Appendix C

Dam Management Plans

Souhegan River Water Management Plan

August 2013

DAM MANAGEMENT PLAN

Burton Pond Dam (State Dam ID #147.17)

Figure 1 - Burton Pond Dam spillway, photo taken 1974, from DES Dam Bureau.

Introduction

Burton Pond Dam (lat. 42° 52’ 02”, long. -71° 48’ 47”) is located on a tributary of Stony Brook in Lyndeborough, New Hampshire approximately one half mile north of the Burton Highway. This dam is privately owned (see contact description), it is considered to be active and its designated use is for recreation. There is no public access to the dam.

Dam Design

The dam was reportedly built in 1846, and is constructed of earth materials. The outlet structure is reportedly an uncontrolled spillway (Figure 1). Details on the design and operation of the dam were obtained from the records of the Department of Environmental Services (DES) Dam Bureau and from the dam owner. The information required by Env-Wq 1906.04 on the characteristics of the dam is summarized in Table 1.

Minimum Flow, Flowage Rights or Contractual Obligations

None; according to the owner.

Riparian Property Obligations or Agreements

None; according to the owner, all bordering land is privately owned.

Water Quality Requirements or Limits

None; according to the owner.

Assessment of Potential Water Availability

DES Dam Bureau files show the maximum storage volume for the Burton Pond Dam is 350 acre-feet (or ac-ft), while its permanent storage volume is 300 ac-ft, with the difference being 50 ac-ft (2.2 million cu. ft. or 16.3 million gallons). When compared with the other dams being evaluated as part of this study, the potential volume of water available from this dam is moderately high, but the drainage area upstream of the dam is only 0.46 sq. miles, which limits the amount of runoff to the impoundment. Therefore, only a moderate amount of water would be available for flow management.

Potential Impacts of Storage and Release of Relief Flows

The shoreline around Burton Pond is undeveloped. So impacts to property from increased storage in the pond or releases from the dam would be limited. No extensive wetlands are mapped within or bordering the pond, so changes in water levels due to the storage or release of water from the dam would have minimal impact.

More importantly, there is a large wetland complex approximately 1,500 ft downstream of the dam and a DES Dam Bureau owned flood control dam (Souhegan River Site #10A) located 1.5 miles downstream. Both the wetland and the flood control dam could reduce the volume of any relief flows released from Burton Pond Dam. Coordination with the DES Dam Bureau would be required to minimize the impoundment of any water released from Burton Pond Dam.

Potential for Dam Management to Support Instream Flow Requirements

Although this dam is centrally located in the Souhegan River watershed, several other factors offset its favorable location. These include the private ownership of the dam and the surrounding property, the moderate amount of potential storage volume, the small size of the contributing drainage area and the age and condition of the dam, which has an uncontrolled outlet. In addition, a large wetland complex and a flood storage dam are located downstream of the Burton Pond Dam, which may temporarily impound or reduce the volume of any relief flows. As a result, it is unlikely that this dam could feasibly be managed to meet instream flow needs.

Dam Management Activity

No dam management activity is required at this time.

Schedule for Dam Management Plan Implementation

Since no dam management plan activity is currently required for Burton Pond Dam, there is no implementation schedule.

Estimated Cost of the Implementation of the Dam Management Plan

Since no dam management plan activity is currently required, there are no estimated costs.

Dam Owner and Contact Information

Owner: SNVK LLC
Address: 700 Mitchell Bridge Rd Apt 58, Athens GA 30606
Contact: Barbara Woodward
Phone: 603-654-5351
Email: None available

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Table 1 – Burton Pond Dam Characteristics

Elevation (ft) of recreation pool or height relative to lowest spillway	**NA**
Elevation (ft) of additional spillway crest(s) or height relative to the lowest spillway	**NA**
Elevation (ft) of streambed at the dam centerline or the height relative to the lowest spillway	**NA**
Height of the dam (ft) from toe to the highest point on the dam	**14**
Freeboard (ft)	**NA**
Type of spillway controls or outlet works	**Uncontrolled**
Dimensions of spillway controls or outlet works	**NA**
Surface area (ac) of impoundment at maximum impoundment	**40**
Drainage area (sq. miles)	**0.46**
Maximum storage (ac-ft)	**350**
Normal or permanent storage (ac-ft)	**300**
Total discharge capacity (cfs)	**NA**
Maximum unoperated discharge (cfs)	**75**
Design storm discharge (cfs)	**NA**
Estimated 50-year flood flow (cfs)	**NA**
Estimated 100-year flood flow (cfs)	**NA**

Source of information: DES Dam Bureau, NH Dams Data Sheet for Dam #147.17

Note:

NA – not available from NH Dams Data Sheet.

References

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

DAM MANAGEMENT PLAN

Dream Lake Dam (State Dam ID #007.15)

Figure 1 – Dream Lake Dam outlet, photo taken August 16, 2007.

Introduction

The Dream Lake Dam (lat. 42° 52’ 09”, long. -71° 36’ 12”) is located on a natural swale in Amherst, New Hampshire and just north of Baboosic Lake Road. This dam is privately owned (see contact information), its status is considered to be active and its designated use is for recreation. There is no public access to the dam.

Dam Design

The dam was reportedly built in 1966, and it consists of a concrete and earth embankment. The outlet structure is a drop inlet constructed of concrete and stone and has slots for the installation of stoplogs (Figure 1). Details on the design and operation of the dam were obtained from the records of the Department of Environmental Services (DES) Dam Bureau and from the dam owner. The information required by Env-Wq 1906.04 on the characteristics of the dam is summarized in Table 1.

Minimum Flow, Flowage Rights or Contractual Obligations

None, according to the dam owner.

Riparian Property Obligations or Agreements

None, according to the dam owner, the surrounding land is privately owned.

Water Quality Requirements or Limits

None, according to the dam owner.

Assessment of Potential Water Availability

DES Dam Bureau files show the maximum storage volume for the Dream Lake Dam is 36.24 acre-feet (or ac-ft), while its permanent storage volume is 15.44 ac-ft, with the difference being 20.8 ac-ft (906,048 cu. ft. or 6.78 million gallons). When compared with the other dams in the Water Management Plan Area, the permanent storage volume of this dam is low. In addition, the drainage area contributing runoff to the impoundment behind the dam is only 0.25 sq. miles, which due to its small area would provide limited runoff to the impoundment following any drawdown in water levels. Therefore, little water would be available for flow management from this dam.

Potential Impacts of Storage and Release of Relief Flows

Dream Lake discharges from a culvert pipe under the dam and Baboosic Lake Road and into a large wetland complex. No distinct channel is mapped in this area and it is suspected that water from the wetland discharges to an unnamed tributary which then flows southeast to discharge into the Souhegan Designated River. There is limited development downstream of the dam, although the unnamed tributary does cross Spring Road, Upham Road and Thorntons Ferry Road before discharging into the Souhegan.

The large wetland complex downstream of the outlet of the dam could reduce the effectiveness of any relief flows released from it by temporarily storing the released water. Insufficient information is available to determine the amount of water that could be stored by the wetland and its resulting impact on any relief flows.

Potential for Dam Management to Support Instream Flow Requirements

The potential for Dream Lake Dam to provide relief flow to the Souhegan Designated River is low due to it being privately owned, the low amount of storage potentially available, the small drainage upstream of the dam and the presence of a large wetland complex immediately downstream of its outlet.

The dam does have an outlet structure that would allow for controlled releases of water from the lake, although the discharge rating for the structure would need to be confirmed. In addition, the point of contribution to the Souhegan Designated River is downstream of the last direct withdrawal (Souhegan Woods Golf Club) from the river. Releases from Dream Lake Dam could potentially provide relief flow downstream of this withdrawal, but only for a brief period of time.

Dam Management Activity

No dam management activity is required at this time.

Schedule for Dam Management Plan Implementation

Since no dam management plan activity is currently required for Dream Lake Dam, there is no implementation schedule.

Estimated Cost of the Implementation of the Dam Management Plan

Since no dam management plan activity is currently required, there are no estimated costs.

Dam Owner and Contact Information

Owner: Emmagene Riccitelli
Address: 14 Dream Lake Drive, Amherst NH 03031
Contact: Same as owner
Phone: Not available
Email: Not available

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Table 1 – Dream Lake Dam Characteristics

Elevation (ft) of recreation pool or height relative to lowest spillway	**NA**
Elevation (ft) of additional spillway crest(s) or height relative to the lowest spillway	**NA**
Elevation (ft) of streambed at the dam centerline or the height relative to the lowest spillway	**NA**
Height of the dam (ft) from toe to the highest point on the dam	**6.5**
Freeboard (ft)	**NA**
Type of spillway controls or outlet works	**Stops Logs**
Dimensions of spillway controls or outlet works	**NA**
Surface area (ac) of impoundment at maximum impoundment	**10.4**
Drainage area (sq. miles)	**0.25**
Maximum storage (ac-ft)	**36.24**
Normal or permanent storage (ac-ft)	**15.44**
Total discharge capacity (cfs)	**8**
Maximum unoperated discharge (cfs)	**8**
Design storm discharge (cfs)	**NA**
Estimated 50-year flood flow (cfs)	**NA**
Estimated 100-year flood flow (cfs)	**NA**

Source of information: DES Dam Bureau, NH Dams Data Sheet for Dam #007.15

Note:

NA – not available from NH Dams Data Sheet.

References

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

DAM MANAGEMENT PLAN

New Wilton Reservoir Dam (State Dam ID #254.09)

Figure 1 – New Wilton Reservoir outlet, photo taken June 15, 2005.

Introduction

The New Wilton Reservoir Dam (lat. 42° 50’ 32”, long -71° 46’ 16”) is located on Stockwell Brook, a tributary to Stony Brook, in Wilton, New Hampshire and south of Sand Hill Road. This dam is municipally owned (see contact information), its status is considered to be active and its designated use is for water supply. The reservoir has not been used as a water supply since 1988 due to the development of a groundwater supply source. The dam is accessible to the public.

Dam Design

The dam was reportedly built in 1933, and is constructed of concrete. The outlet structure is a drop inlet and water levels can be managed by the installation of stoplogs along with a gate (Figure 1). Details on the design and operation of the dam were obtained from the records of the Department of Environmental Services (DES) Dam Bureau and from the dam owner. The information required by Env-Wq 1906.04 on the characteristics of the dam is summarized in Table 1.

Minimum Flow, Flowage Rights or Contractual Obligations

None, according to the owner.

Riparian Property Obligations or Agreements

None, according to the owner, the surrounding land is publicly owned.

Water Quality Requirements or Limits

None, according to the owner.

Assessment of Potential Water Availability

DES Dam Bureau files show, the maximum storage volume for the New Wilton Reservoir Dam is 335 acre-feet (or ac-ft), while its permanent storage volume is 240 ac-ft, with the difference being 95 ac-ft (4.1 million cu. ft. or 31 million gallons). When compared with the other dams in this Water management Planning Area, the permanent storage volume of this dam is of moderate size. The drainage area contributing runoff to the impoundment is only 0.4 sq. miles, which is small. Therefore, the water available from this dam for flow management is considered moderate to low.

Potential Impacts of Storage and Release of Relief Flows

The shoreline of the pond is undeveloped and there are no significant wetlands mapped in the pond or within its immediate drainage. So the potential impacts of the storage and release of any relief flows should be minimal.

Potential for Dam Management to Support Instream Flow Requirements

Factors supporting the potential use of the New Wilton Reservoir Dam for flow management include; the public ownership of the dam, the existence of flow control structures (although they may require upgrading), the absence of residences on the reservoir and because it is no longer used as a public water supply source.

The location of the New Wilton Reservoir Dam in the central portion of the Souhegan River drainage basin is also favorable. Releases from this dam would be conveyed by Stockwell Brook to Stony Brook, which then discharges to the Souhegan Designated River in Wilton. These releases could provide some relief flow to the lower portion of Souhegan Designated River.

The limiting factors relative to this site include the moderate volume of water storage and the small size of the drainage area providing runoff to the reservoir. These limiting factors are significant and, as a result, the potential for dam management at this site to meet the instream flow requirements is considered to be moderate to low.

Dam Management Activity

No dam management activity is required at this time.

Schedule for Dam Management Plan Implementation

Since no dam management plan activity is currently required New Wilton Reservoir Dam, there is no implementation schedule.

Estimated Cost of the Implementation of the Dam Management Plan

Since no dam management plan activity is currently required, there are no estimated costs.

