

LINCOLN ORDER NO.2021-1

The Town Council of the Town of Lincoln (the “Town”) met at the Town Office in Lincoln, Maine, on March 8, 2021, at 7:00 p.m. to review the testimony provided at a February 22, 2021 public hearing on the Water Levels to be set for the Upper Cold Stream Pond Watershed via the Big Narrows Dam. Present during the February 22, 2021 public hearing were Council Chair George Edwards acting as Hearing Officer, with Councilors Cathy Moison, Jared McCarthy, Stephen Clay, John Trask, and Marscella Ireland with Jeff Gifford attending via Zoom. Staff members present were Town Manager Rick Bronson, Town Clerk Ann Morrison, Town Assessor Ruth Birtz and Town Attorney Andrew Hamilton. The Chairman presided as Hearing Officer and the Clerk kept the record. The Councilors reviewed the testimony of witnesses at the public hearing under the Lincoln Lakes Water Level Ordinance and now issue this Order as to Water Levels for the Upper Cold Stream Pond waters (Big and Little Narrows and Smelt Brook).

Section 1.0 Notices to Public and Property Owner:

Notice of the February 22, 2021 Public Hearing was posted at the Town Office on February 4th, published in the Lincoln News on February 4th and 11th, and mailed certified mail, return receipt to the abutting property owner.

Section 2.0 Attendance at Public Hearing:

The public hearing was attended by the following: Roger Huber, Esq; Al Nash of Renewable Power Consulting; and David Moison.

Section 3.0 Testimony at February 22, 2021 Public Hearing:

- 3.1.1 Al Nash - A copy of Mr. Nash’s Power Point Presentation on February 22, 2021 and Mr. Nash’s Technical Report of February 25, 2021, are attached as **Appendices A-1 and A-2.**
- 3.1.2 David Moison.
- 3.1.3 A verbatim transcript of all testimony and the further discussion of the Lincoln Town Council at the close of the public hearing is attached as **Appendix B.**

Section 4.0 Description of Impounded Water Bodies and Dam, Dam Purpose, and Current Condition

The Upper Cold Stream Pond consists of two separate basins which are connected by a road culvert. The ponds have a combined surface area of approximately 685 acres with approximately 1,850 acre-feet of storage and over 4 miles of shoreline. The pond segments are known locally as Big Narrows and Little Narrows.

The Big Narrows Dam’s current purpose is to provide fish and fowl habitat, recreational boating and fishing, and to provide a water source for fire suppression operations. The Dam is not equipped with fish or eel passage facilities but the pond is stocked annually by the State of Maine. The stop log section of the outflow is equipped with a slotted plate to maintain minimum flow releases to Smelt Brook established by the Town, ME Department of Environmental Protection (DEP) and ME Department of Inland Fisheries & Wildlife (MDIF&W).

Section 5.0 Summary of Testimony under Water Level Ordinance Criteria

The Town Council took testimony and enters its Order under the Lincoln Lakes Water Level Ordinance; a copy is attached under Appendix C.

5.1.1 Ordinance Criterion

Ordinance Criterion A: Public Access

5.1.2 Ordinance Requirement:

The Ordinance requires consideration of the following:

The water levels necessary to maintain the public rights of access to and use of the water for navigation, fishing, fowling, recreation and other lawful public uses.

5.1.3 Ordinance Criterion A Discussion

The site is equipped with a public boat launch with the majority of the shoreline privately owned. Angling and recreational boating can be significantly impacted by water levels with some reported “stranding” during low pond levels. Boating activities are typically substantially curtailed annually by the end of October. Access for ice fishing and similar winter season activities are not significantly impacted by water levels.

A reduction of historic water levels during the non-winter season would generally reduce the existing opportunities as the pond’s surface area would be diminished, and fish habitat and depth reduced. In addition, a low pond level would initially expose the loose pond bed material making access and traversing of the area difficult.

An increase of historic pond level will provide greater depth over existing submerged obstacles but has limited ability due to the low height of the

dikes associated with the Dam. The generally shallow bank slope adjacent to the pond would result in an increase in shoreline exposed to new water inundation and potentially reduce shoreline area available for use.

5.1.4 Ordinance Criterion A Suggested Water Level

Based upon the above discussion, the suggested water level target elevation necessary to satisfy this Ordinance criterion is:

The target pond elevation of 100.3 ft (current historic level during the non-winter season) shall be maintained throughout the year with all inflows being instantaneously passed downstream of the Dam

5.2.1 Ordinance Criterion B: Shoreline Protection

5.2.2 Ordinance Requirement:

The Ordinance requires consideration of the following:

The water levels necessary to protect the safety of the littoral or riparian proprietors and the public.

