Existing Conditions and Facility Evaluations – Twin Mountain

POWDER MILL FISH HATCHERY FEASIBILITY STUDY

New Hampshire Fish and Game Department

May 25, 2023

Contents

Figures

This page is intentionally left blank.

1 Introduction

Twin Mountain State Fish Hatchery (Twin) is located in the town of Carroll along US Route 3 in Coos County, New Hampshire. The facility was originally constructed in 1942 by the Works Progress Administration (WPA) under the Franklin D. Roosevelt Administration. The site was selected due to the presence of several springs that form Carroll Stream and that yielded a continuous supply of oxygen rich water. Today Twin Mountain produces approximately 57,112 (20,838 lbs) fish annually. Twin Mountain is situated on a 28.4-acre site of which about nine acres have been developed. The facility consists of groundwater and surface water supply, twenty-two (22) outdoor concrete raceways, three (3) covered circular broodstock holding tanks, a hatchery building with eleven (11) concrete raceways and heath egg incubators, an office building, a pump house, a brood house, a visitor's center and garage, and a residence.

Twin Mountain at a Glance

- Constructed in 1942
- Source water includes surface water, well water, and spring water
- Fish rearing begins with incubation
- Produces 57,112 (20,838 lbs) of fish annually
- Stocks out between end of March and early July

The existing Site Plan (Figure 1-1) illustrates the hatchery boundary, approximate topographical information and general hatchery infrastructure. The study drawing was developed using digitized (i.e., traced) Computer Aided Drafting (CAD) techniques and map overlay technology. The drawing is believed to be reasonable, to-scale representations of hatchery resources for planning purposes. The drawing is not intended to be used for construction phase engineering.

The active parts of the hatchery receive spring water flowing artesian out of well points discharging into pools. Combined production ranges 500-800 gallons per minute (gpm). Buried gravity pipelines convey the spring water to the hatchery production units. Between pools named Left Spring and Right Spring is a well and pump with discharges into the pools and a truck fill pipe. The pumped well is only used for backup or truck filling since it causes an equal decline in artesian flow.
NPDES has authorized Twin Mountain State Fish Hatchery to discharge its effluent through outfall 001 into the Unnamed Tributary to Carroll Stream. In 2021 the Region 1 Final Aquaculture General Permit (AQUAGP) was released (NHG130000), which superseded Twin Mountains individual permit issued in 2012 (NH000074). A flow diagram of the facility is shown in Figure 1-2.

