

GOOSE POND MASTER PLAN STUDY

Prepared for

The Conservation Commission
Keene, New Hampshire

November 1984

PROLOGUE

"Our ideals, laws and customs should be based on the proposition that each generation in turn becomes the custodian rather than the absolute owner of our resources - and each generation has the obligation to pass this inheritance on to the future."

- Alden Whitman

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CITY OFFICIALS

Mayor - Edward Reyor

City Councilors

Robert Barber
Terry Bishop
Neil Donegan
Zoe Vrakatitsis
Patrick Sweeney

Douglas Hill
Aaron Lipsky
Ruth MacPhail
Kenneth Paquette
John Watterson

Jack Olsen
Mary Penny
Dean Eaton
Mary Monahan
Robt. Williams

Conservation Commission

Everett P. Alther, Chairman
Peter Hansel

Louisa Snowman
Mary Monahan

Ann Ladam

Working Committee

James Sise
Ann Ladam

Homer Ash
Louisa Snowman

Dean Eaton

Jerry F. McCoilough, Planning Director
Pamela Bower, Assistant Planning Director
Brian Mattson, Director of Parks & Recreation
Extension Service
Sierra Club, Monadnock Group
Audubon Society, Monadnock Chapter
Harris Center

Prepared by Hans Klunder Associates
Hans Klunder - Project Planner
Elizabeth Ham - Environmental Planner
William Countryman, Special Consultant

INTRODUCTION

Over the past nine years, the City of Keene has followed through with the implementations of the 1975 Master Plan. At the time, the plan stated, among other things, a goal that "Keene must be a community that practices conservation ... adequate open space, including wooded areas, meadows, swamps, ponds and brooks, must be reserved to insure sound conservation practices." This particular goal is to be implemented through a program that "establishes an accurate map and inventory of all open spaces, marshlands, swamps and wetlands within the city indicating the present status of each area. It should encourage the preservation of Goose Pond and its surrounding forests. The City should institute forestry and land management practices in the woods for the properties owned by the City." It is the function of the conservation commission to implement this community goal. The planning board, through the planning staff, lends the coordinating efforts for the creation of open space and conservation of these land resources for the citizens of Keene.

This study deals with the Goose Pond area which is one parcel of many acres of conservation land the City has acquired over the past ten years. The property is located north of the bypass and lies between East Surry, Gunn and Old Gilsum Roads. In 1984, the Conservation Commission recognized the importance of beginning to manage the conservation lands the City had acquired and undertook the development of the Goose Pond Master Plan as a way of implementing a Land Management Program. The following document is an evaluation of the City's conservation lands which are located in the north central area of the City of which Goose Pond is the focal point.

In collaboration with a work committee, the conservation commission with the assistance of its consultant, has studied options to make these city land holdings a meaningful and integral part of the City's overall open space and recreation program. The Goose Pond master plan, by

using legislative, regulatory, and financial measures, will bring about the development of a plan which will enhance the natural significance and beauty of this area.

I. PRESENT CONDITIONS

This part of the master plan study is a description of the land's condition as found today within the Goose Pond area specifically and the "North Central Park" in general. The following topics were examined: 1) geology, hydrology, and topography, 2) biological resources, 3) fish and wildlife resources, 4) water resources, 5) forest resources, 6) present uses of Goose Pond and the surrounding area, 7) present access and roadways, and 8) the city's open space needs.

1. Geologic, Topographic, and Hydrologic Information

a. Geology and Soils surrounding Goose Pond

Based on data and maps from the U.S. Department of Agriculture, Soil Conservation Service (SCS), the soils associated with the steeper topographic features are glacial tills and stony tills which are often shallow. These poorly drained soils have moderately slow to slow percolation rates (as determined by the SCS). They are generally ill suited for development because of the adverse effects on ground water and streams leading into Goose Pond.

Adjacent to the south side of the pond is an area of soils mapped by SCS as sandy till. These soils have higher percolation rates, but because of the area's location to the pond, the risk of polluting the pond through development is great. Consequently, any development which requires the installation of septic systems and leach fields should be avoided in areas of sandy till soils.

To the southeast, the land is too wet for the development of any facilities. The major wetland, which extends south to the powerline, will be an access barrier to the eastern side of the property precluding access to all vehicles. However, sites for hikers are accessible over the dike.

The land north of Goose Pond (the former Paquette property) is mostly shallow to bedrock soils, as is evidenced by frequent bedrock outcrops. The area should not be developed beyond an occasional campsite and trail.

b. Topography

Topographically, the area is characterized by moderately steep to steep slopes east and northeast of the pond. To the south and southwest there are two relatively flat sections; one associated with a large (± 30 acre) wetland and the other with the dam and outlet works. Between the two rather flat areas is a hill with moderate slopes on the west side and quite steep slopes on the east.

Immediately to the west of the pond is a hill with moderate slopes and north flanks and steep slopes to the south and east of the pond. North of the pond is a rather large section that has gentle slopes (much of this area is outside the present city owned property).

Goose Pond is located in a basin surrounded by a landscape that reaches 900 feet elevation to the east, 700 feet to the northwest, and drops off to an elevation of 600 feet to the south and southwest. the pond's mean water surface is at an elevation of 635 feet.

Large areas of steep topography and shallow bedrock exist and, because of this steep topography, most of the land area is only marginally suitable for development. Other areas, such as the former Paquette property, while they might be suitable for development, are lacking access.

To the north and northeast, the slopes are generally steeper than to the south and the best apparent use of this section is hiking trails. From the north, vehicular access is limited by the steepness of the terrain as it is from the east.

Because of terrain limitations, vehicular access has been limited to what is available from the East Surry Road and, possibly, some minor

parking areas adjacent to the Old Gilsum Road from the northeast and Gunn Road from the west.

c. Hydrology

The steepness of the north side combined with the moderately slow percolation rates for groundwater in the till make this area rather unsuited for facility development as do the conditions to the east.

The combination of shallow soil depths, steep slopes and poor internal drainage must preclude any intense development of the area. Future uses of the property should be very low intensity usage, if any.

Except for the extreme southern portion of the property and those area downstream of the dam, all of the property drains into Goose Pond. Because the dam and the pond retard flow out of this portion of the basin, any pollution in the basin will tend to accumulate in the pond, multiplying the effect of water pollution.

2. Biological Resources

The environs of Goose Pond contain an interesting variety of divergent plant habitats. The area in general is highlighted by mature softwood forests containing exceptionally large individual trees. The upland habitats around Goose Pond include both hardwood and softwood associations. They contain areas of relatively undisturbed forest. Some individual white pine and hemlock are up to three feet in diameter. (See Photo 6). On Table 1, a listing of characteristic species found surrounding Goose Pond is shown.

Probably the second most notable environment is sphagnum/shrub wetland with a bog-like community of heath plants. This, and similar water areas adjacent to Goose Pond, are reservoirs of unusual plant and wildlife associations.

Wetlands adjacent to the pond and in the areas of the former Paquette property contain a rich heath community with many species of ericaceous shrubs typical of bog communities in central northern New England (See Photo 2). More detailed studies will most likely reveal many herbaceous associations of somewhat limited distribution in the Keene area specifically and New Hampshire generally. The bog community associated with Goose Pond has been affected in the past by raising the water level (See Photo 8) but notable areas of the original bog community remain. In addition to the original bog communities, as a result of the flooding areas of marsh like habitat have considerably increased. This has created another type of habitat in shallow water areas which present an interesting natural study area.