Dam Owner and Contact Information

Owner: Town of Wilton
Address: P.O. Box 83, Wilton, NH 03086
Contact: Steve Elliot, Water Commissioner
Phone: 603-654-9451
Email: None provided

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Table 1 – New Wilton Reservoir Dam Characteristics

Elevation (ft) of recreation pool or height relative to lowest spillway	**NA**
Elevation (ft) of additional spillway crest(s) or height relative to the lowest spillway	**NA**
Elevation (ft) of streambed at the dam centerline or the height relative to the lowest spillway	**NA**
Height of the dam (ft) from toe to the highest point on the dam	**24**
Freeboard (ft)	**1.3**
Type of spillway controls or outlet works	**Stops Logs, Gate**
Dimensions of spillway controls or outlet works	**NA**
Surface area (ac) of impoundment at maximum impoundment	**22.1**
Drainage area (sq. miles)	**0.4**
Maximum storage (ac-ft)	**335**
Normal or permanent storage (ac-ft)	**240**
Total discharge capacity (cfs)	**127**
Maximum unoperated discharge (cfs)	**105**
Design storm discharge (cfs)	**33.3**
Estimated 50-year flood flow (cfs)	**NA**
Estimated 100-year flood flow (cfs)	**33.3**

Source of information: DES Dam Bureau, NH Dams Data Sheet for Dam #254.09

Note:

NA – not available from NH Dams Data Sheet.

References

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

DAM MANAGEMENT PLAN

Osgood Pond Dam (State Dam ID #159.04)

Figure 1 - Osgood Pond Dam, photo taken September 25, 2007.

Introduction

The Osgood Pond Dam (lat 42° 49'14", long -71°39'50") is located on Great Brook in the Town of Milford, New Hampshire and west of Osgood Road. This dam impounds Osgood Pond, which is listed by the Department of Environmental Services (DES) as a Great Pond. The dam is municipally owned (see contact information), its status is considered to be active and its designated use is for recreation. A parking area and a small park with several park benches are located at the dam.

Dam Design

The dam was reportedly built in 1861, and is constructed of stone and earth materials. The outlet structure is constructed of concrete and stone and has slots for the installation of stoplogs (Figure 1). Details on the design and operation of the dam were obtained from the records of the DES Dam Bureau and from the dam owner. The information required by Env-Wq 1906.04 on the characteristics of the dam is summarized in Table 1.

Minimum Flow, Flowage Rights or Contractual Obligations

None, according to the owner.

Riparian Property Obligations or Agreements

None, according to the owner. Surrounding land is both privately and publically owned.

Water Quality Requirements or Limits

None, according to the owner.

Assessment of Potential Water Availability

DES Dam Bureau files show the maximum storage volume for the Osgood Pond Dam is 270 acre-feet (or ac-ft), while its permanent storage volume is 57 ac-ft, with the difference being 213 ac-ft (9.3 million cu. ft. or 69.4 million gallons). Due to a historical sedimentation problem in the pond, the actual permanent storage volume could be significantly less than reported. At the request of the Town, the New England District of the U.S. Army Corps of Engineers has proposed an aquatic ecosystem restoration project. This project would include the hydraulic dredging of sediment over a 15 acre area to increase the depth of Osgood Pond to 10 feet.

The drainage area upstream of the dam is 5.24 sq. miles, which would provide recharge to the pond. The outlet structure at the dam can accommodate stoplogs, so controlled releases of water from the dam could be performed.

Potential Impacts of Storage and Release of Relief Flows

Extensive forested and shrub wetlands are mapped within the immediate drainage of the impoundment. Raising or lowering of the water levels within the impoundment for long durations could affect these wetland complexes.

A concern associated with the release of water from Osgood Pond, in its current shallow condition, would be the possible water quality (thermal) impacts to the Souhegan Designated River.

Potential for Dam Management to Support Instream Flow Requirements

Operation of the Osgood Pond Dam for flow management may be potentially feasible, especially since the dam is owned and operated by a public agency and because the outlet structure allows for controlled flow releases. In addition, its location in the central portion of the Souhegan River basin would provide some water for relief flows in the lower basin. However, under its current condition, the amount of water actually available for flow management could be significantly lower than expected and any releases from the dam could result in water quality impacts to the Souhegan Designated River.

Dam Management Activity

No dam management activity is required at this time.

Schedule for Dam Management Plan Implementation

Since no dam management plan activity is currently required for Osgood Pond Dam, there is no proposed implementation schedule.

Estimated Cost of the Implementation of the Dam Management Plan

Since no dam management plan activity is currently required, there are no estimated costs.

Dam Owner and Contact Information

Owner: Town of Milford
Address: 289 South Street, Milford, NH 03055
Contact: Rick Riendeau, Director of Public Works
Phone: 603-673-1662
Email: rriendeau@milford.nh.gov

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Table 1 – Osgood Pond Dam Characteristics

Elevation (ft) of recreation pool or height relative to lowest spillway	**NA**
Elevation (ft) of additional spillway crest(s) or height relative to the lowest spillway	**NA**
Elevation (ft) of streambed at the dam centerline or the height relative to the lowest spillway	**NA**
Height of the dam (ft) from toe to the highest point on the dam	**9**
Freeboard (ft)	**1.9**
Type of spillway controls or outlet works	**Stops Logs**
Dimensions of spillway controls or outlet works	**NA**
Surface area (ac) of impoundment at maximum impoundment	**24.16**
Drainage area (sq. miles)	**5.24**
Maximum storage (ac-ft)	**270**
Normal or permanent storage (ac-ft)	**57**
Total discharge capacity (cfs)	**581.8**
Maximum unoperated discharge (cfs)	**581.8**
Design storm discharge (cfs)	**158.6**
Estimated 50-year flood flow (cfs)	**NA**
Estimated 100-year flood flow (cfs)	**NA**

Source of information: DES Dam Bureau, NH Dams Data Sheet for Dam #159.04

Note:

NA – not available from NH Dams Data Sheet.

References

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

DAM MANAGEMENT PLAN

Pratt Pond Dam (State Dam ID #175.03)

Figure 1 – Pratt Pond Dam outlet, photo taken June 10, 2005.

Introduction

Pratt Pond Dam (lat. 42° 44' 11", long. -71° 54' 20") is located on Pratt Pond Brook in New Ipswich, New Hampshire and off of Lower Pratt Pond Road. This dam impounds Pratt Pond, which is listed by the Department of Environmental Services (DES) as a Great Pond. This dam is privately owned (see contact information), its status is considered to be active and its designated use is for recreation. There is no public access at the dam or to the pond.

Dam Design

The dam was reportedly built in 1890, and is constructed of concrete. The outlet structure is constructed of concrete and has slots for the installation of stoplogs (Figure 1). Details on the design and operation of the dam were obtained from the records of the DES Dam Bureau and from the dam owner. The information required by Env-Wq 1906.04 on the characteristics of the dam is summarized in Table 1.

Minimum Flow, Flowage Rights or Contractual Obligations

The Pratt Pond Association stated that it owns the flowage rights from the dam to the stone arch bridge at Route 124 in New Ipswich (Warwick Mills).

Riparian Property Obligations or Agreements

None, according to the owner, the property surrounding the pond is privately owned.

Water Quality Requirements or Limits

No information is available on this; the dam owner is unaware of any such requirements.

Assessment of Potential Water Availability

DES Dam Bureau files show the maximum storage volume for Pratt Pond Dam is 110 acre-feet (ac-ft), while its permanent storage volume is 58 ac-ft, with the difference being 52 ac-ft (2.3 million cu. ft. or 16.9 million gallons). When compared with the other dams being evaluated as part of this study the permanent storage volume of Pratt Pond Dam is relatively low. In addition, the drainage area behind the dam is only 0.74 sq miles. Therefore, little water would be available for flow management from this dam.

Potential Impacts of Storage and Release of Relief Flows

One potential impact of the storage and subsequent release of water from the Pratt Pond Dam for flow management would be the modification and change in the ponds water level, which could affect waterfront residential property.

Any flow management releases from Pratt Pond Dam would travel via Pratt Pond Brook and into the Smithville Reservoir (also known as Souhegan River Site #35) approximately 1.5 miles downstream. From here the flow would be conveyed by the West Branch Souhegan River, joining with the flow from the South Branch Souhegan River, before discharging into Waterloom Pond. Any releases from Pratt Pond Dam would need to be coordinated with the DES Dam Bureau relative to the available storage and operation of the Smithville Reservoir to ensure conveyance of the relief flow to the Souhegan River.

Potential for Dam Management to Support Instream Flow Requirements

Although the outlet structure of this dam would allow for managed releases, the overall potential for this dam to provide relief flow is low due to the private ownership of the dam and the property around the impoundment, the small amount of storage potentially available and its small drainage area. An additional complication is that any water released from the Pratt Pond Dam would discharge into the Smithville Reservoir, which is a flood control reservoir owned by the DES Dam Bureau.

Dam Management Activity

No dam management activity is required at this time.

Schedule for Dam Management Plan Implementation

Since no dam management plan activity is currently required for Pratt Pond Dam, there is no implementation schedule.

Estimated Cost of the Implementation of the Dam Management Plan

Since no dam management plan activity is currently required, there are no estimated costs.

Dam Owner and Contact Information

Owner: Pratt Pond Association
Address: 99 Lower Pratt Pond Road, New Ipswich, NH
Contact: Dan Blanchette, PPA President
Phone: 603-291-0393
Email: None provided.

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Table 1 – Pratt Pond Dam Characteristics

Elevation (ft) of recreation pool or height relative to lowest spillway	**NA**
Elevation (ft) of additional spillway crest(s) or height relative to the lowest spillway	**NA**
Elevation (ft) of streambed at the dam centerline or the height relative to the lowest spillway	**NA**
Height of the dam (ft) from toe to the highest point on the dam	**6.5**
Freeboard (ft)	**1.5**
Type of spillway controls or outlet works	**Stops Logs**
Dimensions of spillway controls or outlet works	**NA**
Surface area (ac) of impoundment at maximum impoundment	**35**
Drainage area (sq. miles)	**0.74**
Maximum storage (ac-ft)	**110**
Normal or permanent storage (ac-ft)	**58**
Total discharge capacity (cfs)	**128**
Maximum unoperated discharge (cfs)	**36**
Design storm discharge (cfs)	**47**
Estimated 50-year flood flow (cfs)	**NA**
Estimated 100-year flood flow (cfs)	**NA**

Source of information: DES Dam Bureau, NH Dams Data Sheet for Dam #175.03

Note:

NA – not available from NH Dams Data Sheet.

References

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

DAM MANAGEMENT PLAN

Souhegan Site 8 Dam (State Dam ID #147.28)

Figure 1 – Souhegan Site 8 Dam outlet, photo taken June 17, 2005.

Introduction

The Souhegan Site 8 Dam (lat. 42° 53’ 07”, long. -71° 46’ 08”), also known as the James AG Putnam Dam, is located on Furnace Brook in Lyndeborough, New Hampshire and west of Cemetery Road. The dam impounds Furnace Brook and the resulting pond is referred to as Putnam Pond. Two other structures (Cemetery Dike #147.36 and South Dike #147.37) are also part of this flood control facility, but neither of them have an outlet structure, so they are only used to contain flood water behind the dam. This dam is owned by the New Hampshire Water Division (see contact information). The dam is active and its use is for flood control. There is public access to Putnam Pond, which is a conservation area (Putnam Pond Conservation Area).

Water released from the Souhegan Site 8 Dam flows into Furnace Brook, which flows to the southwest for approximately one mile before turning to the southeast. At a distance of approximately 1.7 miles, Furnace Brook discharges into Stony Brook. Stony Brook then flows 2.7 miles to the southeast to join the Souhegan Designated River.

Dam Design

The dam was reportedly built in 1977 and is constructed of concrete and the outlet is a concrete drop inlet structure (Figure 1). Details on the design and operation of the dam were obtained from the records of the New Hampshire Department of Environmental Services (DES) Dam Bureau, the dam owner and operator. The information required by Env-Wq 1906.04 on the characteristics of the dam is summarized in Table 1.

Minimum Flow, Flowage Rights or Contractual Obligations

The state owned dam is located on private property. The state flowage rights only permit/allow for water levels to be raised during storm events to abate flooding downstream. The Putnam Pond Conservation Area surrounds the pond and is administered by the DES.

Riparian Property Obligations or Agreements

There are warranty deed/easement deeds in place, according to the dam owner.

Water Quality Requirements or Limits

There are no water quality requirements or limits associated with this dam.

Assessment of Potential Water Availability

DES Dam Bureau files show the maximum storage volume for the Souhegan River Site 8 Dam is 2,721 acre-feet (ac-ft), while its permanent storage volume is 180 ac-ft, with the difference being 2,541 ac-ft (110.7 million cu. ft. or 828 million gallons). When compared to the other dams in this Water Management Planning Area, this dam has the second highest potential storage. Because this is a flood control dam, the Natural Resources Conservation Service (NRCS), which contributed to the construction of the Souhegan River basin flood control dam network, requires that 85 percent of flood storage volume be available following a previous storm event. This restriction reduces the potential available storage volume to 381 ac-ft (16.6 million cu. ft. or 124 million gallons) which is large.