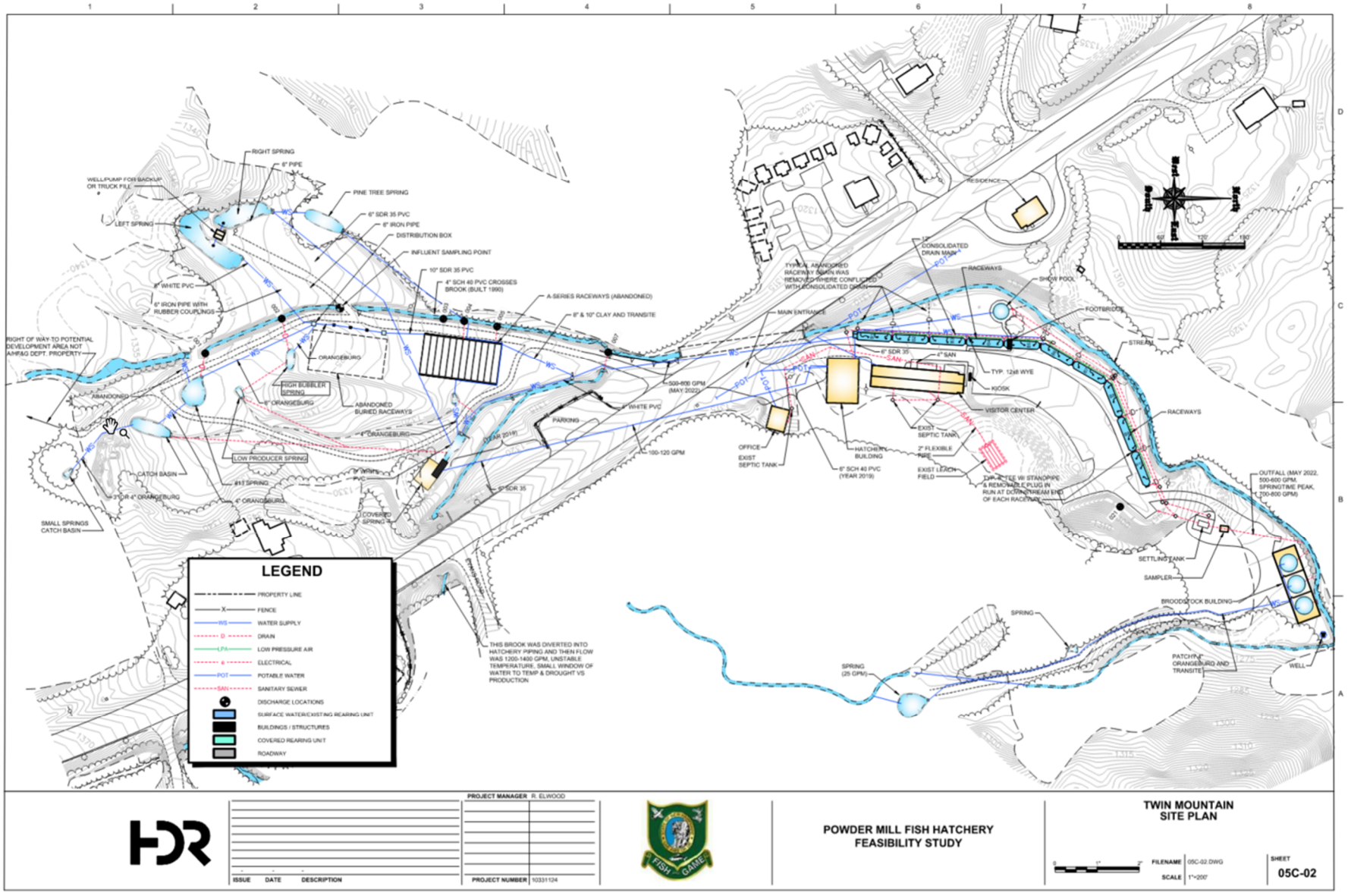

Figure 1-1: Existing Site Plan

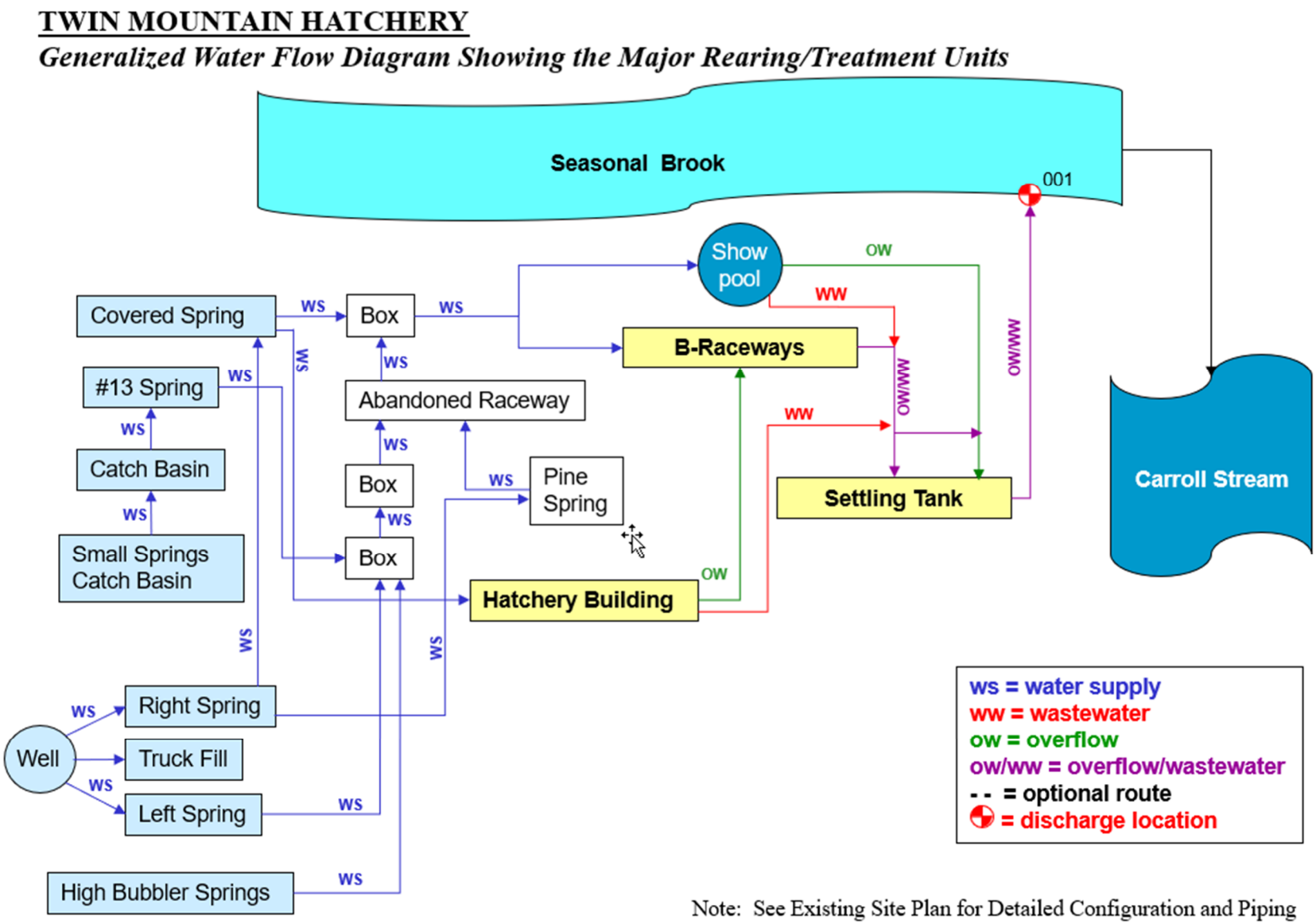

Figure 1-2: Process Flow Diagram

A condition assessment field visit was performed by HDR on May 4, 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.

2 Best Management Practices

Rearing units historically had untreated independent drains to an unnamed tributary to Carroll Stream. B-Series Raceway drains, Hatchery Building drains, and show pool drain were consolidated and had some removable standpipes added. Draft drawings of the pipeline consolidation are dated March 27, 2009. By way of buried valves, the consolidated drain can be diverted to a Settling Basin or can bypass it. The Settling Basin is 4,765 gallons and has a 4-foot wide gate. Settled solids in the basin can be vacuumed out with a pump. Cleaner water can be decanted to the effluent.

3 General Site Conditions

The site is divided by US Route 3 into two sections, east and west with most of the facilities in the eastern section. The only facilities in the western section are water sources and the abandoned A-Series Raceways. The site and facilities generally follow the unnamed tributary that flows north.

3.1 Predator Control System

Predation control consists of approximately one-foot-high chain link fencing around the perimeter of the show pool. The ten outdoor concrete raceways adjacent to the visitor center have no predation protection. The magnitude of fish losses due to predation is estimated to be about 10%. Trapping measures have been used in the past to reduce mink and otter predation.

3.2 Roads and Parking

The roadways and parking areas are either gravel or asphalt and are generally in good condition.

3.3 Fencing and Security

Chain link fencing extends around the settling tank, and safety railing is present around the circumference of the show pool. Raceways (#1-#10) used to contain fencing but it was removed for public relations purposes.

There is minimal site lighting, but hatchery staff do not have a strong need for lighting based on typically expected night-time tasks.