These areas also show evidence of diverse assortment of trees, shrubs, and herbacious plants unique to wetland areas. The following pictures are evidence of the natural setting of Goose Pond with the accompanying map identifying those areas of high biologically significant characteristics.

Table 1

Woody Plant Species, Goose Pond Vicinity

<u>Common Name</u>	<u>Biological Name</u>
Pine Family	Pinaceae
Hemlock	<i>Tsuga canadensis</i> (L.) Carr
Eastern White Pine	<i>Pinus Strobus</i> L.
Willow Family	Salicaceae
Willows	<i>Salix</i> spp
Aspen	<i>Populus</i> sp.
Wax-myrtle Family	Myricaceae
Sweet-fern	<i>Comptonia peregrina</i> (L.) Coult.
Hazel Family	Corylaceae
Yellow Birch	<i>Betula alleghaniensis</i> Britt.
Gray Birch	<i>Betula populifolia</i> Marsh.
Paper Birch	<i>Betula papyrifera</i> Marsh.
Beech Family	Fagaceae
Beech	<i>Fagus grandifolia</i> Ehrh.
White Oak	<i>Quercus alba</i> L.
Red Oak	<i>Quercus rubra</i> L.
Elm Family	Ulmaceae
American Elm	<i>Ulmus americana</i> L.
Witch-hazel Family	Hamamelidaceae
Witch-hazel	<i>Hamamelis virginiana</i> L.
Rose Family	Rosaceae
Meadowsweet	<i>Spiraea latifolia</i> (Ait.) Borkh.
Shadbush	<i>Amelanchier</i> sp.
Bramble	<i>Rubus</i> sp.
Pin Cherry	<i>Prunus pensylvanica</i> L. f.
Black Cherry	<i>Prunus serotina</i> Ehrh.
Maple Family	Aceraceae
Red Maple	<i>Acer rubrum</i> L.
Sugar Maple	<i>Acer saccharum</i> Marsh.
Cashew Family	Anacardiaceae
Staghorn Sumac	<i>Rhus typhina</i> L.
Linden Family	Tiliaceae
Basswood	<i>Tilia americana</i> L.
Heath Family	Ericaceae
Election pink	<i>Rhododendron roseum</i> (Loisel.) Rehd.
Lambkill	<i>Kalmia angustifolia</i> L.
Blueberries	<i>Vaccinium</i> spp.
Honeysuckle Family	Caprifoliaceae
Hobblebush	<i>Viburnum alnifolium</i> Marsh.
Highbush-cranberry	<i>Viburnum trilobum</i> Marsh.



Photo 1. The island in Goose Pond, its most notable feature.



Photo 2. Ericaceous bog association at southeast margin of Goose Pond. Area is rich in both plant and animal life.



Photo 3. Beaver dam at west side of Goose Pond.



Photo 4. Recent evidence of beaver activity at Goose Pond. The beaver is the most obvious of the many wildlife species found at the site.



Photo 7. Typical view across Goose Pond.



Photo 8. Relict tree stumps, evidencing increased water levels.

3. Fish and Wildlife Resources

Within the property, there are no streams which have a large enough year round water volume to be inhabited by fish.

Goose Pond, on the other hand, was stocked with several hundred large mouth bass six to eight years ago by the New Hampshire Fish and Game Department. At the time the pond was stocked, no specific chemical analysis was done. The fishery biologist from the New Hampshire Fish and Game Department used the vegetation surrounding the pond to determine that large mouth bass were suitable for the pond. It is the belief of the Fish and Game Department that there currently is an ample supply of large mouth bass in Goose Pond.

There was no specific study conducted on wildlife within the Goose Pond area, but it is recognized that the area does house white tail deer, grouse, and several beaver colonies. The Audubon Society has conducted a bird survey of the Goose Pond area including both nesting birds and bird sitings. These are recorded in Table 2.

4. Water Resources

The single most significant water resource in the North Central Park is Goose Pond. The 42 acre pond varies in depth from wetland to 30 feet of water, north of the gatehouse. Goose Pond, in the past, has served as a water reservoir and was abandoned for that purpose several years ago when the City acquired the Roxbury Water Shed area. At that time, the water main linking Goose Pond with the city's water system was cut off and the Pond is now without the draw-down to supply water to the city.

Goose Pond receives its water through both surface water and springs. Essentially, the areas northeast and a smaller area to the west drain into Goose Pond in intermittent streams. The only permanent stream enters Goose Pond from the north and originates on the former Paquette property. Goose Pond relies on a relatively small drainage basin of 1.5 square miles (approximately 950 acres). The pond is approximately one half mile in length and slightly less than that in width. The pond is full and overflowing in the spring; however, during the dry season in the summer there is no flow over the spillway, the pond becomes stagnant, and a drop in water level results. This occurs because the springs which feed the pond do not flow during this season.

5. Forest Resources

In 1970, the City conducted a timber survey of the 166 acres of land the City then owned around the pond. It was estimated that there were 60,000 board feet of softwood, and 45,000 board feet of hardwood with 700 cords of pole timber. An updated study has not been done since the City has acquired an additional 400 acres of land around the pond. All the forest lands owned by the City are mixed soft and hard woods. The woods are undisturbed except for a powerline right-of-way.

With Drummer Hill to the south, the Goose Pond land area in the center, and the former Paquette property to the north, the City has a large tract of land containing considerable volume of mature and harvestable timber resources. (This significance as a timber resource is coupled with the fact that it presents a large nature study area for the citizens of the community.) Deer, grouse, rabbits and other wildlife associated with New England mixed wood forests are found as a result of these woodlands.

6. Present Uses

Goose Pond and its immediate surroundings are not used by many individuals or groups. This is partly due to the fact that there is no overall City policy or master plan for the area. In the past, access and use by the general public was prohibited when Goose Pond functioned as part of the City's water supply system. When the area no longer needed to be preserved as a water supply, the City still did not open the land to the public.

The area went through a period of abuse by individuals who knew of vehicular access points to the pond and used the area for unauthorized uses ie, bond fires, camping, parties, etc. When they left, they left behind trash and trampled vegetation. These access points were closed by the Recreation Department last year. Since that time there has been a noticeable decline in the amount of undesirable activities which occur in the area.

Along East Surry and Gunn Roads are individual homes of a very low density nature. Some of these buildings are of recent construction and indicate an increased desire for residential development along East Surry and Gunn Roads.

Probably the most significant use is the powerline right-of-way. Although it detracts from the natural beauty of the immediate area it crosses, it provides an orientation for those hiking through the property and, in part, could render pedestrian access via the maintenance path along the right-of-way to the north central properties.

7. Property Ownership

The City's ownership generally runs between the Old Gilsum Road, East Surry and Gunn Road. This is significant because the City now controls large tracts of land from its urban boundary north of the bypass almost to the Gilsum town line. The only interruptions are properties between the Goose Pond property and the former Paquette property.

In addition, there are private properties that come to within 100 feet of the pond to the east of Old Gilsum Road. This lack of control by the city over these properties which are part of the Goose Pond watershed could lead to pollution and sedimentation problems in the basin should construction ever take place.

8. Present Access and Internal Roadways

With the recent closing of the unauthorized roadway via abandoned logging roads, the only vehicular access now exists off East Surry Road at a point south of the Bauer property. This road is subject to gates and bars and acts as the City's maintenance access to the pond. It is suitable for vehicular access.

