

DRAFT DRAWDOWN PLAN SWAINS LAKE DAM, NH ID D015002 BARRINGTON, NEW HAMPSHIRE

Stephens Associates Consulting Engineers, LLC (SA, we, our, or us) prepared this Drawdown Plan for the Town of Barrington, NH (Town, Client, you, your, etc.) to guide the Town in drawdown and refill (lowering and raising) of Swains Lake (Lake) by operating Swains Lake Dam (aka Union Dam, Dam, etc.). The Dam impounds Swains Lake and discharges to the Bellamy River. SA performed these services for the Town in general accordance with our Agreement dated June 30, 2020, authorized by Town signature on July 14, 2020 (Agreement). Figure 1 shows the Dam location. The attached Table 1 summarizes the operations described in detail herein. The body of this Drawdown Plan should be read in entirety and understood prior to using the operations summarized in Table 1. This Drawdown Plan is subject to the limitations presented herein, including Drawdown Plan body, Figures, Tables and Appendices, (e.g. Appendix A – Limitations, etc.).

SA prepared this Drawdown Plan based on existing information we obtained from review of files maintained by the Town and New Hampshire Department of Environmental Services Dam Bureau (NHDES), interview of Town's personnel and others, and our observations and limited elevation measurements of the Dam and downstream culverts at Lakeside Oaks Drive.

Drawdown Plan Purposes

The purposes of this Drawdown Plan include:

- To guide the Town's future lowering and raising of Lake height for seasonal drawdown, occasional maintenance, floods, and, if necessary, urgent repairs;
- To guide the Town's Dam operations in consideration of the poor condition of the existing downstream culverts beneath Lakeside Oaks Drive, to reduce risks of damage to these culverts and Lakeside Oaks Drive until the culverts can be replaced;
- To help the Town inform residents when drawdowns and refilling might occur and how much to expect; and
- To establish Town policy for timing and amount of seasonal Lake drawdown.

The Town has lowered/raised the Lake level seasonally for many (more than 20) years. One purpose of this Drawdown Plan is to formalize these seasonal changes. This Drawdown Plan is not meant as an exhaustive re-evaluation of Swains Lake drawdown, but is largely based on previous operations in consideration of the plan purposes stated above and purposes of drawdown described below. Additionally, this Drawdown Plan is not meant to replace, but to supplement, the existing Emergency Action Plan and Operation Maintenance and Response Form.

Irrespective of the operations and guidance in this Drawdown Plan, Lake levels should be expected to fluctuate in response to precipitation (or lack thereof), snowmelt, evaporation, infiltration, and other factors at any time of year. Residents should expect lower lake levels during times of drought and higher levels resulting from increased precipitation, snowmelt, etc. The operations and guidance in this Drawdown Plan are not meant to maintain constant, invariable lake elevations (whether summer or winter), but to assist the Town in practical operations of the Dam to change (lower and raise) the Lake level.

As indicated above, one purpose of this Drawdown Plan is to guide Dam operations in consideration of the poor condition of the existing downstream culverts at Lakeside Oaks Drive, on-the-order of 300 ft. downstream of the Dam. The culverts consist of three metal pipes. The Town intends to replace the culverts in the near future. New culverts should be designed with increased hydraulic capacity to accommodate subsequent operation of the Dam (i.e. larger releases). Additionally, the channel downstream of the culverts has clogged in the past, resulting in a debris dam. The Town should routinely check the channel and remove debris that might affect hydraulic performance of the culverts.

Dam Operational Components

The elevation of Swains Lake is largely controlled by Swains Lake Dam. The Dam discharges through the fixed-crest primary spillway beneath the gate house and a low-level, mechanically operated slide gate (when opened). The Town adjusts Lake elevation by adjusting (operating) the low-level mechanical gate for controlled release of water.

Summer Lake level is largely controlled by the fixed-crest elevation of the spillway with the low-level gate typically closed. The summer Lake elevation therefore fluctuates depending on amount of precipitation (and other factors) and is generally not actively managed by the Town.

Winter Lake level is managed by discharge through the gate (depending on its opening) and is typically below the spillway crest elevation.

Stoplogs are located in the channel upstream of the spillway and low-level outlet. The purpose of the stoplogs appears to have been occasional water control to allow work on the gate and/or low-level outlet rather than for control of seasonal Lake elevations. The crest of the stoplogs is below the Winter Lake level and the upstream side of the stoplogs is backfilled with boulders and soil.