Twin does not have or utilize any instrumentation or alarm systems except for a fire alarm system in the Visitor's Center. There used to be an alarm system for the well, which has been abandoned. There is an alarm for the septic system.

3.4 Site Drainage and Flooding

According to the Flood Insurance Rate Map (FIRM) from the National Flood Insurance Program (Community Panel Number 33007C1070D, effective February 20, 2013), Twin does not lie within a regulated floodplain. In 31 years, there has never been a problem.

3.5 Domestic Water/Wastewater Systems

Potable water is supplied to the facility by the Town of Carroll. Domestic wastewater is treated on-site via a conventional septic system, which is pumped to a leaching field.

3.6 Electrical

Electricity is provided to Twin by the utility Eversource. Power is provided at 240/120V single-phase, and 208V 3-phase from the overhead distribution line that runs along Highway 3. Electricity is considered fairly reliable. On-site personnel report that power outages occur approximately 4-5 times per year.

There are three utility service points to hatchery facilities: 1) a 240/120V, single-phase service to the Visitor's Center and Garage; 2) a 240/120V, single-phase service to the Office and the Hatchery

building; and 3) a 208/120V, three-phase service to the Well House. Utility service comes in overhead and distributes overhead to the three service points.

There is no backup power capability for any facilities at Twin. It is recommended that the need for backup power be evaluated further after required modernization improvements have been determined.

3.7 Other Utilities

There are no vehicle fuel (gasoline or diesel) storage tanks on the site. The facility contains five (5) 275-gallon capacity tanks for heating oil. There are also small propane tanks that are used to heat the garage and the pump house.

3.8 Public Visitation Information & Education Services

Twin personnel estimate that approximately 10,000 people visit the facility annually. Visitor's amenities include a visitor's center (Figure 3-1) with public amenities, visitor's parking, information signs, brochures, fish feeding, and fish viewing areas.

Figure 3-1: Visitor's Center & Information Sign

3.8.1 Architectural

The visitor's center was constructed in 1992 as an addition to the existing storage garage adjacent to the Hatchery Building, and consists of a main entrance vestibule, accessible bathrooms, a large

meeting area, display room, and an exit vestibule. The visitor's center main entrance vestibule is located at the north side of the building with an accessible walkway to the parking lot. Men's and women's accessible bathrooms are on either side of the vestibule, which also provides access to the main meeting area. The main meeting area consists of large open space (31-feet by 27-feet) with tables and chairs, a kitchenette, displays, and closets. Adjacent to the meeting area is a large display room (26-feet by 27-feet) with custom built displays, including an area for digital displays (Figure 3-2).

The finishes consist of vinyl sheet flooring in the vestibules and thin carpeting in the meeting room and display room, gypsum board walls, and acoustic ceiling tiles, all of which are original to the 1992 renovation. The vinyl sheet flooring appears to still be in good condition, but the carpeting is showing signs of wear and tear and has large rips in various locations in the meeting room (Figure 3-3). The ceiling tiles are in good shape other than some water damage in few locations from leaks through the roof (Figure 3-4). The doors appear to be good to fair condition, other than some rusting on the double doors at the exit vestibule (Figure 3-5). The windows are wood double hung windows with double pane insulated glazing, which are installed as part of the 1992 renovation and are in good condition. Some staining and water damage to the walls was observed in the bathrooms.

3.8.2 HVAC/Plumbing

There is no air conditioning or ventilation within the building. Another 156 MBH oil fired furnace provides heating for the visitor center areas. Domestic hot water is provided by a 30-gallon electric water heater. The HVAC and water heater are in good condition but are assumed to be at the end of service life and should be replaced.

3.8.3 Electrical

Electricity to the Visitor's Center is provided from the utility distribution line along Route 3. The line is tapped and routed across the highway at distribution voltage, along with the LV service to the Office Building. The distribution line extends east and then north along the backside of the buildings. A 15kVA single-phase, pole-top transformer is located on the north side of the building. The distribution line continues north to the abandoned Brood building.

A slack span is routed overhead from the transformer to the main service entrance/meter on the north side of the Visitor's Center. The main panel is rated 240/120V, 200A. This main panel sub-feeds to a panel in the connected garage. Loads are primarily lighting/receptacles. There is a water heater, sewer pump, and an aquarium pump as well. There are no major HVAC or process loads. The electrical infrastructure appears to be in adequate working condition.

Lighting in the Visitor's Center space is recessed LED fixtures. Lighting equipment appears to be in adequate condition, though light levels appear insufficient.

The building has a disconnected telephone line and no internet capacity at this point in time. The building has a new fire control panel, and associated protection devices.

Overall, the visitor's center was found in be in good condition, but the following are recommended. It is recommendations include:

- Replace the roof
- Replace ceiling tiles with water damage
- Replace the carpeting
- Replace the rusted double doors at the exit vestibule

- Patch the water damaged areas of the walls in the bathrooms
- Provide fresh coat of paint on all walls
- Upgrade the digital display to a new LED screen, with new controls, so this display can be easily changed.
- Install internet or a WIFI system so that it can be used in the visitor's center.

Figure 3-2: Digital Display

Figure 3-3: Meeting Room with rips in carpet

Figure 3-4: Display Room with water damaged ceiling tiles

Figure 3-5: Rusted door at Exit Vestibule

4 Water Supply and Control Structures

Production water for the active parts of Twin Mountain is provided by seven named springs and two unnamed pools that seasonally collect water. There is also one production well. The springs and well are located on the west side of the facility in three separate clusters of artesian well points in seven pools. The pools have impoundment structures with screened and piped outlet boxes. Among the utilized springs are:

1) Covered Spring
2) #13 Spring
3) High Bubbler Spring
4) Low Producer Spring
5) Left Spring
6) Right Spring
7) Pine Tree Spring
8) Two unnamed pools.