All other accesses are non-vehicular. The City does have access from Gunn Road to the former Paquette property and owns considerable frontage along Old Gilsum Road which is subject to gates and bars. In addition, the City owns a 150 foot wide access north of the Bauer property from East Surry Road to the Goose Pond property in fee simple? These accesses are adequate with the exception of a potential access from Gunn Road to the northern portions of the Goose Pond property.

The only internal roadways existing on the property are those remaining from logging activities. The logging roads were designed for a specific purpose and are not a continuous road network and afford only a limited utilitarian function as access to and within the city's properties. There is a path that runs around the periphery of Goose Pond and affords considerable enjoyment of the pond's environs. The path is not large enough for use by motorized vehicles.

9. The City's Open Space Needs

As the City becomes more urbanized, an increasing demand will be placed on the City's existing recreational facilities. The Goose Pond area can be developed slowly to meet some of the projected needs.

Essentially the recreation needs can be divided into two categories - active and passive. The present active recreation needs are being met as was pointed out in a recent survey of the present/future recreation needs of the City done by the Goose Pond Committee. The City is also making strides and closing the gap on open space needs by acquiring conservation and open space lands for the City's natural resource inventory.

The recent survey indicates the types of future recreational facilities that will be needed:

1) swimming facilities of which Goose Pond would be unable to satisfy because of the low pond level and bacteria count during the latter summer months.

2) picnic areas - the Recreation Department currently has enough picnic sites to meet the demands of current users. The demand is growing, however, and more sites will be needed in the near future. The unsuitability of the soils around Goose Pond to support a septic system for restroom facilities may limit the size of a picnic area which could be developed around the pond.

3) baseball/softball fields - There is a continual growing demand in the City for baseball and softball fields; however, the natural environment of the Goose Pond area is not suited for the development of this use.

4) quiet park settings

5) crosscountry skiing

6) snowmobile trails

7) boating

8) bridal paths

9) fishing

10) motorized vehicle paths.

II. OPTIONAL USE CONSIDERATIONS

With such a large tract of land, the city has various opportunities for making this a land area part of the city's open space and recreation program. These options could range anywhere from the draining of Goose Pond and allowing passive use only to increasing the size of Goose Pond and making it part of an active recreation effort allowing diving boards, motor boats, etc. Options considered in the plan preparation included preventing access under a preservation/conservation measure. The passive option would be justifiable were the area occupied by unique, fragile, or irreplaceable natural phenomenon. As indicated in the inventory phase, none of these exist. However, there are inherent values in an undeveloped, publically owned body of water surrounded by forestland that should be preserved. This can be done by limiting certain destructive uses and encouraging more benign ones.

The active option which was reviewed involves increased recreation use of Goose Pond itself by possibly allowing increased fishing and boating. The very nature of Goose Pond, its limited inflow of fresh water, the lack of sandy beaches, the difficulty for creating adequate access, the lack of level land and the unique natural setting do not support such an active recreation approach. The limiting soil conditions and the steep topography, the lack of access to the area, and the potential for pollution, make residential or intensive recreational development of the area incompatible with existing environmental factors. Increased housing and other intense development were found inappropriate as an option.

The preferred option is one that pays heed to the limitations imposed by shallow soils and subsoils, steep topography, preserves the water quality and unique areas and yet encourages use by the citizens of Keene for the enjoyment of the natural aspects, the very resource of the "North Central Park" area. Such an option would legitimize access to the pond for passive recreation uses. Such a use option recognizes that active recreation except for minor uses such as picnicking is not desired in the Goose Pond area because of the biological findings. The

finds were not unique to the Keene area, however are significant enough to call for restrictive uses. The development of active recreation uses would destroy this environment. These active recreation needs are being fulfilled by the City's well organized active recreation programs that take place in the neighborhoods and urban areas.

In contrast to past activities, the proposed use option would encourage public access but for limited activities only. Two major use programs are envisioned: 1) a nature study use exposing school and college population to the natural aspects of the Goose Pond area and 2) a hiking/cross country ski trail network linking Drummer Hill, Goose Pond, and the Paquette property for the tranquil enjoyment of the natural environment.

By increasing the exposure of the area to the people of Keene, increased use will be encouraged through proper planning and design. This option will lead to use and not misuse and abuse or over use of the area and create a nature park preserve that would be a long term asset to the City and its people.

Such a limited multiuse option could be combined with a sound forest management practice. A trail system, envisioned as necessary for the exposure of the area to its visitors, could be adjunct to the forest management venture. It would also allow for the use of the area without polluting the pond or destroying the natural aspects that the North Central Park offers to the City of Keene.

III. PLAN RECOMMENDATIONS

It is recommended that the city of Keene create a North Central Park system. This system would consist of the Drummer Hill property in the south, the Goose Pond tract in the center and the Paquette land to the north. The overall concept is to link these areas with a trail system which affords a diversity of exposure to the natural aspects of this large tract of land. This North Central Park would encompass approximately 1/10 of the land area that, in its master plan, the city proposes to acquire to create conservation and open space lands for the enjoyment of the residents of the community.

It is proposed that the city, in its endeavor to plan for the future, designate Goose Pond as a permanent forest tract with natural trails, access to these trails, and provide for a fauna and flora preserve for nature study purposes in coordination and collaboration with the city's school system and Keene State College. Long range plans for Goose Pond, Drummer Hill, and Paquette property should provide for their connection and could render, without distracting from the area, small group overnight camping facilities for scout troop or similar outings.

A central building for maintenance purposes and a shelter with information about the significance of the area and its opportunities should be created.

The development of nature study trails, the identification of natural phenomenon, plants, and trees, should be carried out in collaboration with the Keene school system and Keene State College and Antioch College.

The master plan should include the following:

1) The Pond

It is recommended that the pond be kept in its present form. It is proposed that it serve as a focal point to the establishment of a

nature preserve area as well as the North Central Park preserve which is proposed to include Drummer Hill and the Paquette property.

The Corps of Engineers, in its evaluation has found that Goose Pond improvements (the dike and major dam) were found satisfactory with only minor needed improvement and continued maintenance. Some of these improvements have been carried out and continued maintenance is planned. The Corps of Engineers recommendations for the pond should continue to be followed.

2) The Natural Setting

Those who have experienced a sunset or a quiet afternoon at Goose Pond must have been impressed by the natural beauty of the area. It is recommended that this strikingly beautiful natural setting be preserved. This means that forest management practices, trail systems, access to the pond, key areas for public use and vistas be located in areas which afford the ultimate natural experience that the area has to offer. It is necessary that the natural setting be assured by either covenant or additional land acquisition of lands located east of the lake, west of the Old Gilsum Road, and west of Goose Pond (east of Gunn Road).

3. Access Recommendations

It is recommended that access via trails be provided to the north central park system from the Old Gilsum Road in the east, and East Surry Road and Gunn Road from the west. Access to these trails should be provided and parking areas created adjacent to the roads. In no case should vehicular access bring motorized transportation closer than 1000 feet of the lake. The only exception would be a provision for handicapped access and maintenance vehicles on the existing road south of the Bauer property. This road would otherwise remain closed as it is now.

It is recommended that pedestrian access to the pond be increased. Vehicles should be accommodated through the creation of 10 - 15 space

parking lots. Trails should be developed from these parking areas to the pond area. The master plan outlines the recommended access points to the former Paquette property and the Goose Pond area.

An additional access to the former Paquette property from Gunn Road should be created. It is recommended that the access be just south of the powerline crossing over Gunn Road. For scouting access, it is recommended that a second access from Gunn Road be created approximately half way between East Surry Road and the power line along Gunn Road. This should be carried out in the future after easements are acquired from the current property owners. These easements should be acquired so off-street parking facilities for no more than five to ten cars can be created.