5.2.3 Ordinance Criterion B Discussion

The existing shorelines have established vegetation protection. Water levels below the historic level could result in exposure of the existing pond bottom until new plant growth could be established. A reduction in current water levels could result in access along the shoreline being hindered due to the unconsolidated bed material immediately adjacent to the existing shoreline.

A change in water level will likely result in the loss of plant life and exposure to tree/shrub root dislodgement during future flow events. The exposed area would have increased exposure to erosion of the area.

5.2.4 Ordinance Criterion B Suggested Water Level

Based upon the above discussion, the suggested water level target elevation necessary to satisfy this Ordinance criterion is:

The target pond elevation of 100.3 ft (current historic level during the non-winter season) shall be maintained throughout the year with all inflows being instantaneously passed downstream of the Dam.

5.3.1 Criterion C: Fish and Wildlife Habitat and Water Quality

5.3.2 Ordinance Requirement:

The Ordinance requires consideration of the following:

The water levels and minimum flow requirements necessary for the maintenance of fish and wildlife habitat and water quality.

5.3.3 Ordinance Criterion C Discussion

Every dam is required to release a minimum flow into the outlet stream or river below a dam to maintain aquatic habitat and water quality. The State agencies typically use the median flow for August (typically the lowest flow month) as the aquatic base flow to set the required minimum flow. Mean monthly flows for the site were obtained using the USGS StreamStats data with the following results:

Upper Cold Stream Pond Mean Monthly Flows (cfs)	
January	11.2
February	5.63
March	3.47
April	11.6
May	40
June	9.19
July	3.19
August	1.76
September	2.06
October	10.3
November	17.3
December	15.6

Staff from the ME Department of Inland Fisheries and Wildlife (MIF&W) and the ME Department of Environmental Protection (MDEP) conducted a

site review of the Smelt Brook flow requirements to maintain aquatic habitat. Representatives from the Town, Upper Cold Stream Pond Association, the MDEP and MIF&W met to review the required minimum flow releases from the dam to satisfy the downstream Smelt Brook habitat needs. The representatives agreed that a flow amount of around 1.12 cfs should be released at all times from the Dam. This required flow can be reduced to inflows when inflows into the pond are less than the required 1.12 cfs. The periods in which the inflow is less than this amount would likely be accompanied by gradual reduction in pond level and during a high temperature and low precipitation period. The pond is not required to be used to maintain this discharge during these short duration events and the release can be reduced to inflows into the pond to maintain a constant water level balancing lake levels and a temporarily lower stream flow during these exceptionally dry periods.

The minimum flow amount is currently released through a metal plate within the stop log section of the Dam. The plate has a full width $\frac{3}{4}$ inch high slot to permit flow to pass through the plate and into the downstream reach. The Dam operator indicated the slot is generally installed around elevation 96.5'. A review of the slot discharge indicates that the slot may be installed at a lower elevation than required to limit outflow from the dam. A lower slot elevation increases the flow through the slot potentially resulting in the outflow exceeding inflow and thereby lowering the pond level. The calculated outflow during the non-winter period is approximately 1.89 cfs and 1.76 cfs during the winter period. The 1.76 cfs flow was originally suggested by the MIF&W and may be the rationale for the current slot setting. This slight deviation from the required minimum potentially impacts the water level during the month of August with a drop in water level of less than $\frac{1}{4}$ ". The plate setting is suggested to be reviewed and adjusted as required to avoid excessive flow releases that would potentially impact the pond level. The slot setting becomes immaterial whenever inflows are greater than the required release as excess inflow is released over the top of the stop logs or the side spillway.

The 7-day, 10-year low flow rate (7Q10) for the site is reported to be 0.17 cfs. This flow rate represents the lowest 7-day average flow that occurs on average once every 10 years. A review of the impact of the current minimum flow release (1.89 cfs) using the 7Q10 inflow indicates that the potential pond level change over a 7-day period would be approximately $\frac{1}{2}$ inch. The required minimum flow release can be adjusted during this and

similar periods. A reduction in the flow release can be accomplished using several methods with the potential blockage/removal of the submerged slot and permitting all flows to pass over the top of the stoplogs as a likely preferred method.

The manner in which the flow is released impacts downstream water quality. Water releases which cascade down into the receiving water entrain air and thereby increase dissolved oxygen (DO) in the water. The current manner in which the flows are released result in the potential for enhanced DO concentration levels and thereby improved water quality.