A general flow schematic has been generated for the site, which depicts the water sources and discharge locations (see Figure 1-2). Water flow measurements have been obtained using the sharp crested weir method or calculated using a known volume container and timed fill. There is an effluent water flow meter for total flow leaving the active parts of the hatchery.

The maximum combined spring flow rate to the facility is 820 gpm. Total flow does not increase when the well is operated. In winter the water is 43-44 degrees (°) Fahrenheit (F). In summer the water can reach 52 °F.

4.1 Covered Spring

The covered spring pool is approximately half uncovered and the cover over the upper half is collapsed (Figure 4-1). It has a screened pool outlet box (Figure 4-2) with piping leading to a junction box (Figure 4-3) leading to B-Series Raceways. There is also a pipeline leading to the Hatchery Building. The pool has a concrete headbox impoundment that can spill into an unnamed tributary to Carroll Stream. The headbox concrete is in good condition. It should be cleaned of debris and vegetation and a new headbox cover should be installed.

The roof of the covered spring collapsed approximately six years ago and has not yet been repaired. Staff noted that partial repairs took place around 2005, but they did not have enough funding to repair the entire structure. The part of the walkway over the spring leading to the covered spring that was replaced during the 2005 repairs appears to be in good condition. It is recommended that the structure over Covered Spring be replaced, and any built up debris be removed.

Figure 4-1: Covered Spring

Figure 4-2: Screening Structures Below Wooden Cover of Covered Spring

Figure 4-3: Concrete Headbox of Covered Spring

4.2 All Other Springs and Catch Basins

All other springs and two unnamed pools are all uncovered. Left Spring and Right Spring are shown in Figure 4-4 and Figure 4-5, respectively. Flows from all of the springs, but Right Spring and Pine Tree Spring, are collected into two lines join within a distribution box. From here, the line continues north to a junction box where flow from Right Spring merges in prior to entering a channel within the abandoned A-Series. Pine Tree Spring water is piped to approximately the center of the header of A-Series Raceways. From here, the line joins with flow from Covered Spring and crosses under the road near the main entrance and before discharging into B-Series Raceways.

The spring pools contain sediment, algae, and storm related debris that should be removed periodically. Some of the intakes include screening. The concrete headboxes at the outlet of the spring ponds are in various conditions but most are in fair to good condition (Figure 4-6). These headboxes should be cleaned of debris and vegetation. If the concrete has been degraded, removal of loose and deteriorated concrete and installation of new concrete to the original structure dimensions should be completed. Additionally, the headbox covers should be replaced along with inlet screening.

Figure 4-4: Left Spring with Headbox in Foreground

Figure 4-5: Right Spring with Headbox in Foreground

Figure 4-6 Low Producer Spring Headbox

4.3 Production Well

The production well is in a well house between Left Spring and Right Spring with discharge piping to both spring pools. This 6-inch diameter well yields about 300 gpm when pumped. It is currently only used on a short-term basis as backup or to fill trucks since the spring flows are reduced when the well pump is operated. The pump is a vertical line-shaft type with 3-phase 240/480 volt 5 hp motor and gate valves (Figure 4-7). The well has a rusted pressure gage and an old pressure switch. It has low artesian flow that spills across the floor of the well house.

The well / pump house consists of a wood frame structure sitting on a concrete foundation and slab (Figure 4-8). The structural foundation appears to be in good condition, but the slab on grade is cracked and appears to be settling, with various size gaps between the slab and foundation. As this space floods and water seeps up through the slab (Figure 4-9), an opening has been installed at the low point in the slab to allow the water to drain out of the building towards the right spring. The well/pump house floor slab and floor drain system should be rehabilitated or replaced.

The well house interior consists of asbestos panels walls and ceiling, which have water stains from moisture build-up within the structure. The exterior walls are clad with vinyl siding and the roof is a corrugated metal roof. There is a wood door on the south façade and wood frame windows on each of the other three facades.

Figure 4-7: Production Well Pump Discharge Head

Figure 4-8: Well / Pump Building between Left and Right Springs

Figure 4-9: Interior of Well/Pump House

The electricity service to the Well House is tapped off the utility distribution line that runs along Route 3. A 3-phase circuit is routed overhead along the access road to a 3-phase 15kvA pole-top transformer located near the building. The utility service slack span drops overhead into the building service entrance/meter.

A 208/120V load center provides power to the pump and to ancillary receptacles/lighting. The pump is controlled by a combination motor starter with a Hand/Off/Auto switching. It was noted by hatchery staff that there is no “Auto” functionality, and the pump is manually stopped/started. Lighting is provided by one overhead incandescent bulb. Electrical equipment appears to be in adequate working condition.

There is a propane through-wall heater on the east wall to prevent the pump and pipes from freezing during the winter. The heater is connected to a propane storage tank on the other side of the building. The heater and tank appear to be in good condition.

4.4 West Springs Water Control Structures

As discussed above, flows from all the springs but Right Spring, Pine Tree Spring, and Covered Spring are collected into two lines which are individually joined within a distribution box (Figure 4-10). From here, the line continues north to a junction box (Figure 4-11) where flow from Right Springs merges in prior to entering a channel within the abandoned Series A. Pine Tree Spring water is piped to approximately the center of the header of A-Series Raceways. From here, the line joins with flow from Covered Spring and crosses under the road near the main entrance before discharging into B-Series Raceways.

Hatchery personnel report that the collection and distribution system is in good condition and that the 6-inch diameter, ductile iron piping system is drainable. However, the concrete of these structures is severely deteriorated, and wood planks serve as covering for the structures. Each structure should be rehabilitated by removing loose and deteriorated concrete and installing new concrete to the original structure dimensions. Each structure should have a new fiber-reinforced plastic (FRP), or similar cover installed.