The drainage area upstream of the dam is 4.7 square miles, which should provide sufficient flow for the refilling of the reservoir during periods of below normal precipitation. Therefore, based on the available storage volume and the size of the contributing drainage area, the potential water available from this dam for flow management is considered high.

Potential Impacts of Storage and Release of Relief Flows

The major impact of storing water within Putnam Pond above the permanent pool level would be the flooding of a large emergent and forested wetland complex located immediately east of the pond. Based on National Wetlands Inventory (NWI) mapping approximately 82 acres of wetlands would be inundated if water was stored at the maximum storage volume. These wetlands are part of a much larger wetland complex system located along Furnace Brook, which has been noted as one of the most important ecological landscapes in Lyndeborough (Trudeau 2009).

Storage of water for flow management would also result in elevated water levels on private land. The state flowage rights only permit/allow for water levels to be raised during storm events to abate flooding downstream. The existing agreements with landowners would have to be renegotiated to allow for non-flood control storage.

Potential for Dam Management to Support Instream Flow Requirements

When compared with the other flood storage dams in the Souhegan basin, the large potential storage volume of this dam makes it favorable for the storage and release of water for flow management. However, limiting factors for its use include: its location in the middle portion of the basin so that it would only provide water to the lower half of the designated river, the existing flowage rights which only allow for flood control storage, the impact of elevated water levels on the extensive wetlands at the site, the ecological value of this landscape feature and the need to retrofit the outlet structure to allow for the managed release of water. These limiting factors are significant and, as a result, the potential for dam management at this site to meet the instream flow requirements is considered to be low.

Dam Management Activity

No dam management activity is required at this time.

Schedule for Dam Management Plan Implementation

Since no dam management plan activity is currently required for Souhegan River Site 8, there is no implementation schedule.

Estimated Cost of the Implementation of the Dam Management Plan

Since no dam management plan activity is currently required, there are no estimated costs.

Dam Owner and Contact Information

Owner: NH Water Division
Address: P.O. Box 95, 29 Hazen Drive, Concord, NH 03302-0095
Contact: James Gallagher
Phone: 603-271-3406
Email: james.gallagher@des.nh.gov

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Table 1 – Souhegan River Site 8 Dam Characteristics

Elevation (ft) of recreation pool or height relative to lowest spillway	**682***
Elevation (ft) of additional spillway crest(s) or height relative to the lowest spillway	**688.5&696.5***
Elevation (ft) of streambed at the dam centerline or the height relative to the lowest spillway	**680.6***
Height of the dam (ft) from toe to the highest point on the dam	**25**
Freeboard (ft)	**9**
Type of spillway controls or outlet works	**Drop Inlet**
Dimensions of spillway controls or outlet works	**NA**
Surface area (ac) of impoundment at maximum impoundment	**40**
Drainage area (sq. miles)	**4.7**
Maximum storage (ac-ft)	**2721**
Normal or permanent storage (ac-ft)	**180**
Total discharge capacity (cfs)	**7140**
Maximum unoperated discharge (cfs)	**7140**
Design storm discharge (cfs)	**NA**
Estimated 50-year flood flow (cfs)	**NA**
Estimated 100-year flood flow (cfs)	**77.5**

Source of information: DES Dam Bureau, NH Dams Data Sheet for Dam #147.28

Note:

* - from DES Dam Bureau plans on file.
NA – not available from NH Dams Data Sheet.

References

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

Trudeau, J.M. 2009. Hills, Woods, and Sweeping Vales: A Natural Resources Inventory of Lyndeborough, New Hampshire. Preserve Land Works, Hancock, New Hampshire. Report prepared for Lyndeborough Conservation Commission.

DAM MANAGEMENT PLAN

Souhegan River Site 12A South (State Dam ID #234.11) and Souhegan River Site 12A North (State Dam ID #234.16)

Figure 1 – Souhegan River Site 12A South Dam, photo taken September 3, 2008.

Introduction

The Souhegan River Site 12A South Dam (also known as the Senator Charles W. Tobey Dam) (lat. 42° 47'42", long. -71° 49'45") is located on Richardson Brook in Temple, New Hampshire and east of State Route 45. This dam is owned by the NH Water Division (see contact information). The dam is active and its designated use is for flood control, but it is also used as the public water supply source for the Town of Greenville, New Hampshire. Tobey Reservoir is impounded by the Site 12A South Dam and the Site 12A North Dam.

Water released from the South Dam discharges into Richardson Brook, which flows south 1.6 miles and discharges into the Souhegan Designated River approximately 1.3 miles downstream of Greenville. The North Dam only includes a pond drain. Water released from the North River discharges to an unnamed tributary of Temple Brook and flows 5.5 miles to the north and then to the east via Blood Brook in Wilton and discharges into the Souhegan Designated River approximately 4 miles downstream of Greenville.

Dam Design

Both dams were built in 1965 and are constructed of earth material. The outlet structure for the reservoir is a concrete riser located at the South Dam (Figure 1). Details on the design and operation of the dams were obtained from the Department of Environmental Services (DES) Dam Bureau, the operator of both dams. The information required by Env-Ws 1906.04 on the characteristics of the Site 12A South Dam is summarized in Table 1.

Minimum Flow, Flowage Rights or Contractual Obligations

According to the DES Dam Bureau, there are deeded easement restrictions and the reservoir is the water supply source for the Town of Greenville, New Hampshire.

Riparian Property Obligations or Agreements

Deeded easement restrictions and shared storage with Town of Greenville.

Water Quality Requirements or Limits

No information is available on this; the facility owner is unaware of any such requirements.

Assessment of Potential Water Availability

Management of the Site 12A Dam in combination with other impoundments could provide sufficient storage to reset flow above the Rare/Critical protected instream flow levels established for the Souhegan Designated River. The DES Dam Bureau files show the maximum storage volume for the Souhegan River Site 12A South as 3,310 acre-feet (ac-ft), while its permanent storage volume is 690 ac-ft, for a difference of 2,620 ac-ft (114 million cu. ft. or 854 million gallons). When compared to the other dams in this Water Management Planning Area, this dam has the largest potential storage volume. Because this is a flood control dam, the Natural Resources Conservation Service, which contributed to the construction of the Souhegan River basin flood control dam network, requires that 85 percent of the flood storage volume be available following a previous storm event. This condition reduces the potential available storage, left above the permanent storage, to 393 ac-ft (17.1 million cu. ft. or 128 million gallons), which is large when compared with the other dams in this Water Management Planning Area.

The volume that is available for use is much less than this. DES would use at most the volume within a two foot range of water level change in order to protect impoundment habitat. The surface area of the impoundment's permanent pool is 108 acres, resulting in about 216 ac-ft of storage within 2 feet of water level change.

In addition to the volume designated for flood storage, a portion of the total volume is designated for water supply. Based on the information available from the DES Dam Bureau, 652 ac-ft of the permanent storage (690 ac-ft) is designated for water supply.

The drainage area contributing runoff to the reservoir is 5.6 sq. miles, which should provide sufficient flow for the refilling of the reservoir during periods of below normal precipitation. Therefore, the potential of this dam for flow management is high. In addition, two DES Dam Bureau flood control dams (Sites 19 and 35) and Waterloom Pond Dam are located upstream. These facilities will also be used as sources of water for flow management. Based their relative location in the watershed, Sites 19 and 35 are responsible together for 21% of each flow release, Waterloom for 17%, and Site 12A for 62%. So long as each upstream impoundment supports at minimum these respective portions of the overall release, the instream flows will be met for the intervening segments.

Potential Impacts of Storage and Release of Relief Flows

A review of National Wetlands Inventory (NWI) mapping available for the site and for the stream between the South Dam and the Souhegan Designated River did not indicate any significant wetlands. In addition, a review of information available from the New Hampshire Natural Heritage Bureau (NHNHB) shows that there are no records of any federal or state-listed rare threatened or endangered (RTE) species or Exemplary Natural Communities for the area of the impoundment. As a result, the potential impacts of the storage and release of relief flows at the site appear limited.

Potential for Dam Management to Support Instream Flow Requirements

Management of this dam for instream flow could potentially provide 216 ac-ft of water for flow management on the Souhegan Designated River. In addition to the large volume of water stored in the Tobey Reservoir, its location in the upper portion of the Souhegan River basin is also a favorable characteristic of this site. Water released from the South Dam could provide relief flows to approximately 28.3 miles of the 34.1 miles of Designated River. Therefore, management of the Site 12A South Dam could provide sufficient water, in coordination with other dams in the Water Management Planning Area, to maintain the instream flow requirements for the Souhegan Designated River and this dam is a primary candidate for this purpose.

The chief purpose of the dam is for flood control. DES has contacted the Natural Resources Conservation Service regarding the addition of flow management as a designated use of the facility and has received their support for this concept. The Natural Resources Conservation Service has agreed with the use for instream flow purposes within the limits of maintaining the impoundment's flood control capacity (Ellsmore, 2012).

The dam is also used as the Town of Greenville's water supply. Per the design records of the facility, 652 ac-ft of water is to be available for the Town of Greenville's water supply. DES has spoken with representatives of the Town of Greenville and they would support the use of the dam for the storage and release of release flows as long as the operation of the dam for this purpose does not impact storage for water supply. Operation of the dam for instream flow purposes should protect the water supply interests of the Town of Greenville.

The dam's outlet will need to be changed to allow active management. The current configuration of the outlet structure is not designed for the storage and release of relief flows.

Additional evaluation will need to be performed to determine how the dam would be operated for flow management. In order to make the outlet structure operable for releasing flow, the outlet would need to be retrofitted. The cost to retrofit the outlet structure was estimated to be $136,000 by the DES Dam Bureau. A source of funding will need to be identified for the design, retrofitting, operation and maintenance of the dam for flow management.

Dam Management Activity

Site 12A Dam's primary use is described by the DES Dam Bureau as flood control. It is also the primary water supply source for the Town of Greenville. The use of Site 12A Dam will be expanded to include instream flow.

When water management activities are necessary, water will be released from the Site 12A Dam as described in Table 2 to create relief flows to support the protected instream flows on the Souhegan Designated River. For release flow conditions not described in Table 2, stream flow conditions that would attain the protected flows and management needs remain undefined. Stream flow conditions will continue to be compared to protected flow criteria and management needs will be defined if deficit conditions begin to occur. Coordination of these releases with other dams relative to timing and volumes will be addressed as part of the continuing evaluation of dam management described in the Water Management Plan.

Site 12A can assist in management of both the upper and lower Souhegan River segments. Protected flow conditions will be evaluated at two gages measuring the upper and lower segments. Flow conditions will be evaluated based on the records from the United States Geological Survey (USGS) gaging stations 01093852 Souhegan River (Site WLR-1) near Milford, NH and 01094000 Souhegan River at Merrimack, NH.

Site 12A Dam relief flows will be released when flows on the Souhegan Designated River fall below the Critical or Rare flow level for a period greater than their catastrophic duration or in response to repeated persistent events. The release from the Site 12A Dam will be coordinated with releases from other watershed dams to provide a relief flow.

The operation of the dam for the storage and release of relief flows for flow management will be performed to limit negative effects on impoundment habitat and the Town of Greenville's water supply system. To minimize the effects on habitat, the maximum water level change resulting from the storage and release of water for the relief flows will be two feet. No releases will be made if the effect of the release on water supply storage would result in conditions that would jeopardize human health and safety. As a result, DES anticipates increasing the impoundment water level by up to two feet to provide additional storage for instream flow protection which will ensure the water supply storage remains intact.

The DES Instream Flow Program will provide notification to the dam owner of an impending flow management release. The DES Dam Bureau as the owner of the dam will be responsible for the operation of dam to support the protected instream flows on the Souhegan Designated River. The DES Dam Bureau will take such actions as are necessary to adjust the controls of the outlet structure to increase flow from the dam by an amount and at a time identified by the DES

Instream Flow Program. The DES Instream Flow Program will notify the Town of Greenville and downstream dam owners in advance of planned relief flow releases from the Site 12A Dam.

Schedule for Dam Management Plan Implementation

DES will evaluate the retrofitting of the outlet structure and its reconstruction. This Dam Management Plan will be implemented when after funding is obtained and the reconstruction has been completed.