An increase in historic water levels may increase fisheries habitat while reducing terrestrial habitat. An increase in water level could result in shoreline area inundation causing potential soil erosion from waves (wind or as a result of recreational boating activity) or wind uprooting vegetation. Shoreline erosion would degrade the water quality of the pond and downstream waters through contamination of the waters.

Reducing the water level below established norms could result in the exposure of unstable soils causing water quality impacts. Therefore, maintaining historic water levels is beneficial for littoral preservation and water quality.

5.3.4 Ordinance Criterion C Suggested Water Level

Based upon the above discussion, the suggested water level necessary to satisfy this Ordinance criterion is:

The target pond elevation of 100.3 ft (current historic level during the non-winter season) shall be maintained throughout the year with all inflows being instantaneously passed downstream of the Dam. The current means of supplying a minimum outflow of 1.12 cfs shall be maintained at all times, except during exceptionally dry periods when State MDEP guidance allows temporarily reduced stream flows in balancing lake levels during dry periods when lake inflows will not sustain the minimum the stream flow without adverse impacts to lake levels.

5.4.1 Ordinance Criterion D: Erosion Protection

5.4.2 Ordinance Requirement:

The Ordinance requires consideration of the following:

The water levels necessary to prevent excessive erosion of shorelines.

5.4.3 Ordinance Criterion D Discussion

The maintenance of consistent water levels minimizes the potential for shoreline erosion as vegetation protection can be established. The historic pond levels have been established for several years which has permitted the shorelines to stabilize and establish protective vegetative growth. The Dam's presence permits the ability to minimize water level changes through adjustment of the Dam's discharge mechanisms.

Fast moving water and ice movement can cause shoreline erosion to occur. In addition, killing of large trees or brush can result in pull out of the root system exposing the soil beneath and the immediately surrounding area of the root system being exposed to erosion. Raising the water level above the historic level may result in saturation of the soil and increased exposure to erosion and local slope failure. A reduction in historic pond level may expose the immediate non-vegetated pond bed to be exposed. The exposed pond bed would likely become covered with vegetation but in the near term newly exposed pond base would be subject to erosive forces during the spring thaw flows and ice (if present) movement.

5.4.4 Ordinance Criterion D Suggested Water Level

Based upon the above discussion, the suggested water level target elevation necessary to satisfy this Ordinance criterion is:

The target pond elevation of 100.3 ft (current historic level during the non-winter season) shall be throughout the year with all inflows being instantaneously passed downstream of the Dam.

5.5.1 Ordinance Criterion E: Flood Protection

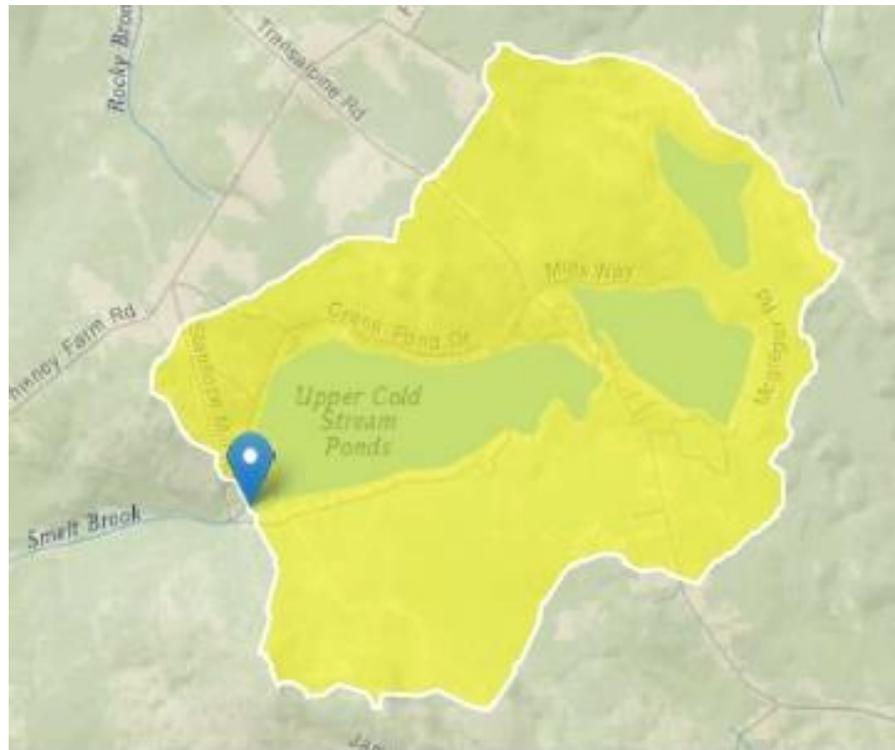
5.5.2 Ordinance Requirement:

The Ordinance requires consideration of the following:

The water levels necessary to accommodate precipitation and run off waters.