The spillway crest elevation upstream of gatehouse is about El. 277.9 ft., which can be used as a reference to measure Lake elevation. No staff gage is present. Height of gate opening is read by the indicator mounted on top of the gate operating mechanism inside the gatehouse. Elevations herein refer to feet relative to NGVD 1929¹.

Previous reports (e.g. NHDES 2012) indicated impoundment surface area at “normal pool” as about 407 acres. For typical seasonal drawdown of 2 to 2½ ft., the volume of stored water to be released (or refilled) would therefore be on the order of 800 to 1,000 acre-feet. Drainage area to the Dam is reported variously as 3 or 4 square miles (1933 or 2560 acres).

Seasonal Drawdown and Refilling

It is our understanding that the Town opens the gate attempting to lower the Lake level each autumn to about 2 to 2½ feet below the spillway concrete and again closes it each spring to refill the Lake. Purposes of this autumn seasonal drawdown and late winter/early spring refilling are:

¹ Referenced to survey disk El. 282.03 established in 2013 by Norway Plains Assoc. on the Dam crest left of the gatehouse.

- Reducing winter shorefront ice impacts that might cause erosion and/or structure damage;
- Facilitating repair of shorefront structures;
- Facilitating seasonal Dam maintenance/repair;
- Providing higher summer Lake level for recreation; and
- Providing additional capacity to stage and discharge higher spring flows and meltwater runoff to manage Lake level and reduce potential shorefront impacts².

It has been reported to us that an additional purpose of the seasonal drawdown may have been to reduce development of air pockets beneath ice that might occur if the water level dropped significantly after ice formation, which might have therefore affected recreational uses of the ice (e.g. snowmobiling, etc.). Since the autumn drawdown described herein occurs before significant ice-over of the Lake and fluctuations in Lake elevation are likely to be relatively small once ice is established, SA did not further evaluate this purpose.

It is also our understanding that past seasonal drawdowns have not been used for the purpose of aquatic vegetation control, and therefore, SA did not include such vegetation control as a purpose in this Drawdown Plan.

The amount of drawdown of about 2 to 2½ feet is based on past operations that were reported as generally achieving the purposes stated above while allowing the Lake to refill at reasonable rate in the spring and is generally similar to operations of other lakes in New Hampshire. SA therefore did not evaluate in detail the magnitude (height) of drawdown.

Autumn Drawdown

- Target start date: Third Monday in October (a week after Columbus Day).
- Target end date: Third Monday in November, results in target drawdown rate of about 1 in./day. Actual drawdown completion date and rate will vary based on precipitation and changes in operations according to observed conditions.
- Target Lake level lowering: about 2 to 2½ feet below spillway, resulting in Lake elevation of about 275.9 to 275.4 ft.
- Initial operations of Dam for drawdown:
 - We recommend operating the Dam for a target total discharge, combined through spillway and gate, of about 20 cubic feet per second (cfs) during typical years. Dry years may require less discharge (lower gate opening) and wet years higher discharge (higher gate opening) to achieve the target drawdown rate of about 1 in./day.
 - Until the downstream culverts at Lakeside Oaks Drive are replaced, we recommend limiting total discharge (combined through spillway and gate) to 30 cfs or less to reduce risk to the road and culverts. At 30 cfs, we estimate the water elevation at the culverts would be above the culvert crowns, but below the road.
 - Each 3 in. of gate opening can be assumed (roughly) equivalent to 10 cfs of discharge through the gate for the range of water depths between summer and winter Lake elevations.
 - Half a foot of water depth over the spillway is about 11 cfs; one-foot depth is about 30 cfs. Refer to attached stage discharge curves in Figure 2 for more detailed information.
 - An example: If starting water depth is ½ foot over spillway, open gate about 3 in., which gives a discharge of about 21 cfs (consisting of 11 cfs over spillway and 10 cfs through the gate). Alternatively, the discharge can be read from Figure 2 using the curve for “Gate 3 in. open” and

² Refer to discussion under “Flood Operation” below

Lake elevation 278.4. Periodically and progressively increase the gate opening as the water level falls, until it is about 6 in. open when the water level falls below the spillway crest (i.e. no further flow over spillway). Adjust gate opening as needed based on precipitation and rate of change of Lake level.