Estimated Cost of the Implementation of the Dam Management Plan

The estimated cost for the implementation of a Dam Management Plan for the Site 12A Dam includes both capital and recurring costs. The capital cost is associated with retrofitting the outlet structure, so it can be used for flow management of the Souhegan Designated River. The DES Dam Bureau has performed an initial evaluation of the potential cost to modify the outlet structures on two other flood control dams (Site 19 and Site 35) as part of this project. Assuming that the outlet structure at Site 12A would require similar modification, its cost would be $136,000 (see Appendix D). The recurring costs are associated with operation and maintenance of the outlet structure. This work requires that at least one trained DES employee travel to the site to adjust the outlet structure to release or store water. The costs associated with this work will be dependent upon the number of personnel involved, the number of site visits required to perform the necessary flow management releases and the travel time and mileage.

Dam Owner and Contact Information

Owner: NH Water Division
Address: P.O. Box 95, 29 Hazen Drive, Concord, NH 03302-0095
Contact: James Gallagher
Phone: 603-271-3406
Email: james.gallagher@des.nh.gov

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Table 1 – Site 12A South Dam Characteristics

Elevation (ft) of recreation pool or height relative to lowest spillway	**861.0***
Elevation (ft) of additional spillway crest(s) or height relative to the lowest spillway	**873.0***
Elevation (ft) of streambed at the dam centerline or the height relative to the lowest spillway	**839.8***
Height of the dam (ft) from toe to the highest point on the dam	**33.5**
Freeboard (ft)	**8.5**
Type of spillway controls or outlet works	**Riser**
Dimensions of spillway controls or outlet works	**NA**
Surface area (ac) of impoundment at maximum impoundment	**108**
Drainage area (sq. miles)	**5.6**
Maximum storage (ac-ft)	**3310**
Normal or permanent storage (ac-ft)	**690**
Total discharge capacity (cfs)	**6310**
Maximum unoperated discharge (cfs)	**6310**
Design storm discharge (cfs)	**922**
Estimated 50-year flood flow (cfs)	**NA**
Estimated 100-year flood flow (cfs)	**922**

Sources of information: DES Dam Bureau, NH Dams Data Sheets for Dams #234.11 (Site 12A South) and 234.16 (Site 12A North).

Note:

*- from DES Dam Bureau plans on file.
NA – not available from NH Dams Data Sheets.

References

Department of Environmental Services (DES) Dam Data Sheet 234.11.

Department of Environmental Services (DES) 2013. Declaration of the Establishment of Protected Instream Flows for the Souhegan Designated River.

Department of Environmental Services (DES) 2008. Final Souhegan River Protected Instream Flow Report. Prepared by University of New Hampshire, University of Massachusetts and Normandeau Associates, Inc.. NHDES-R-06-50.

Ellsmore, Richard. State Conservationist, USDA - NRCS, February, 15, 2012. Personal communication by email.

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

Table 2 - Two-Day Flow Release Contribution from Site 12A Dam in the Event of Instream Flow Water Management.

Site 12A (Tobey Reservoir)		Upper Souhegan Release					
Bioperiod	**Bioperiod name**	**Start**	**End**	**Volume needed to meet 90% of historical deficits with 20% buffer (ac-ft)**	**Two-day flow release contribution (cfs)**	**Change in water level from full pool (feet)**	**Notes**
1	Overwintering	15-Nov	28-Feb	11.8	8.9	0.11	
2	Spring Flood	1-Mar	30-Apr	12.2	9.2	0.11	
3	Clupeid Spawning	1-May	14-Jun	--	--	--	Release flow management currently too rare to define release flows.
4	GRAF Spawning	15-Jun	14-Jul	--	--	--	Release flow management currently too rare to define release flows.
5	Rearing & Growth	15-Jul	30-Sep	7.2	5.4	0.07	
6	Salmon Spawning	1-Oct	14-Nov	--	--	--	Release flow management currently too rare to define release flows.
Site 12A (Tobey Reservoir)		Lower Souhegan Release					
1	Overwintering	15-Nov	28-Feb	23.7	6.0	0.22	
2	Spring Flood	1-Mar	30-Apr	--	--	--	Release flow management currently too rare to define release flows.
3	Clupeid Spawning	1-May	14-Jun	--	--	--	Release flow management currently too rare to define release flows.
4	GRAF Spawning	15-Jun	14-Jul	--	--	--	Release flow management currently too rare to define release flows.
5	Rearing & Growth	15-Jul	30-Sep	20.2	5.1	0.19	
6 revised	Salmon Spawning	1-Oct	14-Nov	54.9	13.9	0.51	

Waterbody	**Area of flow responsibility (sq. mi.)**	**Percent contribution to protected flow release**	**Surface area of waterbody (acres)**	**Description of area of flow responsibility**
Site 19 and/or Site 35	21.4	21%	~25	upper SR watershed to entrance to WL Pond
Waterloom Pond	38.8	17%	75	to confluence with Tobey Res outlet to SR
Site 12A (Tobey Reservoir)	103.0	62%	108	to gage - Souhegan Near Milford

DAM MANAGEMENT PLAN

Souhegan River Site 15 Dam (State Dam ID #254.30)

Figure 1 – Souhegan River Site 15 Dam outlet structure, photo taken June 15, 2005.

Introduction

The Souhegan River Site 15 Dam (lat. 42° 47’ 54”, long. -71° 48’ 20”) is located on King Brook in Wilton, New Hampshire and west of Heald Road. This dam is owned by the NH Water Division (see contact information), its status is considered to be active and its designated use is for flood control. The impoundment behind the dam is referred to as the King Brook Reservoir, which straddles town line of Temple (west) and Wilton (east).

Water from the dam is discharged into King Brook, which flows to the east and into Batchelder Pond, approximately 650 feet downstream of the dam. King Brook then flows from Batchelder Pond to its confluence with the Souhegan Designated River, approximately 1.2 miles downstream from the dam. The corridor along King Brook, between the dam and the river, is largely undeveloped, but the brook crosses Heald Road, Russell Hill Road, King Brook Road (four times) and State Route 31, just before it discharges into the Souhegan Designated River.

Dam Design

The dam was reportedly built in 1963, and is constructed of earth material, while its outlet structure is a concrete riser (Figure 1). Details on the design and operation of the dam were obtained from the records of the Department of Environmental Services (DES) Dam Bureau, the dam owner and operator. The information required by Env-Wq 1906.04 on the characteristics of the dam is summarized in Table 1.

Minimum Flow, Flowage Rights or Contractual Obligations
According to the DES Dam Bureau there are deeded easement restrictions.

Riparian Property Obligations or Agreements

The DES Dam Bureau did not indicate whether there were any riparian property obligations or agreements associated with this dam.

Water Quality Requirements or Limits

According to the DES Dam Bureau, there are no water quality requirements associated with their operation of the dam.

Assessment of Potential Water Availability

DES Dam Bureau files show, the maximum storage volume for the Souhegan River Site 15 Dam is 708 acre-feet (or ac-ft), while its permanent storage volume is 74 ac-ft, with the difference being 634 ac-ft (27.6 million cu. ft. or 206.6 million gallons). Because this is a flood control dam, the Natural Resources Conservation Service (NRCS), which contributed to the construction of the Souhegan River basin flood control dam network, requires that 85 percent of the flood storage volume be available following a previous storm event. This restriction reduces the potential available storage volume to 95.1 ac-ft (4.1 million cu. ft. or 31 million gallons). When compared to other existing flood control dams in the Souhegan River Water Management Planning Area, this value is considered to be low. An additional potential limiting factor is the small size of its contributing drainage area, 1.1 sq. miles, which could limit the volume of water available for the refilling of the reservoir during periods of below normal precipitation.

Potential Impacts of Storage and Release of Relief Flows

Within the upper portion of the impoundment area are mapped areas of emergent and forested wetlands. Portions of these wetland complexes could be inundated by water stored for flow augmentation. Depending on the depth and duration of inundation, these wetlands could be negatively impacted by water storage.

Potential for Dam Management to Support Instream Flow Requirements

Factors favoring the use of the Site 15 Dam for the storage and release of water for relief flows include; public ownership of the dam, the absence of residences around the impoundment and its location in the upper Souhegan River basin. With the dam located in the upper portion of the watershed, water released from it could augment flow in the lower two thirds of the basin.

Factors limiting this dam for consideration include; the existence of deeded easements that restrict the storage of water for flood control, the requirement to keep 85 percent of the storage volume available for the retention of flood runoff which significantly reduces the amount of water available for flow management, the small size of the contributing drainage area, the presence of emergent and forested wetlands that could be inundated by water storage. In

addition, the outlet structure for the dam is manually operated and is currently configured to release water in response to flood events. The outlet structure would need to be retrofitted to allow for the managed release of flows from the dam. These limiting factors are significant and, as a result, the potential for dam management at this site to meet the instream flow requirements is considered to be low.

Dam Management Activity

Since the potential use of the Souhegan River Site 15 Dam for maintaining instream flow on the Souhegan Designated River is considered low, no dam management activity is currently required.

Schedule for Dam Management Plan Implementation

Since no dam management plan activity is currently required for this site, there is no implementation schedule.

Estimated Cost of the Implementation of the Dam Management Plan

Since no dam management activity is currently required, there are no estimated costs.

Dam Owner and Contact Information

Owner: NH Water Division
Address: P.O. Box 95, 29 Hazen Drive, Concord, NH 03302-0095
Contact: James Gallagher
Phone: 603-271-3406
Email: james.gallagher@des.nh.gov

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Table 1 – Site 15 Dam Characteristics

Elevation (ft) of recreation pool or height relative to lowest spillway	**NA**
Elevation (ft) of additional spillway crest(s) or height relative to the lowest spillway	**NA**
Elevation (ft) of streambed at the dam centerline or the height relative to the lowest spillway	**NA**
Height of the dam (ft) from toe to the highest point on the dam	**13**
Freeboard (ft)	**NA**
Type of spillway controls or outlet works	**Riser**
Dimensions of spillway controls or outlet works	**NA**
Surface area (ac) of impoundment at maximum impoundment	**69**
Drainage area (sq. miles)	**1.1**
Maximum storage (ac-ft)	**708**
Normal or permanent storage (ac-ft)	**74**
Total discharge capacity (cfs)	**NA**
Maximum unoperated discharge (cfs)	**1,040**
Design storm discharge (cfs)	**NA**
Estimated 50-year flood flow (cfs)	**NA**
Estimated 100-year flood flow (cfs)	**24**

Source of information: DES Dam Bureau, NH Dams Data Sheet for Dam #254.30

Note:

NA – not available from NH Dams Data Sheet

References

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

DAM MANAGEMENT PLAN

Souhegan River Site 19 Dam (State Dam ID #175.19)

Figure 1 – Souhegan River Site 19 Dam and outlet structure, photo taken June 15, 2005.

Introduction

The Souhegan River Site 19 Dam (also known as the Ashburnham Road Dam or the South Branch Dam) (lat. 42° 43’ 25”, long. -71° 51’02”) is located on the South Branch of the Souhegan River in New Ipswich, New Hampshire and east of Ashburnham Road. This dam is owned by the NH Water Division (see contact information). The dam is active and its use is for flood control.

Water released from the dam flows north in the South Branch of the Souhegan River. It then flows under Ashby Road and then joins with the West Branch of the Souhegan River and an unnamed tributary to form the Souhegan River, approximately 3,300 feet downstream of the dam. This point also represents the beginning of the Souhegan Designated River. Shortly downstream from this point the river then flows into Waterloom Pond, the impoundment formed by Waterloom Dam.

Dam Design

The dam was built in 1962 and reconstructed in 1980. It is constructed of earth materials, while its outlet structure is a concrete drop inlet (Figure 1). Details on the design and operation of the dam were obtained from the records of the Department of Environmental Services (DES) Dam

Bureau, the dam owner and operator. The information required by Env-Ws 1906.04 on the characteristics of the dam is summarized in Table 1.

Minimum Flow, Flowage Rights or Contractual Obligations

This state owned dam facility is located on private property. Deeded easements only permit the state to raise water levels during storm events to help prevent flooding downstream.

Riparian Property Obligations or Agreements

According to the DES Dam Bureau there are deeded easements. These rights limit the storage of flood waters to a specified level and to the time required for the impoundment to drain after a storm event.

Water Quality Requirements or Limits

There are no water quality requirements or limits associated with this dam.

Assessment of Potential Water Availability

Management of the Site 19 Dam in combination with other impoundments would provide sufficient storage to reset flow above the Rare/Critical protected instream flow levels established for the Souhegan Designated River. The DES Dam Bureau files show the maximum storage volume for the Souhegan River Site 19 Dam is 2,072 acre-feet (ac-ft), while its permanent storage volume is 85.3 ac-ft, for a difference of 1986.7 ac-ft (86.5 million cu. ft. or 647 million gallons). When compared to the other dams in this Water Management Planning Area, this dam has high potential storage. Because this is a flood control dam, the Natural Resources Conservation Service (NRCS), which contributed to the construction of the Souhegan River basin flood control dam network, requires that 85 percent of flood storage volume be available following a previous storm event. This restriction reduces the potential available storage volume to 298 ac-ft (13 million cu. ft. or 97 million gallons).