Figure 4-10 Distribution Box

Figure 4-11 Right Spring Junction Box

4.5 Abandoned East Springs

Other unnamed springs on another unnamed tributary east of the main campus have historically been used to supply water to round tanks for broodstock; but these tanks and springs have been abandoned for years. Flow from those springs was once 45 gpm. The most upstream spring on that tributary had roughly a 25 gpm capacity. The piping leaving the upper spring is a combination of 4-inch Orangeburg (bituminous fiber pipe whose production ended in 1974) and transite and has many patches on breaks suspected of having been caused by freezing. Draft pipeline consolidation drawings from 2009 indicate an 8-inch pipe leaving the lowest spring shown east of main campus. The 8-inch pipe is shown going to another tributary of Carroll Stream.

4.6 Water Supply and Control Structures Summary

To summarize, the following limitations, deficiencies, and conditions are recommended for correction or rehabilitation for the water supply and control structures:

Covered Spring:

- The headbox concrete should be cleaned of debris and vegetation and a new headbox cover installed.
- The structure over Covered Spring be replaced, and any built up debris be removed.

All Other Springs and Two Unnamed Pools:

- Sediment, algae, and storm related debris should be removed.
- Concrete headboxes at the outlet of the spring ponds should be cleaned of debris and vegetation. If the concrete has been degraded, removal of loose and deteriorated concrete and installation of new concrete to the original structure dimensions should be completed.
- Headbox covers should be replaced.
- Inlet screens should be replaced.
- All springs should be covered.

Production Well:

- The well/pump house floor slab and floor drain system should be rehabilitated or replaced.

West Springs Water Control Structures:

- Each structure should be rehabilitated by removing debris and deteriorated concrete and installing new concrete to the original structure dimensions.
- Each structure should have a new FRP, or similar cover installed.

Abandoned East Springs:

- N/A

5 Incubation and Rearing Facilities

Incubation and early rearing occur in the Hatch House while intermediate and late rearing occur in Raceway A-Series and B-Series. Each of these facilities and their conditions are described in the sections that follow.

5.1 Hatch House

The Hatch House is located on the north side of Route 3, between the office and visitors center, near the head of the B-Series raceways. The Hatch House is a single-story 60-foot-long by 42-foot-wide concrete block structure which is believed to be constructed sometime in the 1940s. The building consists of approximately 2,551 +/- SF that is separated into two production spaces consisting of linear raceways and incubation trays. The hatchery building has two separate production rooms (Figure 5-1 and Figure 5-2) that combined have eleven (11) concrete raceways combined, used for fry capture and early rearing. Indoor raceway specification information is as follows:

Indoor Raceways 1-11

- Year constructed: unknown
- Material: concrete
- Dimensions: 33’ L x 2.67’ W x 1.67’ D (1.25’)
- Average (Max) Flow Rates: 6 to 20 (60) gpm

Production water within the indoor rearing units is raw, first-use spring water. Gas stripping systems made by the hatchery manager aerate and reduce detrimental dissolved nitrogen and carbon dioxide (CO2) in the water supply (Figure 5-3). The primary goal is CO2 reduction. Automatic belt feeders are used to administer food to the indoor raceways. Hatchery personnel report that the indoor raceways are brushed and cleaned daily. The south room has an egg picking table with two seats designed for two incubator trays.

Figure 5-1: Indoor Raceways 1-5 and Incubation Area

Figure 5-2: Indoor Raceways 6-11 with Fish Feeders (blue belt feeders)

A row of six incubators is aligned between the two indoor raceway rooms. Each incubator stack has eight trays and is typically fed 4 gpm and each indoor raceway is typically fed 20 gpm. Air from regenerative blowers is pushed through aeration stones in degas boxes at the heads of the rearing units. There is also saltwater distribution piping and tubing to the raceways.

The raceways have screened settling zones with dual screen guides and 3-inch diameter removable PVC standpipes for level control and flushing and draining.

The incubators and raceways overflow and drain to a trench drain network. It has an open bottom outlet pipe that goes to outdoor Raceway B-1 for reuse. It has a bottom outlet pipe with metal cap/plug that is lifted out by hand with a hook to divert wastewater to the campus consolidated drain for treatment.

Figure 5-3: Degas/Aeration Boxes

5.1.8 Structural

The Hatch House is a one-story masonry block building, consisting of CMU block walls and foundations and a concrete slab-on-grade floor (Figure 5-4 and Figure 5-5). The roof structure was not visible, but due to the low slope of the roof and lack of interior columns, it is believed that the roof structure is a steel beam or truss system spanning between CMU walls. The structural condition of the building is fair to good. There is some deterioration of the masonry blocks at the SW corner of the building (Figure 5-6). This may be compounded by ponding/collection of site runoff from the driveway at a catch basin at this location, or leakage into the masonry from the roof and freeze/thaw cycles. It is recommended that the masonry blocks be repointed and any cracks are sealed that allow leakage of water into the wall

The condition of the concrete at the indoor raceways of the hatch house is good. Their interiors and rims are coated/painted and have minor surface chipping.

Figure 5-4: Front Face of Hatchery Building

Figure 5-5: Hatchery Building North and West Faces

Figure 5-6: Cracking of Masonry Block at Hatchery SW Corner

5.1.9 Architectural

The Hatch House is an open floor plan divided into two areas by a partial CMU wall in the middle of the floor. The building finishes consist of an unfinished concrete floor, CMU walls, and asbestos panel ceiling. Some minor water staining was observed on the CMU walls, otherwise the finishes appear to be in good condition.

The roof is a low slope sheet membrane roof that appears to be in fair condition. However, some locations of ponding were observed (Figure 5-7). Staff noted in the winter, they have to remove snow from the roof, due to the low slope.

The doors and windows appear to be original, wood frame with single pane uninsulated glass. Although these appear to be in fair condition and operable, paper and insulation has been applied to cover all of the glass to help prevent heat loss during cold weather (Figure 5-8).

Staff noted that the Hatch House does not have a designated place for cleaning trays that is isolated from the raceways to prevent contamination from the tray washing to the raceway area.