4. Nature Study Area and Protection of Natural Areas

The existing study shows that there are sufficient natural resources along the pond, along the permanent stream to the north of Goose Pond and in the wetland areas that warrant their incorporation into a nature preserve and nature study project. Typical plants and, sometimes rare plants, should be identified through a well marked identification system and a trail network conducive to environmental studies and biological studies. It is recommended that the city, through private donations of \$3000 to \$5000, support an annual scholarship program to a graduate student, either from Antioch or Keene State College, who will devote the summer months to identifying plants, laying out trails, and conducting nature study tours within the area. (This could also provide for some policing if such a person were equipped with a two-way radio.)

To facilitate a crossing over the outlet of Goose Pond, it is recommended that a rustic foot bridge be constructed. The bridge should be constructed just below the concrete spillway of Goose Pond.

5. Forest Practices

It is recommended that the city initiate a forestry management program under the auspices of the county extension service. Such a forestry management program should be designed to enhance the nature study purposes of the Goose Pond area. Sound forestry management would provide revenues to the city through a sustaining yield forestry management practice. If carried out properly, it would develop a trail system affording exposure to the unique qualities of this beautiful basin.

A forester sensitive to the quality of the area and the purposes of a nature study program should be carefully selected.

Such a program can be accomplished through the use of federal cost sharing funds currently available. The city is eligible for federal cost sharing on its lands. The following conditions, however, must be met:

1. A consultant forester who is certified to serve in this function by the county extension service is hired.
2. A forest cover type map, an inventory printout and a detailed management plan approved by the forester are included in the plan.
3. The boundaries of the city properties are well defined.

4. The recommendations are carried out in such a way as to preserve or improve the quality of the environment, especially wildlife habitat and the appearance of the area.
5. The plan recommendations are carried out for a minimum of 10 years following performance of the practice.
6. The procedure developed by the county forester is used.
7. The county forester is assigned technical overview responsibility.

Before beginning a forestry management program, all areas that have been identified as nature study area and the nature hiking trails should be kept from intrusion by logging activities. It is especially important to leave a harvest-free zone. Around the pond, to maintain the natural beauty of the area and to protect any wildlife that may utilize the pond.

A forestry management program should be developed for the enjoyment of the natural surroundings and care should be taken as to the method of removing timber. Careful supervision by a forester in order to insure that proper methods are being used is essential and that too can be accomplished under the cost sharing program provided for through the federal government under the auspices of the county extension service. By carefully coordinating the natural qualities of the area and yet maintaining a sustaining forestry management program, the city can receive income from the property without reducing its assets as a conservation and naturally beautiful area.

6. Recommendations for Property Ownership

It is recommended that the city of Keene acquire approximately 215 additional acres in order to protect the surroundings of Goose Pond from incompatible development and link the Goose Pond tract with the Paquette property. The attached map shows those areas that are recommended for acquisition either in fee or through conservation

easements. The map indicates that those lands lying 500 east of East Surry Road and Gunn Road, and all lands west of the Old Gilsum Road not presently owned by the city, be acquired. It is recommended that the city negotiate with Samuel F. Leigh to acquire the 48 acres lying west of Gilsum Road and adjacent to Goose Pond on a high priority basis.

There are two parcels of land located west of Old Gilsum Road owned by Leroy Champagne and Marino J. Anton A. Constentino. It is suggested that the southerly portion of the Constentino property be sought for acquisition.

The easterly portion of the Christina Bauer property is one flooded by beaver floes. It is recommended that possible easements be negotiated with Christina Bauer to allow for the protection and preservation of this natural area to be incorporated into the nature study aspects of the Goose Pond basin.

To the north, the upper edges of the bowl in which Goose Pond lies, are properties presently owned by Arthur and Vera Kingsbury and by Lillian F. Farrar. Again, negotiations with the Farrars should include the possible acquisition or purchase a covenant for "no development" and the retention of forest land from the City property to the Paquette land. Similarly, the Kingsbury negotiations should include that portion lying south and west of the powerline.

Whether or not ownership should be sought for these parcels, it certainly would be desirable to retain forest cover easements along with the City of Keen's extensive forest holdings north of Goose Pond. In this way, Goose Pond could be linked to the Paquette property as part of the North Central Park system.

7. Trail System

It is recommended that in conjunction with the development of access points off Gunn Road, East Surry Road, and old Gilsum Road, a

trail system for walks through the area be developed as indicated on the master plan map. It is recommended that this trail system, consisting of nearly nine miles of hiking trails, be separate and only incidentally linked with the 2.6 miles of nature study trails. The trails should afford an opportunity for summertime hikes through the area with rest areas in key locations as indicated taking advantage of particularly attractive settings.

The trail system should be planned so that it will be suitable for winter outdoor activities; cross country skiing and snow shoeing. Ultimately, it is envisioned that this trail system would link to the Beaver Brook Conservation Area in the northeastern portion of the city.

8. Hunting Access

It is recommended that the city allow hunting within the North Central Park. This could be allowed until other uses become established and a conflict arises. Hunting should then cease in deference to more popular activities.

IV. IMPLEMENTATION RECOMMENDATIONS

It is recognized that the City cannot implement the entire plan in one project. Therefore, it is necessary that priorities be established and a staging plan be adopted. The plan recognizes that the total of approximately 9 miles of hiking trails and 2.6 miles of nature trails cannot be and should not be carried out as one project. They should be implemented in collaboration with sound forestry management. Similarly, it is recognized that the acquisition of an additional 215 acres in that north central quadrant would require negotiations and a large amount of city financial resources. They could be bought partly through revenue bonds from timber income and be paid back scheduled to coincide with revenues from the forestry management.

There are, however, elements of the plan that need earlier attention rather than later. It is with that in mind that the following staging plan is proposed:

Stage 1: (highest priority)

a. Forestry Management Plan. The City should, through the assistance of the county extension forester, develop a forestry management plan for the Goose Pond tract, the Paquette tract, and the Drummer Hill tract. All three should be coordinated in order to provide for the sound implementation of the overall master plan concept.

b. Where not already done, the City should undertake boundary surveys so that forestry management plan can be carried out. Established boundary lines are a requisite to that federal assistance program.

c. The City should, through negotiations, acquire, either in fee or through conservation easements, lands recommended in the master plan for purchase. It is recommended that the City use revenue bond financing through timber revenues and possibly general obligation bonds to bring the north central park to reality soon.

d. In conjunction with the citizens awareness program of the availability of the north central park and Goose Pond as its focal point, it is proposed that an access from East Surry Road north of the Bauer property be established and possibly through volunteer labor, a foot trail be developed from this access to the pond.

Stage 2:

a. Initiate nature study work. It is recommended that the city, through its conservation commission, seek private contribution for the summer intern to develop the nature study trails and carry out the plant identification system. This should be carried out in conjunction with the included maps showing the various highlights of this area and the established and planned trail network in relationship to the contours shown on the map.

b. In collaboration with the forestry management plan, begin the development of the trail system. This trail system should be divided into two portions; 1. the nature trail around the lake and through the natural unique areas, and 2. a hiking trail with initial phase to be from Drummer Hill to Goose Pond.

c. A development of scout camp sites. In accordance with the master plan, scout camp sites should be established. There should be provisions for sites that have water supply through springs, two or three lean-tos accommodating small outing groups. A specific design should be worked out with scout masters because tent platforms may be more desirable than lean-tos, outhouses, and water supply should be properly planned along with the air of creating a unique outdoor experience.