The volume that is available for use is much less than this. DES would use at most the volume within a two foot range of water level change in order to protect impoundment habitat. The effects of changing the water level on the use and enjoyment of the impoundment by abutting property owners and the public must also be considered. The property owners have an existing easement that would have to be changed before additional storage could be kept in the impoundment. The surface area of the impoundment's permanent pool is 25 acres, resulting in about 50 ac-ft of storage within 2 feet of water level change.

The drainage area upstream of the dam, which extends into Massachusetts, is 11.4 sq. miles, and should provide sufficient flow for the refilling of the reservoir during periods of below normal precipitation. Therefore, based on the available storage volume and the size of the contributing drainage area, the potential of this dam for flow management is high. Flow from this dam and Site 35 runs downstream via the Souhegan River to Waterloom Pond and to the outflow from Site 12A. All of these dams will be part of the flow releases for instream flow protection. Site

19 and Site 35 in combination will be responsible for maintaining flow protection downstream to Waterloom Pond. Based their relative location in the watershed, Sites 19 and 35 are responsible together for 21% of each flow release, Waterloom for 17%, and Site 12A for 62%. So long as each upstream impoundment supports at minimum these respective portions of the overall release, the instream flows will be met for the intervening segments.

Potential Impacts of Storage and Release of Relief Flows

The storage of water at the Site 19 Dam above its permanent pool level could negatively impact wetlands surrounding the existing impoundment. A preliminary analysis of the impact of the higher water elevations indicated that between 31 and 39 acres of wetland could be inundated by the increased storage. Since the duration and timing of the increased water elevations aren't known, the extent of the potential impact to the existing wetlands is also unknown. However, it is believed that if the water levels were raised by 5-10 feet through the growing season repeatedly, there could be a net loss of vegetated wetlands. To reduce the potential impacts of the storage and release of the relief flows on existing wetlands and the abutting properties, DES will limit the change in water level to a maximum of 2 feet. This limitation only applies to the management of the dam for relief flows and may be temporarily exceeded for flood control storage.

Based on a review of information available from the New Hampshire Natural Heritage Bureau (NHNHB), there do not appear to be any federal or state-listed Rare, Threatened or Endangered (RTE) species or any Exemplary Natural Communities in the vicinity of the site. As a result, they would not be affected by an increase in water levels at the site.

Waterloom Dam impounds Waterloom Pond and is a hydropower facility. The plant is operated on a run-of-river basis, and according to the dam operator it would not be negatively impacted by the release of water from the Site 19 Dam, although the operator of Waterloom Dam would require prior notification of any releases from the Site 19 Dam.

Potential for Dam Management to Support Instream Flow Requirements

Management of the Site 19 Dam could provide up to 50 ac-ft for flow management on the Souhegan Designated River. Actual use would probably be less. About 37 ac-ft would be sufficient for the most common management requirements, leaving substantial storage remaining. This would provide a substantial portion, but not all, of the water necessary to maintain the instream flow requirements for the Souhegan Designated River.

To reduce the potential impact to existing wetlands and to neighboring private property at Souhegan River Sites 19 and 35, DES will limit the maximum change in water level, for the storage and release of relief flows, to less than two feet. Management of the Site 19 Dam could provide over two times the volume of storage necessary to reset flow above the Rare/Critical protected instream flow level established for the lower Souhegan Designated River if the water levels were raised to 5-10 feet. Even after reducing the maximum water level change to 2 feet, this dam, in coordination with releases from other watershed dams, could provide sufficient

water to maintain the instream flow requirements for the Souhegan Designated River. Therefore, this dam is a primary candidate for flow management.

The chief purpose of the dam is for flood control. DES has contacted the Natural Resources Conservation Service regarding the addition of flow management as a designated use of the facility and has received their support for this concept. The Natural Resources Conservation Service has agreed with the use for instream flow purposes within the limits of maintaining the impoundment's flood control capacity (Ellsmore, 2012).

Current landowner flowage right agreements must be included in developing and using increased storage within the impoundment. Currently, there are at least 20 landowners that have agreements with the DES Dam Bureau that only allow for the temporary storage of water for flood control and limit permanent flooding to the area at an elevation equal to the low level inlet of the outlet structure. These agreements would need to be re-negotiated to allow for periods during which water would be stored above normal conditions.

The dam's outlet will need to be changed to allow active management. The current configuration of the outlet structure is not designed for the storage and release of relief flows. Additional evaluation will need to be performed to determine how the dam would be operated for flow management. In order to make the outlet structure operable for releasing flow, the outlet would need to be retrofitted. The cost to retrofit the outlet structure was estimated to be $136,000 by the DES Dam Bureau. A source of funding will need to be identified for the design, retrofitting, operation and maintenance of the dam for flow management.

Dam Management Activity

Site 19 Dam's primary use is described by the DES Dam Bureau as flood control. The use of Site 19 Dam will be expanded to include instream flow.

When water management activities are necessary, water will be released as described in Table 2 from Site 19 Dam to create relief flows to support the protected instream flows on the Souhegan Designated River. For release flow conditions not described in Table 2, stream flow conditions that would attain the protected flows and management needs remain undefined. Stream flow conditions will continue to be compared to protected flow criteria and management needs will be defined if deficit conditions begin to occur. Coordination of these releases with other dams relative to timing and volumes will be addressed as part of the continuing evaluation of dam management described in the Water Management Plan.

Site 19 can assist in management of both the upper and lower Souhegan River segments. Protected flow conditions will be evaluated at two gages measuring the upper and lower segments. Flow conditions will be evaluated based on the records from the United States Geological Survey (USGS) gaging stations 01093852 Souhegan River (Site WLR-1) near Milford, NH and 01094000 Souhegan River at Merrimack, NH.

Site 19 Dam relief flows will be released when flows on the Souhegan Designated River fall below the Critical or Rare flow level for a period greater than their catastrophic duration or in

response to repeated persistent events. The release from the Site 19 Dam will be coordinated with releases from other watershed dams to provide a relief flow.

The operation of the dam for the storage and release of relief flows for flow management will be performed to limit the potential effects on Site 19 shoreline habitat and abutting private property. To minimize the effects on the shoreline and abutting private property, the maximum water level change resulting from the storage and release of water for the relief flows will be 2 feet. DES anticipates that the maximum storage needed from this impoundment would result in about 1.5 feet of water level change. DES further anticipates that this water level change may occur partly as a small increase in storage and partly as a release from existing storage.

The DES Instream Flow Program will provide notification to the dam owner of an impending flow management release. The DES Dam Bureau as the owner of the dam will be responsible for the operation of dam to support the protected instream flows on the Souhegan Designated River. The DES Dam Bureau will take such actions as are necessary to adjust the controls of the outlet structure to increase flow from the dam by an amount and at a time identified by the DES Instream Flow Program. The DES Instream Flow Program will notify downstream dam owners in advance of planned relief flow releases from the Site 19 Dam.

Schedule for Dam Management Plan Implementation

This Dam Management Plan will be put into practice after the use of the dam's storage capacity if fully resolved. Agreements with neighboring landowners with deeded easements would be needed before adding water into storage. Use of existing storage could also be applied. When the issue of storage is resolved, DES will then proceed with the evaluation of the retrofitting of the outlet structure and its reconstruction. Once these steps are completed, this Dam Management will be implemented.

Estimated Cost of the Implementation of the Dam Management Plan

The estimated cost for the implementation of a Dam Management Plan for the Site 19 Dam includes both capital and recurring costs. The capital cost is associated with retrofitting the outlet structure, so it can be used for flow management of the Souhegan Designated River. The DES Dam Bureau has estimated that it would cost at least $136,000 to retrofit the outlet structure (see Appendix D). The recurring costs are associated with the operation and maintenance of the dam for its use for flow management. This work requires that at least one trained DES employee travel to the site to adjust the outlet structure to release or store water. The costs associated with this work will be dependent upon the number of personnel involved, the number of site visits required to perform the necessary flow management releases and the travel time and mileage.

Dam Owner and Contact Information

Owner: NH Water Division
Address: P.O. Box 95, 29 Hazen Drive, Concord, NH 03302-0095
Contact: James Gallagher
Phone: 603-271-3406

Email: james.gallagher@des.nh.gov

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Table 1 – Site 19 Dam Characteristics

Elevation (ft) of recreation pool or height relative to lowest spillway	**940.9***
Elevation (ft) of additional spillway crest(s) or height relative to the lowest spillway	**961.0***
Elevation (ft) of streambed at the dam centerline or the height relative to the lowest spillway	**931.0***
Height of the dam (ft) from toe to the highest point on the dam	**35.5**
Freeboard (ft)	**26.1**
Type of spillway controls or outlet works	**Drop Inlet**
Dimensions of spillway controls or outlet works	**25**
Surface area (ac) of impoundment at maximum impoundment	**115**
Drainage area (sq. miles)	**11.4**
Maximum storage (ac-ft)	**2072**
Normal or permanent storage (ac-ft)	**85.3**
Total discharge capacity (cfs)	**16,463**
Maximum unoperated discharge (cfs)	**16,463**
Design storm discharge (cfs)	**247**
Estimated 50-year flood flow (cfs)	**NA**
Estimated 100-year flood flow (cfs)	**225**

Source of information: DES Dam Bureau, NH Dams Data Sheet for Dam #175.19.
Note:

* - from DES Dam Bureau plans on file
NA – not available from NH Dams Data Sheet.

References

Department of Environmental Services (DES) Dam Data Sheet 175.19.

Department of Environmental Services (DES) 2013. Declaration of the Establishment of Protected Instream Flows for the Souhegan Designated River.

Department of Environmental Services (DES) 2008. Final Souhegan River Protected Instream Flow Report. Prepared by University of New Hampshire, University of Massachusetts and Normandeau Associates, Inc.. NHDES-R-06-50.

Ellsmore, Richard. State Conservationist, USDA - NRCS, February, 15, 2012. Personal communication by email.

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

Table 2 - Two-Day Flow Release Contribution from Site 19 or Site 35 Dams in the Event of Instream Flow Water Management.

Site 19 and/or Site 35		Upper Souhegan Release					
Bioperiod	**Bioperiod name**	**Start**	**End**	**Volume needed to meet 90% of historical deficits with 20% buffer (ac-ft)**	**Two-day flow release contribution (cfs)**	**Change in water level from full pool (feet)**	**Notes**
1	Overwintering	15-Nov	28-Feb	11.8	3.0	0.24	Water level change is calculated as from each of Site 19 and Site 35
2	Spring Flood	1-Mar	30-Apr	12.2	3.1	0.24	Water level change is calculated as from each of Site 19 and Site 35
3	Clupeid Spawning	1-May	14-Jun	--	--	--	Release flow management currently too rare to define release flows.
4	GRAF Spawning	15-Jun	14-Jul	--	--	--	Release flow management currently too rare to define release flows.
5	Rearing & Growth	15-Jul	30-Sep	7.2	1.8	0.14	Water level change is calculated as from each of Site 19 and Site 35
6	Salmon Spawning	1-Oct	14-Nov	--	--	--	Release flow management currently too rare to define release flows.
Site 19 and/or Site 35		Lower Souhegan Release					
1	Overwintering	15-Nov	28-Feb	7.9	2.0	0.16	Water level change is calculated as from each of Site 19 and Site 35
2	Spring Flood	1-Mar	30-Apr	--	--	--	Release flow management currently too rare to define release flows.
3	Clupeid Spawning	1-May	14-Jun	--	--	--	Release flow management currently too rare to define release flows.
4	GRAF Spawning	15-Jun	14-Jul	--	--	--	Release flow management currently too rare to define release flows.
5	Rearing & Growth	15-Jul	30-Sep	6.7	1.7	0.13	Water level change is calculated as from each of Site 19 and Site 35
6 revised	Salmon Spawning	1-Oct	14-Nov	18.4	4.6	0.37	Water level change is calculated as from each of Site 19 and Site 35

Waterbody	**Area of flow responsibility (sq. mi.)**	**Percent contribution to protected flow release**	**Surface area of waterbody (acres)**	**Description of area of flow responsibility**
Site 19 and/or Site 35	21.4	21%	~25	upper SR watershed to entrance to WL Pond
Waterloom Pond	38.8	17%	75	to confluence with Tobey Res outlet to SR
Site 12A (Tobey Reservoir)	103.0	62%	108	to gage - Souhegan Near Milford

DAM MANAGEMENT PLAN

Souhegan River Site 33 Dam (State Dam ID #254.34)

Figure 1 – Souhegan River Site 33 Dam and outlet structure, photo taken June 17, 2007.