- Monitor rate of drawdown twice weekly and monitor weather forecast daily. Adjust gate opening as needed based on observed rate of drawdown and weather forecast.
- Measure drawdown from a fixed point such as the spillway crest upstream of gatehouse. We recommend the Town install a staff gage upstream of the spillway to ease reading impoundment elevation.
- Winter operation – Once target drawdown amount is achieved, adjust gate with the goal of maintaining target elevation about 2 to 2½ feet below spillway. Typical gate operations will likely be about one to three inches open, though more or less opening may be needed when higher/lower precipitation occurs. Monitor Lake elevation weekly and adjust gate as needed.

As noted above, lake levels should be expected to fluctuate in response to precipitation (or lack thereof), snowmelt, evaporation, and other factors at any time of year, irrespective of the Dam operations and guidance in this Drawdown Plan.

Spring Refilling

- Target start date: February 1.
- Target completion date: May 1.
- Operation: Initially close the mechanical gate to about an inch of its bottom (i.e. leaving the gate about 1 in. open) to maintain downstream flow during refilling. Adjust mechanical gate as needed based on rate of rise, precipitation, etc. We recommend adjusting the gate such that the Lake rise is no more than about a foot above winter Lake level when appreciable ice thickness (that could cause shorefront damage) remains.
- Monitor rate of filling weekly and monitor weather forecast daily. Adjust gate opening as needed based on observed rate of filling and weather forecast, and as further described below.
- Once the impoundment rises and flow over the spillway resumes, fully close the mechanical gate.
- Target elevation: 277.9 or greater with flow over and controlled by the fixed-crest spillway.
- Maintain consistent level from mid-May to mid-July for nesting loons, a state listed threatened species. Deliberate lake level drawdowns should be avoided during this period and lake level fluctuations should be limited to the extent practicable. The Dam should be operated to limit rises in Lake level, due to precipitation, to 6 in. or less from the typical summer elevation.

The timing of refilling the impoundment is somewhat challenging to meet competing goals of reducing shorefront ice impacts and providing higher Lake level for recreation, and because of varying environmental conditions (e.g. precipitation, inflow, snow melt, etc.) year-to-year. If solely for the purpose of reducing shorefront ice impacts, the approach would be to keep the Lake level low until ice-out, typically March or April. Refilling the impoundment, however, has historically taken one to three months, meaning that waiting until ice-out to start refilling could delay the refilling, in dry years, beyond the target completion date of May 1. It is not practical to specify operations to address all varying conditions between drought and flood that might affect refilling, and the Town will need to adjust the gate based on rate of rise observed, amount of snowpack, precipitation, temperatures, etc.. As we recommended above, the Town should begin refilling on or about February 1, but refilling no more than a foot of height while significant ice thickness remains that might cause shorefront damage. Once ice appreciably thins, the Town can continue adjusting the mechanical gate as needed to achieve full Lake level for target date of May 1.

Flood Operation

According to previous evaluation by others, operating the Dam (i.e. opening the mechanical gate) in advance of, or during, floods is generally unnecessary for dam safety; however, when the Lake is at “full” summer level, managing flood-related Lake level may be desirable to attempt to reduce potential shorefront property damage. Residents should note, however, that the Town’s ability to meaningfully reduce the Lake height during floods is significantly limited.

As we alluded to above, file review of previous hydrologic and hydraulic evaluation (e.g NHDES 2012)³ suggests that, with the mechanical gate closed and impoundment starting at summer elevation, the Dam can stage and pass floods of 2.5 times 100-year magnitude with at least one foot of freeboard⁴ to the Dam’s crest. *This means that neither opening the mechanical gate nor drawdown (seasonal or in anticipation of floods) are necessary for Dam safety to prevent overtopping*⁵. For reference, NHDES (2012) estimated 1.2 ft. of Lake level rise, 2.6 ft. of freeboard, and 50 cfs peak spillway discharge resulting from 7.99 in. of precipitation as the 100-year storm (i.e. the precipitation with probability of occurrence of 1 percent annually; commonly referred to as the “100-year flood”).

The Lake elevation at which shorefront property damage occurs is uncertain. File review indicated residence and shorefront damage occurred during the May 2006 and April 2007 floods (Burrows, 2008). In the 2007 flood, the Lake level was reported to be 2.5 ft. above the spillway (Town of Barrington 2007). Following the 2006 flood, the Lake level was reported to be 1 ft. (Town of Barrington 2006) to 1.5 ft. (NHDES 2006) above the spillway, however, photographs of the Lake show a level more similar to the higher-reported 2007 flood level. SA did not evaluate flood-induced (or other cause) Lake elevations that might cause potential shorefront impacts, as such evaluation was beyond the scope of our services.