5.5.3 Ordinance Criterion E Discussion

Inflow amounts for the dam area were obtained from the USGS SteamStats database. The drainage basin for the Upper Cold Stream Pond dam incorporates Little Round Pond as well and “Big” and “Little” Narrows ponds.



Upper Cold Stream Pond Drainage Basin

The 1987 FEMA Flood Insurance Study previously reported the peak discharge from the Dam as 285 cfs. Subsequent to the study the calculated flows were revised. The following Table provides various flood flows with various recurrence intervals according to the USGS StreamStats database.

Upper Cold Stream Pond Flood Flows

Recurrence Interval	Flow (cfs)
1-year	37
2-year	120
5-year	185
10-year	226
25-year	297
50-year	337
100-year	395

The maximum calculated discharge from the dam is around 235 cfs which has a recurrence interval of around 10-years. Removal of all the stop log boards and the overflow crest board is required to obtain this discharge capacity with the pond level at the top of the overflow spillway side wall. However, the full flow may not be obtainable due to the presence of an upstream inlet constriction approximately 250 feet upstream of the dam.

Flow above the discharge capacity will result in overtopping of the dam and adjacent dike. The 100-year flood level would result in approximately 14 inches of overtopping and would likely result in a breach of the dike area immediately adjacent to the side overflow spillway.

The Pond storage capacity is insufficient to significantly modify the water flows through the site during unusually high run off events (flood flow events). However, lowering of the pond level can provide limited relief from significant flow events.

Effective pond lowering is limited by the presence of an upstream rock weir upstream of the dam. The pond level has historically been lowered during the winter season by approximately 8 inches (Elevation 99.8') from the summer water level (Elevation 100.3'). The volume capacity created by this reduction would, with all boards removed, result in the containment of the 100-year flood flow event for approximately 1.5 days before overtopping would occur. Pond lowering below elevation 99.5' is likely not feasible due to the effect of the weir. Lowering of the pond to around elevation 99.5' would provide potential 100-year flood flow containment for slightly over 2 days and around 3.5 days for the 50-year flood event. The additional retainage time is beneficial as flows may recede quickly and thereby reducing the risk of overtopping.

5.5.4 Ordinance Criterion E Suggested Water Level

Based upon the above discussion, the suggested water level target elevation necessary to satisfy this Ordinance criterion is:

The pond elevation of 99.5 ft (12-inches below abutment top = 4 inches lower than historic winter) shall be maintained throughout the year.

5.6.1 Ordinance Criterion F: Water Supply

5.6.2 Ordinance Requirement:

The Ordinance requires consideration of the following:

The water levels necessary to maintain public and private water supplies.

5.6.3 Ordinance Criterion F Discussion

Variation of the pond level is not anticipated to significantly impact local well water supplies. The pond provides a water source for public use during fire suppression activities. Each basin of the pond is equipped with “dry” hydrants for fire suppression operations. Typically, dry hydrants have a horizontal intake pipe with a perforated pipe section or a screen. The hydrants located on the pond were reported to be in “shallow” water.

An important aspect of efficient pump operation during fire suppression activities is the avoidance of surface vortices. The formation of vortices at the suction inlet causes air to enter the suction line which reduces the capacity of the line. The required submergence is typically above a water depth of 24-inches. The current inlet elevation is unknown but likely sufficient based on no reported concerns with the hydrant’s function.

The pond level should be adequate to permit fire suppression operations to occur while the site experiences low inflows. The extreme low inflow is around 0.2 cfs per the USGS developed StreamStats database (7-day 10-year low flow). The current dam minimum flow release (discussed in Section 3 of this report) exceeds this potential inflow. However, the potential drop in water level during a 30-day period is around 1-inch and therefore not significant. The low inflow period would likely coincide with

extreme dry surface conditions resulting in increased potential for the need for fire suppression ability.

A reduction in historic water levels may result in a loss of fire suppression capacity. An increase in historic water levels would potentially enhance fire suppression capacity but is not feasible due to civil feature (*i.e.*: dike elevation) limitations.