Introduction

The Souhegan River Site 33 Dam, also known as the Dale Road Dam (lat. 42° 51'40", long. -71° 44' 58") is located on Curtis Brook in Wilton, New Hampshire and immediately east of Dale Street. This dam is owned by the NH Water Division (see contact information). The dam is active and its use is for flood control.

The dam impounds the upper portion of Curtis Brook, which then flows approximately 4,000 feet to the southwest to join with Stony Brook. Stony Brook then flows one mile to the southeast to join the Souhegan Designated River. There is little development around the impoundment and the drainage area upstream of the dam is rural in character.

Dam Design

The dam was built in 1971 and reconstructed in 1976. It is constructed of earth materials, while its outlet structure is a concrete riser (Figure 1). Details on the design and operation of the dam were obtained from the records of the Department of Environmental Services (DES) Dam Bureau, the dam owner and operator. The information required by Env-Wq 1906.04 on the characteristics of the dam is summarized in Table 1.

Minimum Flow, Flowage Rights or Contractual Obligations

According to the DES Dam Bureau there are deeded easement restrictions.

Riparian Property Obligations or Agreements

The DES Dam Bureau did not indicate whether there were any riparian property obligations or agreements associated with the dam.

Water Quality Requirements or Limits

There are no water quality requirements associated with the operation of the dam.

Assessment of Potential Water Availability

Dam Bureau records show the maximum storage volume for the Souhegan River Site 33 Dam is 900 acre-feet (ac-ft), while its permanent storage volume is 24 ac-ft, with the difference being 876 ac-ft (38.2 million cu. ft. or 285 million gallons). Because this is a flood control dam, the Natural Resources Conservation Service (NRCS), which contributed to the construction of the Souhegan River basin flood control dam network, requires that 85 percent of flood storage volume be available following a previous storm event. This restriction reduces the potential available storage volume to 131.4 ac-ft (5.7 million cu. ft. or 42.8 million gallons). When compared with the potential storage of the other flood control dams in the Souhegan River Water Management Planning Area this volume is considered low to intermediate.

The drainage area upstream of the dam is only 1 sq. mile, which could limit the volume of water available for the refilling of the reservoir during periods of below normal precipitation. Therefore, based on the available storage volume and the size of the contributing drainage area, the potential water available from this dam for flow management is considered low.

Potential Impacts of Storage and Release of Relief Flows

Based on a review of National Wetlands Inventory (NWI) mapping extensive wetlands exist within the storage area for the Site 33 Dam. These include approximately 37 acres of forested/shrub wetland and 22 acres of freshwater emergent wetland. The inundation of these areas by the storage of water for flow management would negatively impact them.

A review of information available from the New Hampshire Natural Heritage Bureau (NHNHB) shows that there are no records of rare species or exemplary natural communities for the area of the impoundment.

Potential for Dam Management to Support Instream Flow Requirements

Factors favoring the use of the Site 33 Dam for the storage and release of water to support the instream flows include the volume of water potentially available, the public ownership of the dam and the absence of residences around the impoundment.

Limiting factors include; the location of the dam in the middle of the basin so that it would only provide water to the lower half of the basin, the small size of its contributing drainage area, the negative impact that water storage could have on the extensive wetlands located at the site. The management of the dam for relief flow releases would also require retrofitting of the outlet structure. The outlet structure is presently manually operated and is configured to release water at flood levels. The outlet structure would need to be retrofitted to allow for the managed release of flows from the dam. These limiting factors are significant and, as a result, the potential for dam management at this site to support the instream flow requirements is considered to be low.

Dam Management Activity

Since the potential use of the Souhegan River Site 33 Dam for maintaining instream flow on the Souhegan Designated River is considered low, no dam management activity is required at this time.

Schedule for Dam Management Plan Implementation

Since no dam management plan activity is currently required for this site, there is no implementation schedule.

Estimated Cost of the Implementation of the Dam Management Plan

Since no dam management activity is currently required, there are no estimated costs.

Dam Owner and Contact Information

Owner: NH Water Division
Address: P.O. Box 95, 29 Hazen Drive, Concord, NH 03302-0095
Contact: James Gallagher
Phone: 603-271-3406
Email: james.gallagher@des.nh.gov

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Table 1 – Site 33 Dam Characteristics

Elevation (ft) of recreation pool or height relative to lowest spillway	**NA**
Elevation (ft) of additional spillway crest(s) or height relative to the lowest spillway	**NA**
Elevation (ft) of streambed at the dam centerline or the height relative to the lowest spillway	**NA**
Height of the dam (ft) from toe to the highest point on the dam	**21**
Freeboard (ft)	**NA**
Type of spillway controls or outlet works	**Riser**
Dimensions of spillway controls or outlet works	**NA**
Surface area (ac) of impoundment at maximum impoundment	**12**
Drainage area (sq. miles)	**1.0**
Maximum storage (ac-ft)	**900**
Normal or permanent storage (ac-ft)	**24**
Total discharge capacity (cfs)	**NA**
Maximum unoperated discharge (cfs)	**2100**
Design storm discharge (cfs)	**1080**
Estimated 50-year flood flow (cfs)	**NA**
Estimated 100-year flood flow (cfs)	**NA**

Source of information: DES Dam Bureau, NH Dams Data Sheet for Dam #254.34.

Note:

NA – not available from NH Dams Data Sheet

References

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

DAM MANAGEMENT PLAN

Souhegan River Site 35 Dam (State Dam ID #175.21)

Figure 1 – Souhegan River Site 35 Dam, photo taken June 10, 2005.

Introduction

The Souhegan River Site 35 dam (also known as the Smithville Dam) (lat. 42° 44' 4", long. -71° 52' 43") is located on the West Branch of the Souhegan River in the New Ipswich, New Hampshire and north of Binney Hill Road. This dam is owned by the NH Water Division (see contact information). The dam is active and its use is for flood control.

Water released from the dam flows east in the West Branch of the Souhegan River to join with the South Branch of the Souhegan River and an unnamed tributary to form the Souhegan River, approximately 2.3 miles downstream of the dam. Shortly downstream from this point, the river flows into Waterloom Pond, the impoundment formed by Waterloom Dam.

Dam Design

The dam was built in 1965, and is constructed of earth materials. The outlet structure is a concrete drop inlet (Figure 1). Details on the design and operation of the dam were obtained from the records of the Department of Environmental Services (DES) Dam Bureau, the dam owner and operator. The information required by Env-Ws 1906.04 on the characteristics of the dam is summarized in Table 1.

Minimum Flow, Flowage Rights or Contractual Obligations

The impounded area of this state owned dam is located on private property. Deeded easements only permit the state to raise water levels during storm events to help prevent flooding downstream.

Riparian Property Obligations or Agreements

According to the DES Dam Bureau there are deeded easement rights. These rights limit the storage of flood waters to a specified level and to the time required for the impoundment to drain after a storm event.

Water Quality Requirements or Limits

There are no water quality requirements or limits associated with this dam.

Assessment of Potential Water Availability

Management of the Site 35 Dam in combination with other impoundments could provide sufficient storage to reset flow above the Rare/Critical protected instream flow levels established for the Souhegan Designated River. DES Dam Bureau files show the maximum storage volume for the Souhegan River Site 35 Dam is 1,787 acre-feet (ac-ft), while its permanent storage volume is 37 ac-ft, for a difference of 1,750 ac-ft (76.2 million cu. ft. or 570 million gallons). When compared to the other dams in this Water Management Planning Area, this dam has the third largest potential storage. Because this is a flood control dam, the Natural Resources Conservation Service (NRCS), which contributed to the construction of the Souhegan River basin flood control dam network, requires that 85 percent of the flood storage volume be available following a previous storm event. This restriction reduces the potential available storage volume to 262.5 ac-ft (11.4 million cu. ft. or 85.5 million gallons).

The volume that is available for use is much less than this. DES would use at most the volume within a two foot range of water level change in order to protect impoundment habitat. The effects of changing the water level on the use and enjoyment of the impoundment by abutting property owners and the public must also be considered. The property owners have an existing easement that would have to be changed before additional storage could be kept in the impoundment. The surface area of the impoundment's permanent pool is 24.9 acres, resulting in about 50 ac-ft of storage within 2 feet of water level change.

The drainage area upstream of the dam is 6.4 sq. miles. This should provide sufficient flow for the refilling of the reservoir during periods of below normal precipitation. Therefore, based on the available storage volume and the size of the contributing drainage area, the potential water available from this dam for flow management is high. Along with Site 19, Site 35 can help to augment flow in the Souhegan Designated River, first in the upper portion, and if storage allows, in the lower river. Based their relative location in the watershed, Sites 19 and 35 are responsible together for 21% of each flow release, Waterloom for 17%, and Site 12A for 62%. So long as

each upstream impoundment supports at minimum these respective portions of the overall release, the instream flows will be met for the intervening segments.

Potential Impacts of Storage and Release of Relief Flows

To reduce the potential impact to existing wetlands and to neighboring private property at Souhegan River Site 35, DES will limit the maximum change in water level, for the storage and release of relief flows, to less than two feet. This limitation only applies to the management of the dam for relief flows and may be temporarily exceeded for flood control storage.

A review of information available from the New Hampshire Natural Heritage Bureau (NHNHB) shows that there do not appear to be any federal or state-listed Rare, Threatened or Endangered (RTE) species or any Exemplary Natural Communities in the vicinity of the site. As a result, they would not be affected by an increase in water levels at the site.

The upper portion of the river corridor downstream of the dam to Smithville is lightly developed and there are three small impoundments within this section of the West Branch. In this section, the West Branch passes below both Taylor Road and Page Hill Road. During a flow management release from the dam, some of the flow may be temporarily stored in the impoundments, but due to their small size this impact should be relatively small.

Waterloom Dam impounds Waterloom Pond and is a hydropower facility. The plant is operated on run-of-river basis and according to the dam operator it would not be negatively impacted by the release of water from the Site 35 Dam, although the operator of Waterloom Dam would require prior notification of any flow management releases from the Site 35 Dam.

Potential for Dam Management to Support Instream Flow Requirements

Management of the Site 35 Dam could provide up to 50 ac-ft for flow management on the Souhegan Designated River. Actual use would probably be less. About 37 ac-ft would be sufficient for the most common management requirements leaving substantial storage remaining. This would provide a substantial portion, but not all, of the water necessary to maintain the instream flow requirements for the Souhegan Designated River.

The chief purpose of the dam is for flood control. DES has contacted the Natural Resources Conservation Service regarding the addition of flow management as a designated use of the facility and has received their support for this concept. The Natural Resources Conservation Service has agreed with the use for instream flow purposes within the limits of maintaining the impoundment's flood control capacity (Ellsmore, 2012).

Current landowner flowage right agreements must be included in developing and using increased storage within the impoundment. Currently, there are 19 landowners that have agreements with the DES Dam Bureau that only allow for the temporary storage of water for flood control and limit permanent flooding to the area at an elevation equal to the low level inlet of the outlet structure. These agreements would need to be re-negotiated to allow for periods during which

water would be stored temporarily, which would result in a 2 foot increase in water levels compared to normal conditions.

The dam's outlet will need to be changed to allow active management. The current configuration of the outlet structure is not designed for the storage and release of relief flows. Additional evaluation will need to be performed to determine how the dam would be operated for flow management. In order to make the outlet structure operable for releasing flow, the outlet would need to be retrofitted. The cost to retrofit the outlet structure was estimated to be $136,000 by the DES Dam Bureau. A source of funding will need to be identified for the design, retrofitting, operation and maintenance of the dam for flow management.

Dam Management Activity

Site 35 Dam's primary use is described by the DES Dam Bureau as flood control. The use of Site 35 Dam will be expanded to include instream flow.

When water management activities are necessary, water will be released as described in Table 2 from Site 35 Dam to create relief flows to support the protected instream flows on the Souhegan Designated River. For release flow conditions not described in Table 2, stream flow conditions that would attain the protected flows and management needs remain undefined. Stream flow conditions will continue to be compared to protected flow criteria and management needs will be defined if deficit conditions begin to occur. Coordination of these releases with other dams relative to timing and volumes will be addressed as part of the continuing evaluation of dam management described in the Water Management Plan.

Site 35 can assist in management of both the upper and lower Souhegan River segments. Protected flow conditions will be evaluated at two gages measuring the upper and lower segments. Flow conditions will be evaluated based on the records from the United States Geological Survey (USGS) gaging stations 01093852 Souhegan River (Site WLR-1) near Milford, NH and 01094000 Souhegan River at Merrimack, NH.

