storage Shed)

This building was previously a gas station building but is now used to store Formalin and other chemicals. The age of the building is unknown. An underground storage tank (UST) leak detection system is installed for the USTs located adjacent to the building.

Feed Storage Buildings

There are two feed storage buildings at the facility; a larger primary storage building commonly referred to by the staff as “The Brown Building”, located on the west side of the Merrymeeting River channel behind Raceways C and D, and a smaller secondary storage shed located at the lower end of the facility adjacent to the circular rearing tanks.

The Brown Building is a wood framed structure constructed in 1972 located between Raceways B and E (see Figure 1-19). This building is a single-story storage building with an interior staircase to an overhead storage space in the attic. Its entrances include two rollup-type garage doors at its back/west wall, a side door entrance at its south wall and a main entrance door on its east wall, accessed by a walkway over the concrete bypass channel as well as from the service road serving Raceways E, F, and G. Truck access is provided but no unloading features are present. This building is used for storage of bagged feed and smaller vehicles. One section is also used as a wood shop. Feed storage is not temperature or pest controlled.

The southern feed storage building is also a wood frame structure to hold bagged feed for the lower circular rearing units and is in good condition (unknown age). The feed storage building is not temperature controlled. Truck access is provided but no unloading features are present. A large garage door and ramp provide access to this building.

1.2.15.4 Structural

Hatchery Headquarters (Office Building)

This building consists of three floors, with a concrete foundation basement, CMU walls at the first floor, and wood frame construction on the second floor.

The main front entrance is at ground level, which consists of two garage bays with rollup doors primarily used for vehicle and equipment storage. The upper floor is used as a break room, laboratory and office. The basement level consists of a change room, a restroom, furnace/utility/storage rooms and a room with public displays, which is rarely used due to accessibility limitations.

Figure 1-18: Hatchery Headquarters

Chemical Storage Building (Storage Shed)

This storage building is located atop a steep slope above the show ponds. It is a timber-frame building supported by a shallow concrete slab foundation. The structural slab has cracked in several places and has settled. Due to this some of the interior columns that support the roof are no longer bearing on the slab. The ground below the northwest corner at the back of the structure has settled, which has led to undermining and deterioration of the structural slab and uneven settlement of the structure. The walls may contain asbestos/cement composite lined wall panels.

Figure 1-19: Feed Storage Building

Feed Storage Buildings

The northern building is a timber-frame building supported by a concrete slab and short support walls. Its entrances include two rollup-type garage doors at its back/west wall, a side door entrance at its south wall and a main entrance door on its east wall, accessed by a walkway over the concrete bypass channel as well as from the service road serving Raceways E, F, and G. It is a single-story storage building with an interior staircase to an overhead storage space in the attic.

1.2.15.5 Architectural

Hatchery Headquarters (Office Building)

The Hatchery Headquarters Building is a historically registered building. Most of the spaces in the building are not adequately sized or laid out to function properly based on their current use. The second floor office spaces are doubling as the break room area, and do not include any space to use as a conference room. The only bathroom is in the basement, making it inefficient for staff in the office to have to traverse two flights of stairs when they need to use the restroom. The visitors display room is too small, and is not accessible, so it does not function properly for the public.

The stairs connecting the floors do not comply with the current building code, as they are too steep. The existing stairs typically have riser heights of 7-1/2” and tread depths of 10-1/2”, as compared to

the building code, which requires 7” maximum for risers and 11” minimum for treads. And the landings at the top and bottom of the stairs at the basement and first floor level measure between 36” to 43”, which is less than the code required 48” for landings.

This single bathroom located on the basement level is the only bathroom at the entire facility and serves as a public bathroom and as a staff bathroom. The bathroom is not ADA compliant, as there are no grab bars, no ADA compliant sink, and no ADA compliant mirror. Additionally, there is no accessible route for the public to get to the bathroom, as the basement floor is approximately 22” below the access door, with no accessible means between the door and basement level.

Along the exterior of the building, the wall finishes consist of painted concrete or CMU. Interior walls, and all walls and ceilings on the second floor are finished with asbestos panels. The wall and ceiling panels appear to be in fair to good condition.