Stage 3.

a. Look out areas should be developed on high points in the landscape. These areas have been identified on the master plan and should be developed as the trail system reaches these areas.

b. Securing other access points. As the master plan indicates, additional access points will be desirable to provide not only more distribution of population but to allow for convenient access to the areas sought within the North Central Park system. These areas have been identified and should be acquired as the opportunity avails itself and funds become available.

The City has an unique opportunity to create an outstanding open space and conservation area for its present and future citizens. It is unique because very few communities have an opportunity to create a natural area of such magnitude and beauty close to the urban core. Its true success will lie in how the city accepts and implements the master plan for Goose Pond and the North Central Park system. Only through careful planning and even more careful and wise plan implementation will this be the true asset it has an opportunity to become for the City of Keene.

TABLE II

Bird Species Sighted At Goose Pond

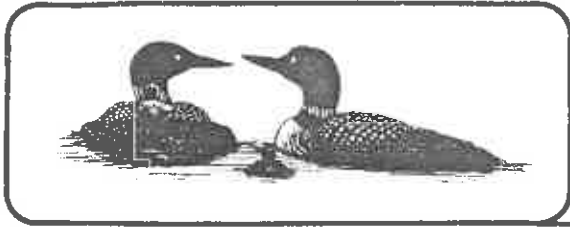
<u>Species</u>	<u>Possible Breeder</u>	<u>Probable Breeder</u>	<u>Confirmed Breeder</u>
Broadwinged Hawk	X		
Common Flicker	X		
Pileated Woodpecker	X		
Hairy Woodpecker			X
Downy Woodpecker	X		
Eastern Kingbird			X
Great Crested Flycatcher		X	
Eastern Phoebe			X
Least Flycatcher	X		
Wood Pewee	X		
Tree Swallow	X		
Blue Jay			X
Common Crow			X
Black-capped Chickadee			X
White-breasted Nuthatch		X	
Red-breasted Nuthatch			X
Brown Creeper	X		
Winter Wren	X		
Catbird			X
Robin		X	
Wood Thrush		X	
Hermit Thrush	X		
Veery	X		
Solitary Viteo	X		
Red-eyed Viteo	X		
Black and White Warbler			X
Yellow-rumped Warbler			X
Black-throated Blue Warbler	X		
Black-throated Green Warbler	X		
Black-burnian Warbler	X		
Chestnut-sided Warbler			X
Ovenbird			X
Louisiana Waterthrush		X	
Redstart	X		
Northern Oriole			X
Scarlet Tanager			X
Rose-breasted Grosbeak		X	
American Goldfinch			X
Rufous-sided Towhee		X	
Darkeyed Junco	X		
Field Sparrow			X
White-throated Sparrow		X	
Song Sparrow			X

TABLE II
continued

Birds Found in Keene-Surry Area,

Likely to be found at Goose Pond

<u>Species</u>	<u>Sighted</u>	<u>Possible Breeder</u>	<u>Probable Breeder</u>	<u>Confirmed Breeder</u>
Great Blue Heron		X		
Green Heron	X			
Mallard		X		
Black Duck		X		
Hooded Merganser				X
Turkey Vulture		X		
Red-shouldered Hawk	X			
Ruffed Grouse				X
Killdeer				X
Rock Dove	X			
Mourning Dove		X		
Black-billed Cuckoo			X	
Chimney Swift	X			
Belted Kingfisher	X			
Yellow-bellied Sapsucker		X		
Barn Swallow		X		
Tufted Titmouse				X
House Wren		X		
Mockingbird		X		
Cedar Waxwing			X	
Starling	X			
Nashville Warbler				X
Yellow Warbler		X		
Prairie Warbler		X		
Yellow-throat Warbler				X
House Sparrow		X		
Bobolink		X		
Red-winged Blackbird				X
Common Grackle		X		
Brown-headed Cowbird	X			
Cardinal				X
Indigo Bunting				X
Purple Finch			X	
House Finch		X		
Chipping Sparrow		X		
Swamp Sparrow		X		



AUDUBON SOCIETY OF NEW HAMPSHIRE

3 SILK FARM RD. • P.O. BOX 528-B • CONCORD, NH 03301 • 224-9909

Mt. Monadnock Chapter
P.O. Box 23, Keene, NH 03431

GOOSE POND PLAN RECOMMENDATIONS

by

Mt. Monadnock Chapter, ASNH

The Mt. Monadnock Chapter of the Audubon Society of New Hampshire strongly supports the proposal to designate the Goose Pond area as a permanent forest park for nature study purposes. We have the following recommendations to insure the successful implementation of this proposal:

1) A parking area should be constructed adjacent to and visible from the East Surry Road so that usage and activities can be more easily monitored, discouraging undesirable activities such as drinking and littering. Having fewer access areas into the park increases the successful monitoring of park activities.

Access into the park from the parking area should be by foot path.

2) An information sign posted at the entrance to the park should encourage proper use and list prohibited activities.

3) Motorized vehicles such as trail bikes and snowmobiles should not be allowed in the park, with the possible exception of the Old Gilsum Road. Motorized vehicles are not compatible with nature study activities as they have an adverse impact on trails, flora, wildlife, and users seeking to enjoy the beauty and tranquility of the natural setting.

4) The Goose Pond forest park is best suited for day use. We recommend that a group camp site not be constructed. The presence of a camp site frequently has an undesirable impact on the scenic beauty of an area, leading to problems with: fires, the cutting of live trees for firewood, litter, alterations of wildlife habitat, increased monitoring problems, and increased maintenance and supervisory expenses. We feel that the drawbacks

of a camping area outweigh the benefits. We are concerned about the probable despoilment of primitive camping areas as has occurred in the White Mountain National Forest. We particularly recommend that no fire pits or fire circles be constructed. This inevitably leads to the destruction of live trees for firewood by unsupervised users. If a group camp site is developed we recommend it be located in an area of the park away from Goose Pond and that stove use, no fires, be required.

5) We strongly encourage the educational day use of the park by school and scout groups. A simple day use shelter and pit toilets may be desirable. The construction of an interpretive nature trail and guide may increase the educational value of the park.

6) Hunting and trapping are not compatible with the nature study uses of the park.

7) We favor the making of a trail network that will provide access to the variety of habitats within the park. Properly designed and constructed trails may help preserve surrounding habitat by encouraging hikers to stay on one trail. The development of a trail network may require increased monitoring to discourage prohibited activities such as trail bike riding and camping.

8) Proper forest management practices may be employed to maintain or improve the quality and variety of wildlife habitats, and provide revenues. Timber harvesting should be very selective to preserve the scenic beauty of the park. Some important habitat areas should not be logged, and logging generally should not take place near trails.

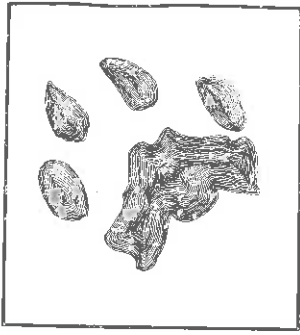
9) The long-term success of the park will depend upon the proper design and location of access and facilities, proper use regulations, and frequent monitoring to discourage improper activities. It is unrealistic to expect most of the monitoring to be done by the general public. Littering, drinking, unauthorized camping, cutting of trees, and improper motorized vehicle use are problems at many local "natural areas". Sufficient funds must be provided to insure adequate official supervision.