Site 35 Dam relief flows will be released when flows on the Souhegan Designated River fall below the Critical or Rare flow level for a period greater than their catastrophic duration or in response to repeated persistent events. The release from the Site 35 Dam will be coordinated with releases from other watershed dams to provide a relief flow.

The operation of the dam for the storage and release of relief flows for flow management will be performed to limit the potential effects on Site 35 shoreline habitat and abutting private property. To minimize the effects on the shoreline and abutting private property, the maximum water level change resulting from the storage and release of water for the relief flows will be 2 feet. DES anticipates that the maximum storage needed from this impoundment would result in about 1.5 feet of water level change. DES further anticipates that this water level change may occur partly as a small increase in storage and partly as a release from existing storage.

The DES Instream Flow Program will provide notification to the dam owner of an impending flow management release. The DES Dam Bureau as the owner of the dam will be responsible for the operation of dam to support the protected instream flows on the Souhegan Designated River. The Dam Bureau will take such actions necessary to adjust the controls of the outlet structure to increase flow from the dam by an amount and at a time identified by the DES Instream Flow Program. The DES Instream Flow Program will notify downstream dam owners in advance of planned relief flow releases from the Site 35 Dam.

Schedule for Dam Management Plan Implementation

This Dam Management Plan will be put into practice after the use of the dam's storage capacity if fully resolved. Agreements with neighboring landowners with deeded easements would be needed before adding water into storage. Use of existing storage could also be applied. When the issue of storage is resolved, DES will then proceed with the evaluation of the retrofitting of the outlet structure and its reconstruction. Once the steps are completed, this Dam Management Plan will be implemented.

Estimated Cost of the Implementation of the Dam Management Plan

The estimated cost for the implementation of a Dam Management Plan for the Site 35 Dam includes both capital and recurring costs. The capital cost is associated with retrofitting the outlet structure so it can be used for flow management of the Souhegan Designated River. The DES Dam Bureau has estimated that it would cost at least $136,000 to retrofit the outlet structure (see Appendix D). The recurring costs are those associated with the operation and maintenance of the dam for its use for flow management. This work requires that at least one trained DES employee travel to the site to adjust the outlet structure to release or store water. The costs associated with this work will be dependent upon the number of personnel involved, the number of site visits required to perform the necessary flow management releases and the travel time and mileage.

Dam Owner and Contact Information

Owner: NH Water Division
Address: P.O. Box 95, 29 Hazen Drive, Concord, NH 03302-0095
Contact: James Gallagher
Phone: 603-271-3406
Email: james.gallagher@des.nh.gov

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Table 1 – Site 35 Dam Characteristics

Elevation (ft) of recreation pool or height relative to lowest spillway	**966.5***
Elevation (ft) of additional spillway crest(s) or height relative to the lowest spillway	**973.9***
Elevation (ft) of streambed at the dam centerline or the height relative to the lowest spillway	**961.3***
Height of the dam (ft) from toe to the highest point on the dam	**30**
Freeboard (ft)	**4.6**
Type of spillway controls or outlet works	**Drop Inlet**
Dimensions of spillway controls or outlet works	**NA**
Surface area (ac) of impoundment at maximum impoundment	**24.9**
Drainage area (sq. miles)	**6.4**
Maximum storage (ac-ft)	**1787**
Normal or permanent storage (ac-ft)	**37**
Total discharge capacity (cfs)	**9,135**
Maximum unoperated discharge (cfs)	**9,135**
Design storm discharge (cfs)	**12,670**
Estimated 50-year flood flow (cfs)	**NA**
Estimated 100-year flood flow (cfs)	**1,306**

Source of information: DES Dam Bureau, NH Dams Data Sheet for Dam #175.21.

Note:

* - from DES Dam Bureau plans on file.
NA – not available from NH Dams Data Sheet.

References

Department of Environmental Services (DES) Dam Data Sheet 175.21.

Department of Environmental Services (DES) 2013. Declaration of the Establishment of Protected Instream Flows for the Souhegan Designated River.

Department of Environmental Services (DES) 2008. Final Souhegan River Protected Instream Flow Report. Prepared by University of New Hampshire, University of Massachusetts and Normandeau Associates, Inc.. NHDES-R-06-50.

Ellsmore, Richard. State Conservationist, USDA - NRCS, February, 15, 2012. Personal communication by email.

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

Table 2 - Two-Day Flow Release Contribution from Site 19 or Site 35 Dams in the Event of Instream Flow Water Management

Site 19 and/or Site 35		Upper Souhegan Release					
Bio-period	**Bioperiod name**	**Start**	**End**	**Volume needed to meet 90% of historical deficits with 20% buffer (ac-ft)**	**Two-day flow release contribution (cfs)**	**Change in water level from full pool (feet)**	**Notes**
1	Overwintering	15-Nov	28-Feb	11.8	3.0	0.24	Water level change is calculated as from each of Site 19 and Site 35
2	Spring Flood	1-Mar	30-Apr	12.2	3.1	0.24	Water level change is calculated as from each of Site 19 and Site 35
3	Clupeid Spawning	1-May	14-Jun	--	--	--	Release flow management currently too rare to define release flows.
4	GRAF Spawning	15-Jun	14-Jul	--	--	--	Release flow management currently too rare to define release flows.
5	Rearing & Growth	15-Jul	30-Sep	7.2	1.8	0.14	Water level change is calculated as from each of Site 19 and Site 35
6	Salmon Spawning	1-Oct	14-Nov	--	--	--	Release flow management currently too rare to define release flows.
Site 19 and/or Site 35		Lower Souhegan Release					
1	Overwintering	15-Nov	28-Feb	7.9	2.0	0.16	Water level change is calculated as from each of Site 19 and Site 35
2	Spring Flood	1-Mar	30-Apr	--	--	--	Release flow management currently too rare to define release flows.
3	Clupeid Spawning	1-May	14-Jun	--	--	--	Release flow management currently too rare to define release flows.
4	GRAF Spawning	15-Jun	14-Jul	--	--	--	Release flow management currently too rare to define release flows.
5	Rearing & Growth	15-Jul	30-Sep	6.7	1.7	0.13	Water level change is calculated as from each of Site 19 and Site 35
6 revised	Salmon Spawning	1-Oct	14-Nov	18.4	4.6	0.37	Water level change is calculated as from each of Site 19 and Site 35

Waterbody	**Area of flow responsibility (sq. mi.)**	**Percent contribution to protected flow release**	**Surface area of waterbody (acres)**	**Description of area of flow responsibility**
Site 19 and/or Site 35	21.4	21%	~25	upper SR watershed to entrance to WL Pond
Waterloom Pond	38.8	17%	75	to confluence with Tobey Res outlet to SR
Site 12A (Tobey Reservoir)	103.0	62%	108	to gage - Souhegan Near Milford

DAM MANAGEMENT PLAN

Swartz Pond Dam (State Dam ID #147.31)

Figure 1 – Swartz Pond Dam outlet structure, photo from DES Dam Bureau.

Introduction

The Swartz Pond Dam (lat. 42° 54’ 15”, long. -71° 47’ 50”) is located on an unnamed tributary to Stony Brook in Lyndeborough, New Hampshire and south of Joslin Road. This dam is privately owned (see contact information), its status is considered to be active and its designated use is for recreation. There is no public access to the dam or pond.

Dam Design

The dam was reportedly built in 1930, and is constructed of stone and earth materials. The outlet structure is constructed of concrete with an uncontrolled spillway (Figure 1). Details on the design and operation of the dam were obtained from the records of the Department of Environmental Services (DES) Dam Bureau and from the dam owner. The information required by Env-Wq 1906.04 on the characteristics of the dam is summarized in Table 1.

Minimum Flow, Flowage Rights or Contractual Obligations

None, according to the dam owner.

Riparian Property Obligations or Agreements

None, according to the dam owner.

Water Quality Requirements or Limits

None, according to the dam owner.

Assessment of Potential Water Availability

DES Dam Bureau files show the maximum storage volume for the Swartz Pond Dam is 42.2 acre-feet (ac-ft), while its permanent storage is 21 ac-ft, with the difference being 21.2 ac-ft (or 923,472 cu. ft. or 6.9 million gallons). When compared with the other dams in this Water Management Plan Area the permanent storage volume is relatively low. In addition, the drainage area contributing runoff to the impoundment behind the dam is only 0.25 sq. miles, which due to its small area would provide limited runoff to the impoundment following any drawdown in water levels. Lastly, the existing outlet structure is an uncontrolled spillway. Without the modification of this structure, controlled releases of water are not possible. Therefore, little water would be available for flow management from this dam.

Potential Impacts of Storage and Release of Relief Flows

The potential impacts of flow management would be low. The area around the impoundment is undeveloped and no extensive wetlands have been mapped within the impoundment.

Potential for Dam Management to Support Instream Flow Requirements

The potential for this dam to provide relief flows to the Souhegan Designated River is low due to its being privately owned, the low amount of storage potentially available, the small drainage area upstream of the dam and the lack of a controlled outlet structure. The location of the dam and its impoundment in the mid portion of the Souhegan River watershed is a positive attribute though. Any releases of water from this dam would potentially contribute flow to the middle and lower portions of the Souhegan Designated River via Stony Brook.

Dam Management Activity

No dam management activity is required at this time.

Schedule for Dam Management Plan Implementation

Since no dam management plan activity is currently required for Swartz Pond Dam, there is no implementation schedule.

Estimated Cost of the Implementation of the Dam Management Plan

Since no dam management plan activity is currently required, there are no estimated costs.

Dam Owner and Contact Information

Owner: Ms. Dorothy Swartz
Address: 50 Congress St. , Suite 832, Boston, MA 02109
Contact: Mr. Thomas Swartz
Phone: 603-654-2418
Email: None provided.

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Table 1 – Swartz Pond Dam Characteristics

Elevation (ft) of recreation pool or height relative to lowest spillway	**NA**
Elevation (ft) of additional spillway crest(s) or height relative to the lowest spillway	**NA**
Elevation (ft) of streambed at the dam centerline or the height relative to the lowest spillway	**NA**
Height of the dam (ft) from toe to the highest point on the dam	**8**
Freeboard (ft)	**3**
Type of spillway controls or outlet works	**Uncontrolled**
Dimensions of spillway controls or outlet works	**NA**
Surface area (ac) of impoundment at maximum impoundment	**10.6**
Drainage area (sq. miles)	**0.25**
Maximum storage (ac-ft)	**42.2**
Normal or permanent storage (ac-ft)	**21**
Total discharge capacity (cfs)	**161.2**
Maximum unoperated discharge (cfs)	**161.2**
Design storm discharge (cfs)	**51.2**
Estimated 50-year flood flow (cfs)	**NA**
Estimated 100-year flood flow (cfs)	**NA**

Source of information: DES Dam Bureau, NH Dams Data Sheet for Dam #147.31

Note:

NA – not available from NH Dams Data Sheet.

References

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

DAM MANAGEMENT PLAN

Waterloom Pond Dam (State Dam ID #175.09)

Figure 1 – Waterloom Pond Dam spillway and controlled outlet, photos taken June 10, 2005.

Introduction

The Waterloom Pond Dam (lat. 42° 44' 58", long. -71° 50' 12") is located on the main stem of the Souhegan River in New Ipswich, New Hampshire and east of River Road. This dam is privately owned (see contact information). The dam is active and its use is for hydroelectric power production.

Dam Design

The dam was built in 1840 and is constructed of stone and earth materials and concrete. The outlet structure and spillway are constructed of concrete and stone (Figure 1). Details on the design and operation of the dam were obtained from the records of the Department of Environmental Services (DES) Dam Bureau and from the dam owner. The information required by Env-Wq 1906.04 on the characteristics of the dam is summarized in Table 1.

Minimum Flow, Flowage Rights or Contractual Obligations

According to the dam owner, the facility must allow for a minimum outflow of 10 cubic feet per second (cfs) during the summer (June through September) and 15 cfs during the winter as per FERC, as inflow is available.

Riparian Property Obligations or Agreements

None, according to the dam owner. However, there are residences on the shoreland areas.

Water Quality Requirements or Limits

The dam owner is unaware of any water quality requirements or limits.

Assessment of Potential Water Availability

Management of the Waterloom Pond Dam in combination with other impoundments would provide sufficient storage to reset flow above the Rare/Critical protected instream flow levels established for the Souhegan Designated River. DES Dam Bureau files show the maximum storage volume for Waterloom Dam is 665 acre-feet (or ac-ft), while its permanent storage volume is 420 ac-ft, for a difference of 245 ac-ft (10.7 million cu. ft. or 79.8 million gallons). This is the largest storage volume of any of the privately owned affected dams in the Souhegan River Water Management Planning Area.