The windows on the first floor and basement level are single pane wood frame windows, which may be original to the building. The windows on the upper level were recently replaced with new insulated windows.

The exterior doors are non-insulated hollow metal doors with vision panels in the upper section. The exterior doors were operable, but otherwise found to be in generally poor condition. Rusting was visible on the lower sections of the doors, and the side entrance door to the basement has piece of plywood replacing a section of the upper vision panel. Staff note that the main front door can only be unlocked from the inside making entry into the building through the garage necessary.

The garage doors are wood panel sectional overhead sliding doors that are manually operated. The garage doors are not large enough to utilize the garage space for functions other than general storage as the openings are too small to use for a full sized vehicle storage or repair. The masonry openings at the doors measured approximately 7’-11” wide by 7’-9” high. The garage door panels were observed to show signs of rot under the painted finish. The garage doors do not provide a tight fit to the openings or edge seals, leaving visible gaps between the edges of the door and the masonry opening.

The roof was observed to be in fair condition. No visual signs of leaking were observed or reported by staff.

Chemical Storage Building (Storage Shed)

The Storage Shed is located adjacent to the north entrance at the top of the hill. The building is a wood frame structure on a concrete foundation and slab. Significant cracking in the foundation slab and rear foundation wall was observed, and the rear wall was visually out of alignment. It appears as if the slab is sinking, since one of the interior columns is no longer touching the floor slab.

The roof is a shed roof sloped towards the back of the building and drips directly onto the soil behind the building at the top of the wall. This has created a clear line of erosion from the water dripping from the roof.

This building is currently used to store smaller equipment, such as tractors and snow blower, and miscellaneous materials, but is not used to store large vehicles or heavy equipment due to fear that the building will collapse. All walls and ceilings inside the building are finished with asbestos panels. Due to the structural concerns with this building, it is not functioning as it was intended, since larger vehicles cannot be parked inside.

Feed Storage Buildings

The Brown Building is a wood framed garage structure on a concrete foundation with a concrete slab floor. The building consists of a 29ft by 33ft storage area and a 29ft by 17ft carpenter's shop on the ground level, with an open storage attic space above the entire ground level. The interior walls and ceiling are primarily finished with plywood paneling, except the southeast corner of the carpenter's shop, around the wood burning stove, which has asbestos paneling on the walls and the entire ceiling of the carpenter's shop. The interior finishes appear to be in good condition. The windows are single pane, wood frame, double hung windows. The windows were observed to be operable, and in overall fair to good condition.

The building has two exterior doors, one from the back of the storage area and one from the south side of the carpenter's shop. The exterior doors are solid wood doors with vision panels. The doors were observed to be functional, however, the doors were observed to be in fair to poor condition. Evidence of rotting wood was visible through the chipped and peeling paint, mostly at the bottom of the doors.

The storage area is access through two large (9'-9" wide by 9'-0" high) overhead garage doors on the west façade of the building. The garage doors were found to be in fair condition. Some evidence of rotting was observed at the bottom of the doors and the bottom of the door frames and trim. The doors are manually operated. The doors do not sit tight to the frames, or have seals, which leaves gaps between the door and frame for weather and rodents to access the building.

The attic storage space is accessed via a set of wood stairs in the middle of the storage area. There are no railings on either side of the stair, and there is only a make-shift 2x4 handrail on one side of the stairs. Although the storage area has more than enough space for the feed storage, it does not function efficiently since it is not temperature-controlled and is not fully sealed to keep mice and rats from getting into the feed.

The southern feed storage building is a wood framed shed sitting on concrete sonotubes, with the floor raised approximately 16 to 24 inches above the ground. This building consists of an observation room for monitoring the circular rearing tanks and a storage room. This building currently has no electricity. The observation room has asbestos panel interior walls and ceiling finishes. The storage area is unfinished. The doors and windows were observed to be operable, but none of them were observed to provide tight seals, which provides multiple opportunities for rats to access the building and get into the feed. This building provides adequate space for feed storage but is inefficient due to the loss of feed caused by the inability to maintain proper temperatures and prevent rodents from accessing the feed.