Figure 5-7: Hatch House – Low Slope Roof

Figure 5-8: Hatch House Interior showing windows covered.

5.1.10 HVAC & Plumbing

There is no air conditioning or ventilation in the building. Heating is provided by a 156 MBH oil-fired furnace. A fuel storage tank is located within the building. The furnace appears to be in good condition but is assumed to be at the end of service life and should be replaced. There is no domestic plumbing in the building.

5.1.11 Electrical

Electricity to the hatchery building is provided at 240/120V, single-phase from the service point at the Office Building. A pole-top transformer is located directly on the distribution line across the road, and low voltage power is routed overhead to the Office Building meter. Power is then distributed to the Office Building and underground over to the Hatchery Building.

The main load panel is located in the SW corner of the building. The panel is rated 240/120V, 100A. Loads are primarily receptacles and lighting, a furnace, and a single-phase pump. There are no large HVAC or process loads. Electrical conduit/wire and equipment appear to be in adequate working condition. The panels are rated NEMA 1 and may not be suitable for proximal location to moving water. Recommend electrical equipment be rated for NEMA 12 at a minimum. The building uses a lot of PVC conduit which is typically not advisable in a facility type environment, where it may be impacted and broken by moving equipment. Recommend conduit exposed to potential damage be replaced with EMT or RGS conduit.

Lighting appears to be LED strip-lights surface-mounted to the ceiling with gasketed protection. The lighting equipment is in good condition, and light levels appear adequate.

There is no instrumentation for monitoring or control in the Hatchery Building. There is no alarm or fire protection systems.

5.2 Raceway A

The A-Series raceways consist of twelve (12) raceways located on the west side of Route 3. The concrete of these raceways is in poor condition (Figure 5-9). The raceways are no longer used for production or water treatment. There was a section of nursery units as well in this area, but they have been abandoned and buried.

Only a water distribution channel integral to Raceway A is still in service, and transports all the spring water but that from Covered Spring to the eastern most part of A-series raceway where flow transitions into a pipe to be conveyed over to B-series raceways.

The concrete of the A-Series raceways is in poor condition and should be removed and replaced. The bypass channel (Figure 5-10) that is part of these raceways that carries source water to the rest of the facility should be replaced with buried piping.

Figure 5-9: Abandoned A-Series Raceways

Figure 5-10: Covered Bypass Channel at A-Series Raceways

5.3 Raceway B

The B-Series raceways (50-ft long by 10-ft wide by 1.75-ft water depth) consist of ten (10) raceways located on the east side of Route 3 that operate under ten-pass serial reuse. Hatchery personnel report the raceway flow rates vary from 281 to 481 gpm. Water supply arrives at a header box at the first raceway and also fills an adjacent filler box. An 8-inch or 12-inch main leaves the filler box and has valved 4-inch branches to Raceways B-2 through B-5, and B-6 has a 6-inch white PVC inlet pipe with a threaded plug (Figure 5-11).

A regenerative blower with distribution piping and hoses to air diffusers adds oxygen. Electrical outlets are not present at either set of raceways. The air blower is hard wired to a disconnect located on a pole opposite the raceways.

All raceways are brushed and cleaned biweekly. Previously, B-Series had independent drains to the unnamed tributary to Carroll Stream, but these were consolidated and removable cleanouts near the end of each raceway were installed. Each raceway has a small settling zone in the end with bar

screen and stoplogs/weir boards for level control. Each settling zone has a 6-inch bottom outlet to the consolidated drain. By way of buried valves, the consolidated drain can be diverted to a Settling Basin or can bypass it. The Settling Basin is 8,044 gallons and has a 10-foot wide gate. Settled solids in the basin can be vacuumed out with a pump. Cleaner water can be decanted to the effluent.

B-Series raceway concrete is in fair condition. Approximately 10% of the raceway wall top surfaces are spalled or have been recently been rehabilitated. There are spalls at the inlet/outlet control structures between adjacent raceways. All loose and deteriorated concrete should be removed from spalled areas and it should be replaced with new concrete.

Figure 5-11: Raceway B-2 Supply Valve

5.4 Show Pool

Twin operates and maintains a 25-foot-diameter concrete circular tank as its show pool (Figure 5-12). It is located adjacent to the upper section of the B-Series Raceways and is accessed by a wooden walkway. The tank was constructed in 1992 and has an operating depth of one foot and an average (max.) flow rate of 20-30 gpm.

The show pool has a valved 2-inch PVC supply pipe from a buried 3-inch PVC main from a filler box at the beginning of B-Series Raceways. It has an outlet box with one standpipe and piping to the outfall for overflow and another removable standpipe with piping to the campus consolidated drain. The pool also has two air diffusers connected to the same aeration blower as the raceways.

The show pool concrete is in fair to good condition, with minor chipping of exposed surfaces and minor abrasion and loss of mortar (less than 1/8-inch average depth) below the water line.

Figure 5-12: Show Pool

5.4.1 Outfalls

Draft pipeline consolidation drawings dated 03/27/09 indicate a sampling vault on a 12-inch PVC outfall pipe. The vault is topped with a shed (Figure 5-13) with refrigerated automatic sampler and transit time water flow meter. Peak springtime flow is 700-800 gpm. On May 4, 2022, the meter displayed 692 gpm.

The outfall is a standpipe and closed knife gate valve that assures a full pipeline that the meter needs (Figure 5-14). The knife gate can be opened to service the pipeline. The outfall pipe is protected by a reinforced concrete headwall. The headwall concrete is in fair condition, with minor chipping and spalling.

Power to the sample shed is fed from the low voltage service that is routed overhead north behind the buildings. The building has a 240/120V load center that powers the building loads.