The volume that is available for use is much less than this. DES would use at most the volume within a two foot range of water level change in order to protect impoundment habitat. There are also the effects of changing the water level on the use and enjoyment of the impoundment by abutting property owners and the public must also be considered. The surface area of the impoundment's permanent pool is 75 acres, resulting in about 150 ac-ft of storage within 2 feet of water level change. However, based on the dam's FERC license and landowner expectations for pond levels, it is likely that nine inches is the largest acceptable change, which represents about 56 ac-ft of storage.

The drainage area upstream of the dam is 23.1 sq. miles, which is the largest contributing area of all of the affected dams evaluated. Therefore, the potential of this dam for flow management is high. In addition, two DES Dam Bureau flood control dams (Sites 19 and 35) are located upstream. These facilities will also be used as sources of water for flow management and any water released from them would directly contribute to flow from Waterloom Dam. Waterloom Dam will be used to increase the flow release pulse arriving from Site 19 and Site 35. Based their relative location in the watershed, Sites 19 and 35 are responsible together for 21% of each flow release, Waterloom for 17%, and Site 12A for 62%. So long as each upstream impoundment supports at minimum these respective portions of the overall release, the instream flows will be met for the intervening segments.

Potential Impacts of Storage and Release of Relief Flows

Since any release of water from Waterloom Dam would flow directly into the main stem of the Souhegan River, there are no anticipated impacts downstream other than the increased flow volumes, which is the intent of the dam management action. Considering that Waterloom Dam is located in the upper basin, flow management releases from it would benefit almost the entire Souhegan Designated River.

Releases from the dam could result in lower water surface levels on Waterloom Pond. These lowered water levels could impact the recreational use of the pond by reducing shoreline access.

The lowered water levels could also impact the large wetland complexes located west of River Road.

Potential for Dam Management to Support Instream Flow Requirements

Management of this dam for instream flow could potentially provide 56 ac-ft of water for flow management on the Souhegan Designated River. Management is limited by hydropower licensing conditions and potentially by abutting landowner interests.

Considering the volume of water potentially available in Waterloom Pond, and the location of the dam on the main stem of the Souhegan River and in the upper part of the watershed, the potential for dam management to meet the instream flow requirements is high. The dam is already managed for the production of hydroelectricity (run-of-river), so no modifications to the dam would be needed for releasing flow.

Dam Management Activity

Waterloom Pond Dam will continue to be operated as a run-of-river hydroelectric facility. The use of Waterloom Pond will be expanded to include instream flow.[1]

When water management activities are necessary, water will be released from the Waterloom Pond Dam as described in Table 2 to create relief flows to support the protected instream flows on the Souhegan Designated River. For release flow conditions not described in Table 2, stream flow conditions that would attain the protected flows and management needs remain undefined. Stream flow conditions will continue to be compared to protected flow criteria and management needs will be defined if deficit conditions begin to occur. Coordination of these releases with other dams relative to timing and volumes will be addressed as part of the continuing evaluation of dam management described in the Water Management Plan.

The Affected Dam Owner may use the relief flow released from Souhegan River Site 19 or Site 35 dams to generate power so long as Waterloom Pond Dam continues to pass inflow and meet Surface Water Quality Standards.

Waterloom Pond Dam can assist in management of both the upper and lower Souhegan River segments. Protected flow conditions will be evaluated at two gages measuring the upper and lower segments. Flow conditions will be evaluated based on the records from the United States Geological Survey (USGS) gaging stations 01093852 Souhegan River (Site WLR-1) near Milford, NH and 01094000 Souhegan River at Merrimack, NH.

DES is the owner and operator of the Souhegan River Site 19 and Site 35 dams and will contact the owner of Waterloom Pond Dam through the contact information in this document when a relief flow release is imminent and identify the start time. The notification will be by phone and email at least 24 hours in advance of the intended relief flow release. The Affected Dam Owner

[1] DES discussed management of Waterloom Pond with the dam's previous owner who agreed that management would be acceptable to his operations and would like fit within his federal licensing agreements. Change in ownership will require new approvals with the new owner.

will confirm receipt of this notification by phone or email. The owner will then operate Waterloom Pond Dam according to this plan to pass the flow release volume downstream with the least amount of attenuation.

Schedule for Dam Management Plan Implementation

By June 1, 2014 Waterloom Falls Dam will implement its Dam Management Plan and will institute the measures required to support the protected instream flows.

Estimated Cost of the Implementation of the Dam Management Plan

There are no significant anticipated costs associated with this Dam Management Plan.

Dam Owner and Contact Information

Owner: Ms. Kathleen R. Dolan
Address: 97 SECOND NH Turnpike, (PO Box 605), Hillsboro, NH 03244
Contact: Ms. Kathleen R. Dolan
Phone: 603-478-7828 (Emergency Cell 603-660-4174)
Email:

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Table 1 – Waterloom Pond Dam Characteristics

Elevation (ft) of recreation pool or height relative to lowest spillway	**NA**
Elevation (ft) of additional spillway crest(s) or height relative to the lowest spillway	**NA**
Elevation (ft) of streambed at the dam centerline or the height relative to the lowest spillway	**NA**
Height of the dam (ft) from toe to the highest point on the dam	**22.5**
Freeboard (ft)	**3.5**
Type of spillway controls or outlet works	**Ogee**
Dimensions of spillway controls or outlet works	**NA**
Surface area (ac) of impoundment at maximum impoundment	**75**
Drainage area (sq. miles)	**23.1**
Maximum storage (ac-ft)	**665**
Normal or permanent storage (ac-ft)	**420**
Total discharge capacity (cfs)	**NA**
Maximum unoperated discharge (cfs)	**1,950**
Design storm discharge (cfs)	**32,340**
Estimated 50-year flood flow (cfs)	**NA**
Estimated 100-year flood flow (cfs)	**1,800**

Source of information: DES Dam Bureau, NH Dams Data Sheet for Dam #175.09

Note:

NA - not available from NH Dams Data Sheet

References

Department of Environmental Services (DES) Dam Data Sheet 175.09.

Department of Environmental Services (DES) 2013. Declaration of the Establishment of Protected Instream Flows for the Souhegan Designated River.

Department of Environmental Services (DES) 2008. Final Souhegan River Protected Instream Flow Report. Prepared by University of New Hampshire, University of Massachusetts and Normandeau Associates, Inc.. NHDES-R-06-50.
NH DES Dam Data Sheet 175.09

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11 .

Table 2 - Two-Day Flow Release Contribution from Waterloom Pond Dam in the Event of Instream Flow Water Management.

Waterloom Pond		Upper Souhegan Release					
Bioperiod	**Bioperiod name**	**Start**	**End**	**Volume needed to meet 90% of historical deficits with 20% buffer (ac-ft)**	**Two-day flow release contribution (cfs)**	**Change in water level from full pool (feet)**	**Notes**
1	Overwintering	15-Nov	28-Feb	9.6	2.4	0.13	
2	Spring Flood	1-Mar	30-Apr	9.9	2.5	0.13	
3	Clupeid Spawning	1-May	14-Jun	--	--	--	Release flow management currently too rare to define release flows.
4	GRAF Spawning	15-Jun	14-Jul	--	--	--	Release flow management currently too rare to define release flows.
5	Rearing & Growth	15-Jul	30-Sep	5.9	1.5	0.08	
6	Salmon Spawning	1-Oct	14-Nov	--	--	--	Release flow management currently too rare to define release flows.
Waterloom Pond		Lower Souhegan Release					
1	Overwintering	15-Nov	28-Feb	6.4	1.6	0.09	
2	Spring Flood	1-Mar	30-Apr	--	--	--	Release flow management currently too rare to define release flows.
3	Clupeid Spawning	1-May	14-Jun	--	--	--	Release flow management currently too rare to define release flows.
4	GRAF Spawning	15-Jun	14-Jul	--	--	--	Release flow management currently too rare to define release flows.
5	Rearing & Growth	15-Jul	30-Sep	5.5	1.4	0.07	
6 revised	Salmon Spawning	1-Oct	14-Nov	14.9	3.8	0.20	

Waterbody	Area of flow responsibility (sq. mi.)	Percent contribution to protected flow release	Surface area of waterbody (acres)	Description of area of flow responsibility
Site 19 and/or Site 35	21.4	21%	~25	upper SR watershed to entrance to WL Pond
Waterloom Pond	38.8	17%	75	to confluence with Tobey Res outlet to SR
Site 12A (Tobey Reservoir)	103.0	62%	108	to gage - Souhegan Near Milford

DAM MANAGEMENT PLAN

Wheeler Pond Dam (State Dam ID #175.23)

Figure 1 – Wheeler Pond Dam outlet, photo taken June 15, 2005.

Introduction

Wheeler Pond Dam (lat. 42° 45' 22", long. -71° 53' 05") is located on Stark Brook in New Ipswich, New Hampshire and east of North Road. This dam impounds Wheeler Pond, which is listed by the Department of Environmental Services (DES) as a Great Pond. This dam is privately owned (see contact information), its status is considered to be active, but is in ruins and its designated use is for recreation. There is no public access to the dam or the pond.

Dam Design

The date of construction for the dam is unknown and it is constructed of earth and rock materials and the outlet structure is uncontrolled (Figure 1). Details on the design and operation of the dam were obtained from the records of the DES Dam Bureau and from the dam owner. The information required by Env-Wq 1906.04 on the characteristics of the dam is summarized in Table 1.

Minimum Flow, Flowage Rights or Contractual Obligations

None, according to the owner.

Riparian Property Obligations or Agreements

None, according to the owner.

Water Quality Requirements or Limits

Unknown, according to the owner.

Assessment of Potential Water Availability

DES Dam Bureau files show the maximum storage volume for Wheeler Pond Dam is 32.89 acre-feet (or ac-ft), while its permanent storage volume is 10.89 ac-ft, with the difference being 22 ac-ft (958,320 cu. ft. or 7.2 million gallons). Information on the drainage basin area was not available from the NH Dam Data Sheet, so it was estimated using the U.S. Geological Survey Streamstats web based program. The estimated drainage basin area upstream of Wheeler Pond Dam is only 0.23 sq. miles. When compared to other dams in this Water Management Planning Area, both the permanent storage volume and the contributing drainage area associated with Wheeler Pond Dam are low. Therefore, little water would be available from this dam for flow management.

Potential Impacts of Storage and Release of Relief Flows

The shoreline of Wheeler Pond is undeveloped. Emergent wetlands are mapped along the northern and eastern portions of the pond. Raising or lowering water levels on the pond for long durations could impact these wetlands.

Water from Wheeler Pond Dam travels south via Stark Brook and discharges into the Smithville Reservoir (also known as Souhegan River Site #35) about 1.8 miles downstream. As a result, any flow management releases from Wheeler Pond Dam would need to be coordinated with the DES Dam Bureau, relative to the available storage and operation of the Smithville Reservoir, to ensure conveyance of this water to the Souhegan River.

Potential for Dam Management to Support Instream Flow Requirements

The potential for this dam for flow management is low due to the small amount of water available, the small contributing drainage area, the poor condition of the dam and its lack of a controlled outlet structure.

Dam Management Activity

No dam management activity is required at this time.

Schedule for Dam Management Plan Implementation

Since no dam management plan activity is currently required for Wheeler Pond Dam, there is no implementation schedule.

Estimated Cost of the Implementation of the Dam Management Plan

Since no dam management plan activity is currently required, there are no estimated costs.

Dam Owner and Contact Information

Owner: David Somero
Address: Wheeler Road, New Ipswich, NH 03071
Contact: Same as owner
Phone: 603-878-1285
Email: None provided.

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Table 1 – Wheeler Pond Dam Characteristics

Elevation (ft) of recreation pool or height relative to lowest spillway	**NA**
Elevation (ft) of additional spillway crest(s) or height relative to the lowest spillway	**NA**
Elevation (ft) of streambed at the dam centerline or the height relative to the lowest spillway	**NA**
Height of the dam (ft) from toe to the highest point on the dam	**5**
Freeboard (ft)	**NA**
Type of spillway controls or outlet works	**Uncontrolled**
Dimensions of spillway controls or outlet works	**NA**
Surface area (ac) of impoundment at maximum impoundment	**11**
Drainage area (sq. miles)	**0.23***
Maximum storage (ac-ft)	**32.89**
Normal or permanent storage (ac-ft)	**10.89**
Total discharge capacity (cfs)	**NA**
Maximum unoperated discharge (cfs)	**NA**
Design storm discharge (cfs)	**NA**
Estimated 50-year flood flow (cfs)	**NA**
Estimated 100-year flood flow (cfs)	**75**

Sources of information: DES Dam Bureau, NH Dams Data Sheet for Dam #175.23
*****New Hampshire Streamstats (streamstatsags.cr.usgs.gov)

Note:
NA – not available from the NH Dams Data Sheet.

References

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.