The Goose Pond Plan is a unique opportunity for the City of Keene to set aside a remarkable habitat for the enjoyment, recreation, and education of future generations. Such areas will become increasingly important as our open spaces rapidly succumb to development. We commend the City for its foresight in considering the Goose Pond Plan.

submitted by:

Dave Hoitt

Dave Hoitt, President
Mt. Monadnock Chapter, ASNH
October 24, 1984



Harris Center for Conservation Education

King's Highway Hancock, New Hampshire 03449 603-525-4073

STAFF:

H. Meade Cadot, Jr.
Director

Cynthia B. Cadot
Marie L. Stoops
Administration

Marian K. Baker
Diana Reno
Mike Zettek
School Programs

Neal Clark
John Kulish
Naturalists

TRUSTEES:

Eleanor Briggs
Chairperson

Benjamin Allison
Thelma W. Babbitt
Kurt Bleicken

Kenneth A. Brighton
Henry W. Drury

William B. Hart, Jr.
William C. Page

Cecil B. Lyon, *Emeritus*

October 24, 1984

Hans Klunder Associates
13 Dartmouth College Highway
Lyme, New Hampshire 03768

To Whom it may concern:

I have reviewed the recommendations in the Goose Pond Project report, and I found them to be for the most part sound and comprehensive. I do, however, feel that the language regarding the harvesting of forest products should be tightened.

Recreational values including wildlife are more important than maximizing timber revenue in this case. Therefore any harvesting should be very carefully planned so as to minimize negative impacts on those values. I recommend a detailed timber inventory be made along with a detailed long range management plan, favoring maximum rotation harvest schedules. This should be done by a consulting forester. Ideally a field inventory should also be made of wildlife of most concern to the public, eg., raptors, game and furbearers, and song birds. Such information would be very valuable for integrated forest management.

You have recommended a harvest free zone around the pond. This is important for both wildlife and aesthetics. The Harris Center's policy is to maintain at least a 300' protected zone around major ponds. You might also consider a protected zone for the major trail(s) in the vicinity.

Thank you for the opportunity to review the report.

Sincerely yours,

H. Meade Cadot, Jr.

TOM DUTTON

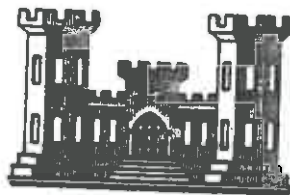
CONNECTICUT RIVER BASIN
KEENE, NEW HAMPSHIRE

GOOSE POND DAM

NH 00101

NHWRB 126.03

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

FEBRUARY 1980



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF
NEDED-E

JUN 04 1980

Honorable Hugh J. Gallen
Governor of the State of New Hampshire
State House
Concord, New Hampshire 03301

Dear Governor Gallen:

Inclosed is a copy of the Goose Pond Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. The report is based upon a visual inspection, a review of past performance, and a preliminary hydrological analysis. A brief assessment is included at the beginning of the report.

The preliminary hydrologic analysis has indicated that the spillway capacity for the Goose Pond Dam would likely be exceeded by floods greater than 6 percent of the Probable Maximum Flood (PMF), the test flood for spillway adequacy. Our screening criteria specifies that a dam of this class which does not have sufficient spillway capacity to discharge fifty percent of the PMF, should be adjudged as having a seriously inadequate spillway and the dam assessed as unsafe, non-emergency, until more detailed studies prove otherwise or corrective measures are completed.

The term "unsafe" applied to a dam because of an inadequate spillway does not indicate the same degree of emergency as that term would if applied because of structural deficiency. It does indicate, however, that a severe storm may cause overtopping and possible failure of the dam, with significant damage and potential loss of life downstream.

It is recommended that within twelve months from the date of this report the owner of the dam engage the services of a professional or consulting engineer to determine by more sophisticated methods and procedures the magnitude of the spillway deficiency. Based on this determination, appropriate remedial mitigating measures should be designed and completed within 24 months of this date of notification. In the interim a detailed emergency operation plan and warning system should be promptly developed. During periods of unusually heavy precipitation, round-the-clock surveillance should be provided.

GOOSE POND DAM
NH 00101

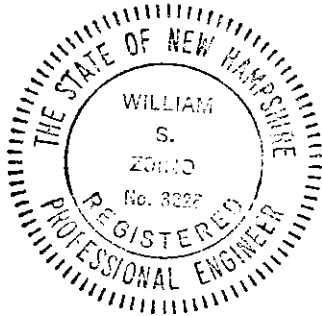
CONNECTICUT RIVER BASIN
KEENE, NEW HAMPSHIRE

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

The adopted Test Flood for this dam is the Probable Maximum Flood (PMF). The peak inflow for this flood would be 3,825 cfs and would result in a peak outflow of 3,470 cfs. This peak outflow would overtop the main dam by 1.6 feet and the dike by 1.1 feet. The spillway capacity at the top of the dam (elevation 637) is 195 cfs or six percent of the routed Test Flood peak outflow.

The dam is in FAIR condition at the present time. Remedial measures to be undertaken by the owner include: rehabilitation or replacement of the waste gate, repair of the gatehouse, removal of debris from spillway and downstream channels, implementation of a program of maintenance and annual technical inspections, and development of a plan for surveillance of the dam during and immediately after periods of heavy rainfall and for warning downstream officials in the event of an emergency. Further investigations are recommended to evaluate the adequacy of the project discharge and to determine the source of wet areas at downstream toes of the dam and dike and the seepage at the spillway apron. It is also recommended that trees be carefully removed from the embankments and the resulting voids be backfilled with suitable compacted material.

The recommendations and remedial measures outlined above should be implemented within one year of receipt of this report by the owner.



William S. Zoino
William S. Zoino
NH Registration 3226



Nicholas A. Campagna, Jr.
Nicholas A. Campagna, Jr.
California Registration 21006

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can unsafe conditions be detected.

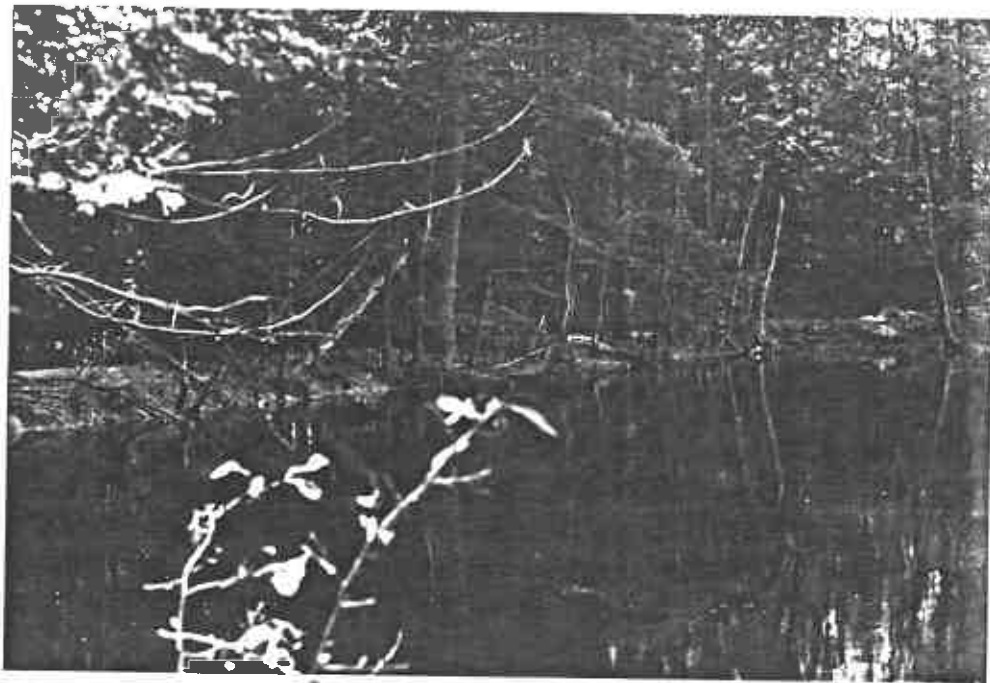
Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the Test Flood should not be interpreted as necessarily posing a highly inadequate condition. The Test Flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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Overview of Dike