Figure 5-13: Sampler Shed

Figure 5-14: Outfall Pipe

5.5 Incubation and Rearing Facilities Summary

To summarize, the following limitations, deficiencies, and conditions are recommended for correction or rehabilitation for the incubation and rearing facilities:

Hatch House:

- The furnace appears to be in good condition but is assumed to be at the end of service life and should be replaced.
- Replace electrical equipment with NEMA 12 rated equipment and replace PVC conduit exposed to potential damage with EMT or RGS conduit.
- Patch damaged CMU at the SW corner.
- Replace windows with double pane insulated glass windows.
- Consider an extension to the rear of the building to include a separated space for cleaning trays and other activities that has the potential to contaminate the rearing area.

Raceway B:

- A minor amount of loose and deteriorated concrete should be removed from spalled areas and replaced with new concrete.

Show Pool and Outfall:

- N/A

6 Broodstock Building (Abandoned)

The water source for the Broodstock Building has been abandoned but is discussed in Section 4.5. Draft 2009 drawings indicate 4-inch PVC pipe into the building with supply branches to each of the three 25-foot diameter painted concrete tanks inside and 6-inch plastic drains from each tank to the receiving stream. Hatchery staff noted that the Broodstock Building was abandoned due to failure of the past regime to concern themselves with future use. They made a decision to not connect the current line into discharge 001 (Figure 6-1). Initial visual inspection of the existing infrastructure appeared to indicate the building could be put back into use with replacement of the roof and minor rehabilitation of some of the wooden structure (Figure 6-2). Water supply sources would require further evaluation to determine if water supply was sufficient to supply water to a brood. Hatchery staff noted that in the past, water quality was good for this purpose.

Figure 6-1: Broodstock Building (Abandoned) with Settling Tank and Sampler Shed in Foreground

Figure 6-2: Typical Interior Tank in Broodstock Building (Abandoned)

7 Garages and Storage Areas

Twin includes several support buildings that provide storage, office, and garage spaces for the facility. These buildings are detailed and assessed for condition in the sections that follow.

7.1 Storage Garage

Attached to the Visitor's Center is the Storage Garage, which was originally constructed in 1949, and consists of three garage bays that are primarily used for feed and material storage (Figure 7-1 and Figure 7-2). The first bay next to the Visitor's Center serves as the feed storage area (Figure 7-3), along with miscellaneous yard maintenance equipment storage. The back of this bay has an old cold storage area (Figure 7-4) that is currently used for miscellaneous parts storage, and there is a set of wood stairs up to a storage attic that extends over the top of the Visitor's Center (Figure 7-5 and Figure 7-6).

The structure for the garage area is the same as the Visitor's Center, consisting of a concrete foundation and floor slabs with wood frame walls and roof structure. The structure appears to be in good condition.

The interior finishes consist of unfinished concrete floor slabs and asbestos paneling walls and ceilings. The finishes appear to be in fair condition. The exterior is clad in the same vinyl siding as the Visitor's Center, and appear to be in fair condition, other than some mold growth on the rear of the building.

The roof consists of a taller section over the first bay and the Visitor's Center and a lower section over the other two garage bays. Both sections are asphalt shingle and were observed to be fair to poor condition and is recommended to be replaced.

There are two double hung windows on the south end of the double garage bay that are wood frame single-pane windows. The sills of both windows are rotted and falling apart (Figure 7-7). All three overhead garage doors appear to be in fair to good condition and are all operable.

Figure 7-1: Visitor's Center Garages Front View

Figure 7-2: Visitor's Center Garages Rear View

Figure 7-3: Feed Storage Bay Interior View

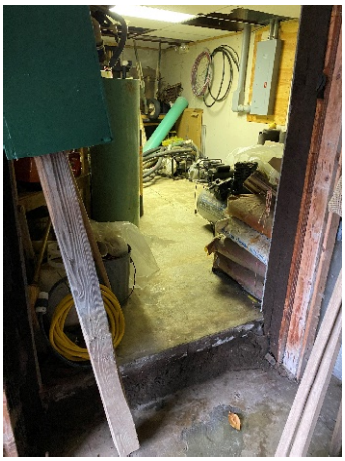

Figure 7-4: Old Cold Storage Area

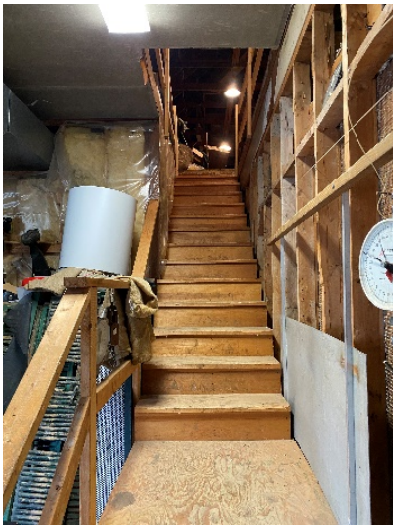

Figure 7-5: Stairs to Storage Attic

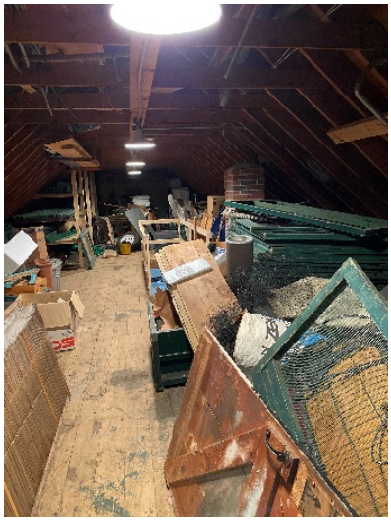

Figure 7-6: Storage Attic

Staff noted that feed is delivered from Berlin Hatchery and must be unloaded and stacked by hand. The feed storage area similar to other facilities does not provide temperature control in the summer, and provides little protection from rodents, as the door to this bay is left open for long durations throughout the day. The double bay garage area (Figure 7-8) does allow for the storage / maintenance of smaller vehicles, but there is no place to store or perform maintenance work on larger vehicles either as part of this building, or anywhere else on-site.

Heating for the garage area is provided by a wall mounted furnace.