While operating the Dam *during* storms would have little effect on the storm-induced Lake elevation, operating the Dam (opening the mechanical gate) *in advance of* forecast major storms could slightly lower the Lake, *possibly* reducing shorefront impacts during the flood. For practical purposes, however, assuming a 5-day advance knowledge of impending storm, the Town might be able to lower the Lake on the order of half-a-foot, potentially reducing the flood-induced Lake elevation by a similar amount. It is uncertain to what extent this may reduce shorefront damage. The corresponding approach would be:

- During summer when the Lake is “full”, the Town should monitor the National Weather Service Quantitative Precipitation Forecast (QPF) at www.weather.gov/nerfc/forecastprecipitation at least 5 days ahead for major storms that might approach a 100-year magnitude.
- If forecast precipitation exceeds 6 in. over 24 hours, the Town may consider operating the Dam to attempt to lower the Lake level prior to the storm, and *possibly* reduce flood-related shorefront impacts. SA has evaluated neither potential Lake elevation resulting from a storm of 6-in. or greater precipitation nor potential for shorefront impacts, however, the criterion of 6 in. precipitation over 24 hours appears reasonable as it is about 75 percent of the 100-year precipitation predicted by others and might result in a Lake level rise on-the-order of a foot without Dam operation.

³ SA neither evaluated hydrology and hydraulics (H&H) of floods nor evaluated accuracy of previous H&H analyses performed by others, as such evaluations were beyond the scope of our services.

⁴ Freeboard is the height between the peak water elevation during a flood and the crest of the Dam.

⁵ Overtopping, if the Lake level exceeded the Dam crest, could jeopardize Dam safety by eroding the Dam, potentially progressing to Dam breach and uncontrolled release of the Lake.

- Because of the configuration and condition of the culverts at Lakeside Oaks Drive, we recommend the Town limit discharges to lower the Lake in advance of major storms to no more than 40 cfs (combined flow through spillway and gate). We estimate water elevation at the culverts would be near the road shoulder at this flow. Design of future replacement culverts should accommodate higher flows, however, since others estimated Dam discharge during the 100-year flood as 50 cfs, we do not recommend releases (flows) of more than 50 cfs when lowering the Lake level in advance of storms unless justified by future engineering evaluation. Releases for various operations and Lake levels can be estimated using the attached rating curves in Figure 2.
- The Town should monitor the culverts at Lakeside Oaks Drive during flood operation releases and adjust the gate accordingly to avoid overtopping the road and/or if the Town notes erosion occurring. The Town should also periodically check other downstream culverts at Hall Road, Hope Road (private driveway), Pierce Road and Rte. 125 to confirm the roads are not inundated and damage is not occurring.
- After the storm begins and the Lake level begins to rise, the Town would need to lower and/or close the gate to offset increasing Spillway discharge from Lake-level rising.

Urgent Drawdown

Urgent drawdowns are used to lower the Lake for urgent repairs/maintenance or in response to a Dam emergency to attempt to prevent or mitigate Dam failure that could rapidly release large volumes of water at high flow rate (e.g. a “flood wave”). The Dam operation and rate of drawdown are affected by the urgency of the situation and hydraulic capacity of, and potential impacts to, downstream culverts⁶ at Lakeside Oaks Drive, Hall Road, Hope Road (private driveway), Pierce Road, and/or Rte. 125. Potential scenarios and operations include:

- For non-emergency, hazardous situation at the Dam or urgent repairs/maintenance:
 - Hold a public information meeting at least 15 days prior to lowering; publish newspaper notice of the meeting at least 7 days prior to the meeting; notify NH Fish & Game Department in writing at least two weeks prior to lowering; notify interested parties in the attached list⁷;
 - Follow procedures above for lowering the impoundment in advance of floods;
- For hazardous situation at the Dam where urgent, more rapid lowering is needed:
 - Implement Emergency Action Plan (EAP);
 - Post personnel at downstream culverts and open mechanical gate to 12 in. open. Further open mechanical gate to the extent practicable without overtopping downstream culverts. Adjust gate based on downstream observations.
- In Emergency where Dam failure is imminent and/or rapid rate of Lake drawdown might save the Dam:
 - Implement Emergency Action Plan (EAP);
 - Post personnel at downstream culverts and close roads over the culverts;
 - Where the Dam is in jeopardy of failure that could cause major downstream flooding and damage, open the mechanical gate fully to attempt to save the Dam. This action would discharge on-the-order of 100 cfs in addition to the spillway discharge and would likely overtop, and could potentially damage, multiple downstream culverts. It may also cause downstream flooding. The objective would be to prevent more severe downstream flooding that might occur if the dam failed (breached).
 - Monitor downstream conditions, evacuate downstream residents as needed based on EAP and observed conditions.
 - Such operation might lower the impoundment on the order of half a foot per day (depending on inflow).