PHASE I INSPECTION REPORT

GOOSE POND DAM

SECTION 1

PROJECT INFORMATION

1.1 General

(a) Authority

Public Law 92-376, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Goldberg, Zoino, Dunncliff & Associates, Inc. (GZD) has been retained by the New England Division to inspect and report on selected dams in the State of New Hampshire. Authorization and notice to proceed were issued to GZD under a letter of October 15, 1979 from Colonel William E. Hodgson, Jr., Corps of Engineers. Contract No. DACW 33-79-C-0058 has been assigned by the Corps of Engineers for this work.

(b) Purpose

(1) Perform technical inspection and evaluation of non-federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-federal interests.

(2) Encourage and prepare the states to initiate quickly effective dam safety programs for non-federal dams.

(3) Update, verify, and complete the National Inventory of Dams.

(c) Scope

The program provides for the inspection of non-federal dams in the high hazard potential category based upon location of the dams, and those dams in the significant hazard potential category believed to represent an immediate danger based on condition of the dams.

(3) Spillway (Photos 8,9 & 10)

The spillway consists of a broad crested weir 24.3 feet long and 15.5 feet wide. The spillway elevation is 2 feet below the top of the dam and 2.5 feet below the top of the dike. A 16 inch intermediate pier is located at mid-length along the crest. Flashboard slots, 3 inches wide and 2 inches deep are cast into this pier. A concrete apron approximately 25 feet long has been constructed as an extension of the spillway. This apron tapers in width to 8 feet at the downstream end and has a slope drop of approximately 3.7 feet in 25 feet.

End walls at both ends of the spillway have been constructed in a V-shaped configuration. The upstream ends of these walls splay into the impoundment pool at an angle of 45° and are 12 feet long. The walls parallel to the spillway axis are 10 feet long and 15 inches wide at the top. Flashboard slots, similar to those in the intermediate pier have been cast into the walls at the spillway interface. Upward sloping concrete aprons have been constructed adjacent to the spillway crest up to the end walls.

(4) Outlet Structure (Photos 5,6 & 7)

This structure, which is constructed with cemented stone masonry, is 11.5 feet square with 14 inch thick walls and a wood framed hip roof. It is located on the upstream slope of the dam. This structure is supported on a concrete slab 15 feet square. This slab is supported on a concrete foundation 3.75 feet below the floor elevation. The inlet of this structure is approximately 30 inches wide with stop log slots.

There is a 24 inch diameter outlet conduit extending under the embankment. The waste gate at the upstream end is closed and all operating mechanisms have been removed.

(h) Design and Construction History

The dam was constructed in 1868. A new outlet conduit was installed in 1929. A new spillway was installed in 1946.

(i) Normal Operating Procedure

The dam is normally self regulating. The waste gate is inoperable.

1.3 Pertinent Data

(a) Drainage Area

The drainage area for this dam covers 1.5 square miles. It is made up primarily of mountainous woodland with some pasture and minor development.

(b) Discharge at Damsite

(1) Outlet Works

The outlet works at this dam consists of a 24 inch diameter outlet conduit equipped with a gate. The gate is inoperable because all the controls have been removed.

(2) Maximum Known Flood

There is no data available for the maximum known flood at this damsite.

(3) Ungated Spillway Capacity at Top of Dam

The capacity of the spillway with the reservoir at top of dam elevation (637 feet NGVD) is 195 cfs.

(4) Ungated Spillway Capacity at Test Flood

The discharge capacity of the spillway at test flood elevation 638.6 is 470 cfs.

(5) Gated Spillway Capacity at Normal Pool

There are no gated spillways. The waste gate is normally closed.

(e) Storage (acre-feet)

- (1) Normal pool: 522
- (2) Flood control pool: Not applicable
- (3) Spillway crest pool: 522
- (4) Top of dam: 606
- (5) Test flood: 670₊

(f) Reservoir Surface (acres)

- (1) Normal pool: 42
- (2) Flood control pool: Not applicable
- (3) Spillway crest pool: 42
- (4) Test flood: 43₊
- (5) Top of dam: 42₊

(g) Dam

- (1) Type: Earth embankment (main dam and dike)
- (2) Length: 210 feet (dam)
210 feet (dike)
- (3) Height: 23 feet (dam)
6 feet (dike)
- (4) Top width: 10 feet (dam)
12 feet (dike)
- (5) Side slopes: 2.5 horizontal to 1 vertical
(dam and dike)
- (6) Zoning: Unknown
- (7) Impervious core: Records indicate a stone
corewall in the dam, dike
is unknown
- (8) Cutoff: Unknown

SECTION 2 - ENGINEERING DATA

2.1 Design Data

No design drawings or calculations are available for this dam. Significantly lacking are data concerning the length and depth of the stone corewall, the character of the earth embankments and the foundation conditions.

2.2 Construction Data

No construction records are available for this dam.

2.3 Operational Records

No operational records are available for this dam.

2.4 Evaluation of Data

(a) Availability

The absence of design drawings and calculations is a significant shortcoming. An overall unsatisfactory assessment for availability is therefore warranted.

(b) Adequacy

The lack of in-depth engineering data does not permit a definitive review. Therefore, the adequacy of the dam cannot be assessed from the standpoint of reviewing design and construction data. This assessment of the dam is thus based primarily on the visual inspection, past performance, and sound engineering judgment.

(c) Validity

Since the observations of the inspection team generally confirm the available data, a satisfactory evaluation for validity is indicated.

There are numerous wet areas within 20 feet of the downstream toe of the embankment. These areas occur at elevations higher than the water level in the downstream swamp and lower than the pond. They appear to be signs of seepage through the dike but seepage from higher natural ground to the west of the dike cannot be discounted.

(3) Spillway (Photos 8,9,10 and 11)

The spillway and the end walls are in fair condition at the present time. Seepage is encountered at the approximate rate of 15 to 20 gallons per minute at the downstream end of the concrete apron adjacent to its right side. (Photo 11) The intermediate pier is in good condition with the exception of minor surface erosion at its interface with the spillway. This can be attributed to ice damage. The spillway crest is in fair condition with the exception of transverse cracks and exposed aggregate on its surface. The downstream apron has two longitudinal cracks approximately $\frac{1}{4}$ inch in width which can be attributed to shrinkage. The concrete in this apron was hand placed without the benefit of screeds. There is debris both immediately upstream and immediately downstream of the spillway.

(4) Outlet Structure (Photos 2,5,6 and 7)

The gatehouse stone walls and concrete slab and foundation are in good condition. The roof is in complete disrepair. The asphalt shingles are randomly patched with roofing paper. The original access manhole has been permanently sealed with concrete. This activity occurred between March 1979 and prior to August 21, 1979. The entrance door is in complete disrepair. All operating equipment has been removed from within the structure. Stop logs are in place at the upstream end of the structure and are set to an elevation approximately 3 feet below the water surface elevation. This structure has been abandoned.