Figure 7-7: Visitor's Center Garages Damaged Windows

Figure 7-8: Double Garage Bay Interior View

7.1.1.1 Electrical

The connected garage panel is rated 240/120V, 100A and is powering lighting/receptacles as well as a freezer and an air compressor. Conduit is a mixture of EMT and PVC conduit. Recommend that PVC conduit be replaced with metal conduit where subject to damage. Equipment in the garage area is showing slightly more advanced degradation compared to the Visitor Center space, but still appears to be adequate.

Lighting in the garage areas is provided by surface-mount LED fixtures, with no lens or other means of physical protection. Lighting equipment appears to be in adequate condition, though light levels appear insufficient.

7.2 Garage/Office Building

The Office Building is a two-story building at the main entrance to the site, that was converted into an office from its original intended use of a garage and maintenance shop (Figure 7-9). The lower level consists of a narrow garage on one side, and main entrance, utility closet, open workspace, small bathroom, and storage area on the other side (Figure 7-10 and Figure 7-11). The upper level is an open area that is set up as an office with file storage.

The building structure consists of a concrete foundation and floor slab with wood frame walls, second floor framing, and roof framing. Some minor cracking of the concrete floor was observed in the middle of the open work area. Otherwise, the structure appears to be in good condition.

The exterior finishes consist of wood siding with wood trim, and a corrugated metal roof. The siding and roof appear to be in good condition. The exterior windows are vinyl frame single pane double hung windows. The windows appear to be in good and operable condition.

The interior finishes consist of gypsum wall board and acoustic ceiling tiles on the first floor. The second floor has a carpet floor, and gypsum board walls and ceiling. The carpet has some staining, otherwise the finishes appear to be in good to fair condition.

The stairs to the second floor are only 35-inches wide, which is less than the 44-inches minimum allowed per code. The stairs also have 8-inch risers with a 9-inch top riser, which are greater than the 7-inch riser maximum allowed per code. The stairs do not have any handrails. See Figure 7-12.

On the second floor, the walls at the sides are only 42-inches high, which again is well below the 6'-8" minimum height allowed per code (Figure 7-13).

Since this building was originally constructed as a garage and maintenance shop, the layout does not comply with current codes for the current office uses. The headroom over the toilet drops down to 4'-2" above the back of the toilet, which is less than the minimum 6'-8" allowed per building code. And the door to the bathroom is only 24-inches wide (Figure 7-14).

Figure 7-9: Garage/Office Building

Figure 7-10: First Level of Garage/Office Building

Figure 7-11: Vehicle Storage/Rollup Door in Garage/Office Building

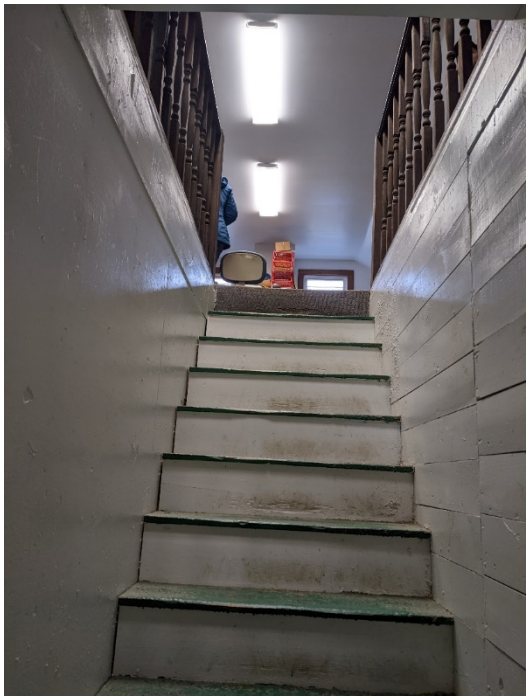

Figure 7-12: Stairway to Upper Level of Garage/Office Building

Figure 7-13: Upper-Level Office Space

Figure 7-14: Bathroom

In order to bring this building up to code, it will need to be gutted and the layout completely revised. It is recommended that this building no longer be used for office space, and remain in place for storage only, and a new office space be provided elsewhere on-site.

7.2.1 Electrical

Electricity to the Office building is provided from the distribution line across the road. Refer to the Hatchery Building section for details.

Power is distributed from the main 240/120V, 100A load panel. Loads include an electric stove, hot water heater, furnace, cooler, and lighting/receptacles. The panelboard is exhibiting signs of distress such as a scorch mark on the bottom right and other physical impact marks. While the panel may continue to operate, recommend considering replacement in long-term planning. General conduit and wiring appear adequate.

Lighting is provided by LED strip-lighting, surface-mounted to the ceiling. Lighting equipment appears to be in good condition, and light levels appear to be adequate. There is an old time-switch on the wall that is likely abandoned in place. Recommend removing all abandoned equipment.

7.2.2 HVAC/Plumbing

There is no air conditioning or ventilation within the building. Heating is provided by an oil-fired furnace. There is a fuel storage tank inside the building. Domestic hot water is provided by a 52-gallon electric tank water heater. The HVAC and water heater appears to be in good condition but is assumed to be at the end of service life and should be replaced.

7.3 Garages and Storage Areas Summary

To summarize, the following limitations, deficiencies, and conditions are recommended for correction or rehabilitation for the garages and storage areas:

Storage Garage:

- Replace the roof
- Gut the feed storage area, including the existing cold storage, and renovate to include a sealed, temperature-controlled area for feed storage.
- Repair / replace the rotted windowsills.

Garage/Office Building:

- Replace panelboard exhibiting signs of distress such as a scorch mark.
- Recommend removing all abandoned equipment.
- Replace HVAC and water heater currently at the end of their useful life.
- Any renovations to the spaces within the office and garage areas would trigger the need to bring the entire building up to current code for its current uses, which would require a full gut renovation, including structural framing adjustments. Considering its use for office space, it may be required to make this building fully accessible. As such, it is recommended that a new office space be constructed, and this space be abandoned in place to be used for storage.