1.2.15.6 HVAC & Plumbing

Hatchery Headquarters (Office Building)

A #2 fuel oil fired boiler with ceiling mounted steam heaters and wall mounted steam radiators provide heat to the lower floor of the facility. The boiler is rated for an output of 181,000 BTU/Hr, is vented out to an exterior wall, and uses the ambient room air for combustion. The boiler is fed by 2 fuel tanks located in the basement of the facility.

The facility is served by single toilet and lavatory draining to the main building outgoing sanitary sewer. There are also two service sinks serving the facility.

Chemical Storage Building

The Chemical Storage Building is heated by a single ceiling mounted steam unit heater. There is no apparent mechanical ventilation in this area. 1 CFM/sqft or 6 air changes per hour is recommended for ventilating chemical storage rooms. There appear to be corrosive chemicals stored in this facility. It is recommended to meet OSHA standards that an emergency eyewash be located within 50 feet of corrosive materials that could cause damage to eyes.

Feed Storage Buildings

There was no HVAC present in either of the feed storage buildings. It was noted on site that the ideal temperature for the feed storage facility is 50 degrees Fahrenheit in the summer and 45 degrees in the winter to prevent the feed from freezing. It is also recommended that minimal ventilation be provided.

1.2.15.7 Electrical

Hatchery Headquarters (Office Building)

Electrical service to the Office Building is provided from the utility distribution line that runs along Merrymeeting Road. This utility line is single-phase, and therefore is not capable of providing the facility with 3-phase power. A slack span is routed overhead from the pole-top 25kVA single-phase transformer to the service entrance point at the Office Building.

The main distribution panel ‘MDP’ located in the garage is 240/120V, 300A. Note that there is an old 277V service equipment that has been abandoned in place. The MDP was installed as part of an electrical upgrade in 1992. The MDP feeds the Hatch House as well as the panel for the Hatchery Headquarters (Office Building) located in the basement electrical room. The old MDP is 240/120V, 100A and supplies all loads in the Hatchery Headquarters. The panelboards and conduit/wiring is in fair condition.

Electrical loads in the office building include primarily lighting and receptacles. There are no major process or mechanical loads. Capacity is sufficient for the current requirements of the facility. Lighting is comprised of old incandescent and fluorescent fixtures.

Chemical Storage Building

Electrical service to the Chemical Storage Building is provided from a separate utility service from the same utility distribution line along Merrymeeting Road. A slack span is routed overhead from the pole-top, single-phase transformer to the service entrance point at the building.

The electric service is 240/120V, 100A. The main panel is located on the wall just inside the garage door. Electrical loads include primarily lighting and receptacles. There are no major process or mechanical loads. The panelboard is in good condition. Capacity is sufficient for the current requirements of the facility.

Lighting is old incandescent fixtures that have deteriorated and have been damaged and are no longer functional. The interior lighting levels are insufficient for safe utilization of the space. There is an exterior high-pressure sodium wallpack and also a large flood light to provide security and also visibility for nearby road traffic.

Feed Storage Buildings

Electrical service to The Brown Building is provided from a separate utility service from the same utility distribution line along Merrymeeting Road. A slack span is routed overhead from the pole-top, single-phase transformer to the service entrance point at the building.

The electric service is 240/120V, 200A. The main panel is located in the corner near the door. Electrical loads include lighting/receptacles, and HVAC equipment. The panel used to power air compressors and a UV skid that are no longer in use. The panel also provides power to the two sampling sheds. Due to the reduction in load, the panel has good spare capacity to take on additional load if desired. The panelboard is in good condition. Wiring and conduit appears to be in good condition. It is noted by hatchery staff that the sampling shed circuit experiences nuisance breaker tripping.

Lighting is old incandescent fixtures that are deteriorated. The interior lighting levels are insufficient.

The southern feed storage building does not have electric service to support needs for lighting, receptacles, and climate control. Hatchery staff have expressed a desire to install electrical power to support climate control for feed storage.