⁶ SA has not evaluated hydraulic capacity of downstream culverts. Statements herein regarding downstream culverts are largely based on information reported in the Emergency Action Plan (Dubois & King 1992).

⁷ Per RSA 482:13

Additional Recommendations

The attached contact list of Lake Association and Interested Parties is to assist the Town in keeping the public informed of changes to Dam operations and un-planned (non-seasonal) changes in Lake height. The contact list should be updated annually.

We recommend periodically updating this plan based on performance of drawdowns and to account for future downstream changes (e.g. replaced culverts, new construction, etc.). We recommend that the Town maintain records of all Dam operations and resulting performance, including dates of operations, heights of mechanical gate opening/adjustment, Lake elevation, precipitation predictions and observations, outside complaints or observations, as well as corresponding photographs of the Dam spillway, staff gage (if the Town installs one), the mechanical gate stem cover (to show gate opening), spillway approach, etc. Such information will be useful for the Town in future, similar efforts. Records and photographs should be saved to the Town's file for the Dam for future use in updating this Drawdown Plan and/or other purposes.

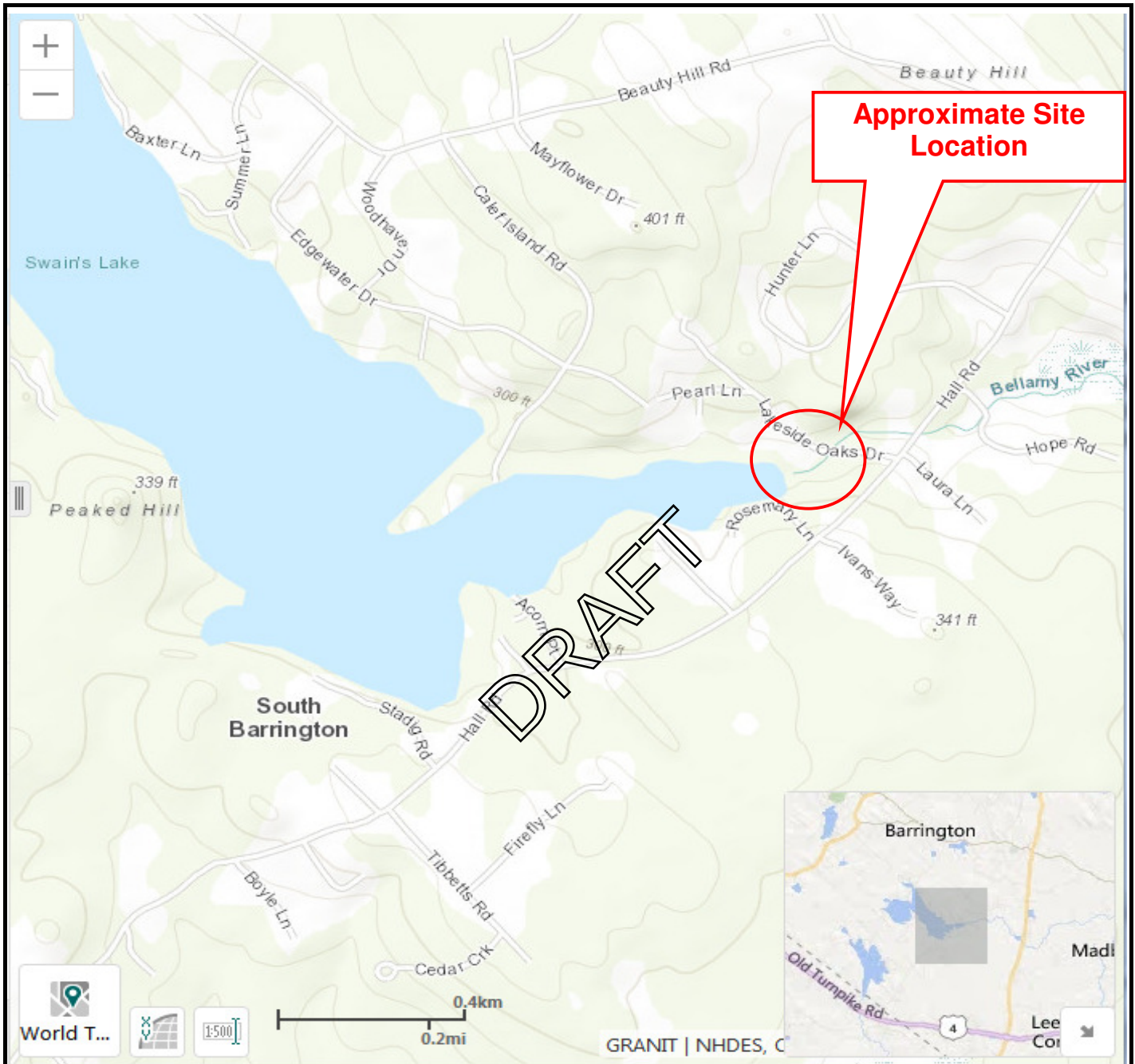
References

- Town of Barrington (2016), "Emergency Action Plan, Swains Lake Dam, Barrington, NH, Dam #015.02 (High Hazard Dam)," last updated 07/12/2016 (EAP).
- Town of Barrington (2016), "Operation, Maintenance and Response Information," July 10, 2016.