5.6.4 Ordinance Criterion F Suggested Water Level

Based upon the above discussion, the suggested water level target elevation necessary to satisfy this Ordinance criterion is:

The target pond elevation of 100.3 ft (current historic level during the non-winter season) shall be throughout the year with all inflows being instantaneously passed downstream of the Dam.

5.7.1 Ordinance Criterion G: Power Generation Use

5.7.2 Ordinance Requirement:

The Ordinance requires consideration of the following:

The water levels and flows necessary for any ongoing use of the dam to generate or to enhance downstream generation of hydroelectric or hydromechanical power.

5.7.3 Ordinance Criterion G Discussion

The site does not currently support generation of hydroelectric or hydromechanical power. A review of the site indicates that development of commercial generation would not be economically feasible. The Ordinance criterion for this condition is not applicable for this site because of the lack of existing facilities and unlikely installation in the near future.

5.7.4 Ordinance Criterion G Suggested Water Level

Based upon the above discussion, the water level necessary to satisfy this Ordinance criterion is:

Water levels and flows have no CURRENT impact on power generation or mechanical power. Therefore, no lake level or stream flow is required for this Criterion.

5.8.1 Ordinance Criterion H: Downstream Area Flows and Level

5.8.2 Ordinance Requirement:

The Ordinance requires consideration of the following:

The water levels necessary to provide flows from any dam on the Pond to maintain public access and use, fish population and fish passage facilities, fish and wildlife habitat and water quality downstream of the body of water.

5.8.3 Ordinance Criterion H Discussion

The Pond's limited storage capacity and mechanisms for flow release control do not provide the ability to enhance public safety downstream of the Dam through regulation of Dam discharge rates. All inflows to the pond are instantaneously passed downstream of the dam irrespective of the Pond's water level. This results in the downstream section's water levels and flow rates fluctuating seasonally in response to varying inflows.

The release of inflows through spillage versus discharges through a submerged orifice (i.e., gate) enhances dissolved oxygen in the water entering the downstream river reach. The water level established for the Pond should be sufficiently above the spillage mechanism to reasonably ensure that discharges will be over the boards (i.e., not just dam leakage).

During extreme low flow periods a static pond level could result in distressed stream areas downstream of the Dam. However, the short reach to the Bay area would permit fish to "fall back" into suitable habitat during extreme events.

5.8.4 Ordinance Criterion H Suggested Water Level and Flows

The water level necessary to satisfy this Ordinance criterion is:

All inflows should be passed over and not through the Dam. No target water level is otherwise required for this Criterion.

Section 6.0 Summary Table For Target Water Levels as to All Criteria

In summary, for all criteria in the Ordinance, the following table summarizes the relevant target Pond elevations.

Criterion #	Criterion Title	Suggested NON-WINTER Pond Elevation	Suggested WINTER Pond Elevation
A	Public Access – See Section 5.1.4	100.3	100.3
B	Shoreline Protection – See Section 5.2.4	100.3	100.3
C	Water Quality and Fish and Wildlife Habitat; See Section 5.3.4	100.3	100.3
D	Erosion Protection—See Section 5.4.4	100.3	100.3
E	Flood Protection—See Section 5.5.4	99.5	99.5
F	Water Supply—See Section 5.6.4	100.3	100.3
G	Power Generation- See Section 5.7.4	Not required	Not required
H	Enhancement for Downstream Areas; See Section 5.8.4	Not required	Not required

Section 7.0 – Town of Lincoln Order for Target Impoundment Water Levels and Minimum Stream Flows for Winter and non-Winter Periods

Now therefore be it ORDERED by the Town Council of the Town of Lincoln as follows:

Target Upper Cold Stream Pond Lake Water Levels (measured at the Dam):

Mid-April to Mid-October	Elevation 100.3 ft
Mid-October to Mid-April	Elevation 99.5 ft¹

Target Minimum Stream Flows (measured at the Dam):

The target minimum stream flow at the Dam shall be 1.12 cfs; if required, the flow may be reduced during fire control, emergency conditions and when natural conditions (drought) cause inflow to be less, all as permitted in Chapter 587 of the DEP regulations. Flows during those periods may be reduced to inflow amounts to maintain existing water levels at the time and then increased back to the target stream flow as soon as conditions permit.

¹ Given the vital importance of lowered lake elevations for Winter Periods under the Flood Protection Criterion.

Signed this 8th day of March 2021 by the following Municipal Officers of Lincoln, Maine.

Attest: _____

Town Clerk Ann Morrison