- New Hampshire Department of Environmental Services, Dam Bureau (NHDES) (2012), "Dam Inspection Form," prepared by Chuck Corliss, January 18, 2012, and associated HydroCAD model output obtained by SA from NHDES files.
- Burrows, J. (2008), typed message dated June 16, 2008 from Julia Burrows, 13 Baxter Lane, Barrington, NH, obtained by SA from Town files.
- Town of Barrington (2007), completion of NHDES Water Division, Dam Bureau form, "Mid April 2007 Storm Survey," obtained by SA from Town files and NHDES files. The copy in NHDES files is stamped as received May 24, 2007.
- Town of Barrington (2006), completion of NHDES Water Division, Dam Bureau form, "May 2006 Storm Survey," obtained by SA from NHDES files. The copy in NHDES files is stamped as received May 24, 2007.
- NHDES Dam Bureau (2006), "Site Evaluation for 2006 May Flooding," prepared by Pat Bell, May 24, 2006, obtained by SA from NHDES files.
- Dubois & King (1991), "Swain Lake Dam, Barrington, New Hampshire, Dambreak Flood Analysis, NHWRD Dam No. 15.02," February 1991, obtained by SA from NHDES files.
- Department of the Army, New England Division, Corps of Engineers (USACE) (1978), "Union Lake Dam, NH 00232, State No. 15.02, Phase I Inspection Report, National Dam Inspection Program," August 1978, obtained by SA from NHDES files.
- Niswender, M. (2020), personal communication, September 17.

Attachments

- Figure 1 – Site Location Map
- Figure 2 – Dam Stage-Discharge Curves
- Table 1 – Dam Operation Summary
- Table 2 – Lake Association and Interested Parties Contact List
- Appendix A – Limitations

Project: Number: 140-20-001 Sheet 1 of 1
 Name: Swains Lake Dam, NH ID No. D015002
 Barrington, NH
 By: J. Turner Date: October 27, 2020 Subject: **FIGURE 1 - Site Location Map**
 Checked By: RSS Date: October 27, 2020

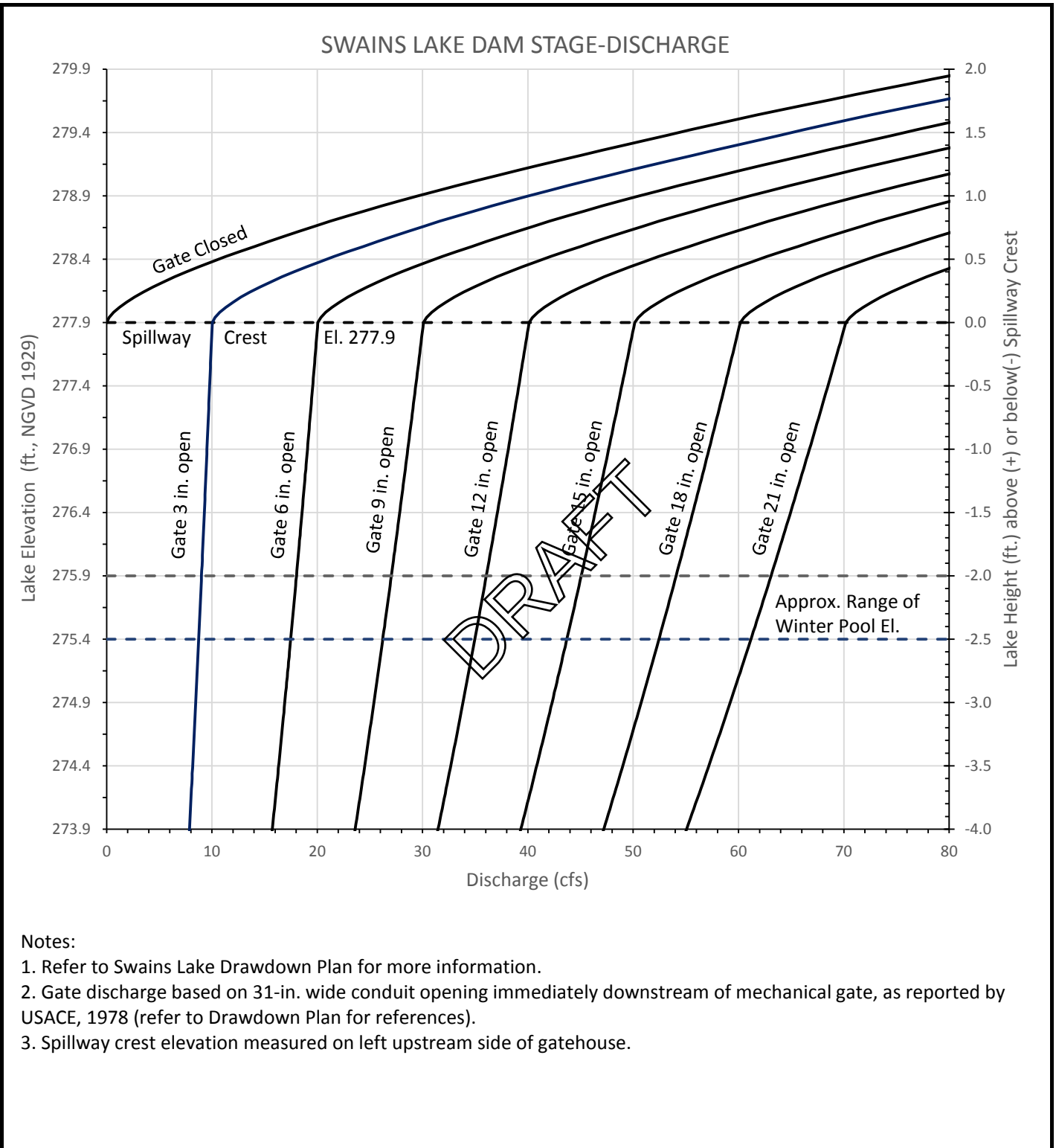


Approximate North ↑

Image obtained from NH GRANIT View, web mapping application, accessed June 5, 2020 at https://granitview.unh.edu/html5viewer/index.html?viewer=granit_view

Original Work:

By: J. Turner Date: October 27, 2020 Subject: **FIGURE 2 - Dam Stage-Discharge Curves**
 Checked By: RSS Date: October 27, 2020



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Revisions:

By: _____ Date: _____

By: _____ Date: _____

SACE 00-1 (v. 1) 1/00

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DRAFT, TABLE 1 - DAM OPERATIONS SUMMARY
Swains Lake Dam, NH ID D015002
Barrington, NH

Autumn Drawdown		Ref. Drawdown Plan p. 3
• Start:	Third Monday in October	
• Target drawdown:	About 2 to 2-1/2 ft. below spillway concrete upstream of gatehouse.	
• Target Rate:	About 1 in. per day; about 1 month to lower.	
• Initial Operation:	<u>If starting Lake level is...</u>	<u>Then...</u>
	- Less than 1/2 ft. over spillway	- Adjust gate to between 3 and 6 in. open.
	- 1/2 to 1 ft. over spillway	- Adjust gate to 3 in. open.
	- More than 1 ft. over spillway	- Leave gate closed until Lake level recedes below 1 ft.
• As Lake level drops, periodically and progressively open gate until it is 6 in. open when Lake level falls below the spillway crest.		
• Monitor rate of drawdown and weather forecast. Adjust gate as needed to achieve target drawdown rate and height.		

Winter Operation:		Ref. Drawdown Plan p. 4
• Maintain Lake level about 2 to 2-1/2 ft. below spillway.		
• Typically gate about 1 to 3 in. open. Monitor weather forecast and Lake level and adjust gate weekly as needed.		

Spring Refilling		Ref. Drawdown Plan p. 4
• Start:	On or about February 1.	
• Target completion:	On or about May 1.	
• Initial Operation:	Adjust gate to be about 1 in. open. Maintain downstream flow while refilling.	
	Until ice-out, adjust gate to limit Lake rise to no more than 1 ft. above winter level.	
	Once Lake overflows spillway, close the gate.	

Summer Operation		Ref. Drawdown Plan p. 4
• Mechanical gate closed; Lake discharge over fixed-crest spillway; no operations.		

Flood Operation		Ref. Drawdown Plan p. 5
• Monitor 5-day advance weather forecast during summer when Lake is "full".		
• If 5-day advance forecast precipitation exceeds 6 in. over a 24-hour period, open gate in advance of storm to lower Lake level:	<u>if starting Lake level is...</u>	<u>Then...</u>
	- 1/2 to 1 ft. over spillway	- Adjust mechanical gate to 6 in. open.
	- Less than 1/2 ft. over spillway	- Adjust mechanical gate to 9 in. open.
• Monitor Lakeside Oaks Drive Culverts.		
• Periodically check downstream culverts at Hall Rd., Hope Rd. (private drive), Pierce Road, and Rte. 125.		
• Adjust gate as needed to avoid overtopping roads.		
• Lower or close gate once Lake begins to rise during storm to offset increasing spillway discharge.		

Urgent Drawdown		Ref. Drawdown Plan p. 6
• For non-emergency, hazardous situation at the Dam or urgent repairs/maintenance where lower Lake is needed:		
	- Publish notice, hold public meeting, and notify NH Fish & Game if time allows.	
	- Follow procedures above for pre-flood operation.	
• For hazardous situation at the Dam where more rapid lowering is needed:		
	- Implement EAP.	
	- Post personnel at downstream culverts.	
	- Adjust gate to 12 in. open and adjust further to extent practicable without overtopping downstream culverts.	
• In Emergency where Dam failure is imminent and lowering the Lake may save the Dam:		
	- Implement EAP.	
	- Close roads over downstream culverts.	
	- Open gate fully.	
	- Monitor downstream conditions, evacuate residents as needed.	

Notes:

1. Operations herein are briefly summarized for quick reference. Refer to the Drawdown Plan for more detailed explanation. The full text of the Drawdown Plan should be read and understood.

2. Irrespective of the operations and guidance in this Drawdown Plan, Lake levels should be expected to fluctuate in response to precipitation (or lack thereof), snowmelt, evaporation, infiltration, and other factors at any time of year. Residents should expect lower lake levels during times of drought and higher levels resulting from increased precipitation, snowmelt, etc. The operations and guidance in this Drawdown Plan are not meant to maintain constant, invariable lake elevations (whether summer or winter), but to assist the Town in practical operations of the Dam to change (lower and raise) the Lake level.

TABLE 2 – INTERESTED PARTIES CONTACT LIST

(List of interested parties to be generated following review of Draft Drawdown Plan)

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APPENDIX A – REPORT LIMITATIONS

Stephens Associates Consulting Engineers, LLC (SA) has prepared this Report based on the information available to us at this time, including information furnished through the Client, the Owner and their representatives for the proposed Project. If any of the noted information is incorrect or has changed, SA should be notified and retained to review the corrections and changes and amend this report. If SA is not retained for these purposes, we cannot be responsible for the impact of those conditions on the performance of the Project.

SA's services were performed using data generated by others (e.g. topographic data, data from NHDES Dams Bureau files, etc.). SA relied on these data for cost savings to Client in lieu of generating these data at higher cost.

SA's scope of services excluded environmental assessment of any kind, such as but not limited to assessments for the presence or absence of wetlands or hazardous or toxic materials or organisms (e.g., fungi, flora, fauna, bacteria, viruses, etc.) in the soil, surface water, groundwater, or air, on or below or around this site. Any observations of odors, colors, or unusual or suspicious items or conditions noted by SA were incidental to our services, and any statements regarding such observations are for the Client and strictly for their information.

This report has been prepared by SA for the exclusive use of the Client and for the specific application to the subject Project, as conceived at this time. Subject to the limitations inherent in the agreed scope of services as to the degree of care, amount of time and expenses to be incurred, and subject to any other limitations contained in the Agreement for SA's services, SA has performed its services with the degree of care and skill ordinarily exercised by other professional engineers under similar circumstances at the time the services were performed. No warranties are implied or expressed.

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