The outlet conduit and the dry masonry headwall and training wall are in fair condition. Approximately 5 to 10 gpm is flowing through this conduit which can be attributed to improper seating of the abandoned sluice gate. There is some brush and debris in the channel immediately downstream (Photo 7).

SECTION 4 - OPERATIONAL PROCEDURES

4.1 Operational Procedures

No written operation procedures exist for this dam. It is normally self regulating.

4.2 Maintenance of Dam

No maintenance program exists for this dam.

4.3 Maintenance of Operating Facilities

No maintenance program exists for this dam.

4.4 Description of Warning System

There is no warning system in effect.

4.5 Evaluation

The present maintenance and operating policy is not satisfactory for continued long-term use of the dam. A formal written warning system is recommended because of the possibility of loss of lives and damage to downstream structures in the event of a dam failure.

The only controlled outlet at Goose Pond Dam is a waste gate leading to a conduit under the dam. This gate is closed and is no longer operable. The operating mechanisms have been removed.

The dike separates Goose Pond from a swamp which is on another unnamed tributary of the Ashuelot. This swamp has an area of about 20 acres and extends for some 1,200 feet to the beginning of a small brook. This brook runs through some 4,800 feet of undeveloped land before reaching a small pond. Several* houses under construction near the pond inlet are 3 to 4 feet above the pond surface, and four existing houses near the outlet are 8 to 9 feet up.

There is a second small pond immediately downstream, which is formed behind a 10 foot by 12 foot culvert under Route 12-A. 1,500 feet beyond Route 12-A, this brook flows into the Ashuelot River.

The first development downstream of the main dam is at East Surry Road, about 2,000 feet away. This road crosses the stream on an earth embankment with a four foot by four foot culvert. There is a house just upstream of the road 14 feet above the streambed.

After passing East Surry Road the brook runs about 1,700 feet to the Ashuelot River. About 3,200 feet downstream from the mouth of the brook on the Ashuelot is a trailer park with about 60 trailers in the flood plain 7 to 10 feet above the river bed. This trailer park is just downstream of the Court Street bridge, which is the only other development in the reach.

(e) Test Flood Analysis

The hydrologic conditions of interest in this Phase I investigation are those required to assess the dam's overtopping potential and its ability to safely allow an appropriately large flood to pass. This requires use of the discharge and storage characteristics of the structure to evaluate the impact of an appropriately sized test flood. None of the original hydraulic and hydrologic design records are available for use in this study.

* There are 2 to 4 houses currently under construction. This area appears to be undergoing rapid development, and additional houses may be added in the near future.

(1) South Dike

For this dike the assumed water surface elevation at failure is 637.5 feet NGVD, 2.5 feet above the spillway crest. There is no outflow at the south dike at this elevation.

For the assumed breach width equal to 40 percent of the embankment width at the half-height, the gap in the dike due to failure would be 75 feet. Given the 6 foot height above tailwater, the resulting peak dam failure outflow would be 1,850 cfs.

This flows into a swamp with a surface area of about 20 acres. Assuming that the swamp's outlet controls flows downstream, the peak failure flow downstream is estimated as 440 cfs.

The first development downstream of the swamp impacted by dam failure flows would be the houses around a small pond in North Keene, 4,800 feet downstream of the swamp's outlet. The pond is created by a 30 foot long, 15 foot high masonry dam with a 5 foot spillway and 2 feet of freeboard. There are several houses around the pond, several under construction 3 to 4 feet above the spillway crest, and four 8 to 9 feet up.

If the masonry dam were to hold under the dam failure flow of 440 cfs, the stage would be 4.3 feet over the spillway crest and 2.3 feet above the dam crest. This would cause minor flooding at the houses under construction, and would probably not cause serious damage.

Whether or not dam failure flows from the dike caused dam failure at this small pond, the resulting outflow would not cause significant flooding downstream in the 1,500 feet to the Ashuelot River. The brook passes under Route 12-A through a 10 foot by 12 foot box culvert and by the Cheshire Hospital in this reach, but both the highway and the hospital are above flood flow levels.

Downstream of the trailer park, the Ashuelot River flood plain is relatively undeveloped - except for some residences on the fringe of the 100-year flood plain - for the 14,000 feet (+) down to Faulkner and Colony Dam in Keene. In this winding, flat reach with an extensive flood plain, dam failure flows from Goose Pond Dam should largely attenuate. Although some damage might occur in central Keene downstream of the Falukner and Colony Dam, further major flooding is not likely.

The chart on the following page summarizes the downstream effects of the failure of Goose Pond Dam or the south dike. These locations are shown on Page D-32 of Appendix D.

IMPACT OF DAM FAILURE -(cont.)

<u>Location and Number (see Page D-32 Appendix D</u>	<u>Distance Downstream of Dam or South Dike (ft)</u>	<u>Number of Dwellings & Distance above Stream-bed (ft)</u>	<u>Flow & Stage Before After Failure Failure</u>	<u>Comments</u>
South Dike				
3. Small Pond	6000	Dam, and 2-4 houses under construction 3 feet above s/w crest. May be more in the future.	----- 440 cfs 4 feet over s/w crest.	Slight flooding at houses if dam holds. 2 ft. flow over dam crest-possible failure. No development threatened downstream.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS AND
REMEDIAL MEASURES

7.1 Dam Assessment

(a) Condition

The Goose Pond Dam is in FAIR condition at the present time.

(b) Adequacy of Information

The lack of in-depth engineering data does not permit a definitive review. Therefore, the adequacy of the dam cannot be assessed from the standpoint of reviewing design and construction data. This assessment is based primarily on the visual inspection, past performance, and sound engineering judgement.

(c) Urgency

The recommendations and improvements contained herein should be implemented by the owner within one year of receipt of the Phase I Report.

7.2 Recommendations

It is recommended that the owner retain a qualified registered engineer for the following services:

- DO Hydrologic and hydraulic studies to determine the need for additional project discharge capacity.
- *24 days work is* Determination of the source of the wet areas downstream of the toe of the dam and dike; the cause of the seepage at the spillway apron; ~~and recommendations to remedy these problems.~~
- *Tree stumps and shrubs have been removed* Recommendations for the careful removal of trees, shrubs, and saplings, including their roots, from the slopes of the embankments, and for backfilling the ~~resulting voids.~~

The owner should implement the finding of these studies.

APPENDIX A
INSPECTION CHECKLIST

CHECK LISTS FOR VISUAL INSPECTION

AREA EVALUATED	BY	CONDITION & REMARKS
<u>DAM EMBANKMENT</u>		
Crest elevation	<i>NAC</i>	637 feet (NGVD)
Current pool elevation		635 feet (NGVD)
Maximum impoundment to date		No data
Surface cracks		None
Pavement condition		Not applicable
Movement or settlement of crest		None
Lateral movement		None
Vertical Alignment		Good
Horizontal Alignment		Good
Conditions at abutment and at concrete structures		Good
Indications of movement of structural items on slopes		None
Trespassing on slopes		25 to 30 large (1 to 3 feet) trees on downstream slope, 2 on upstream slope
Sloughing or erosion of slopes or abutments		Shallow eroded path down the downstream slope
Rock slope protection - riprap failures		Riprap on upstream slope in fair condition
Unusual movement or cracking at or near toes		None
Unusual embankment or downstream seepage	<i>NAC</i>	Wet area 20 ft. left of outlet pipe at downstream toe. No visible flow.

CHECK LISTS FOR VISUAL INSPECTION

AREA EVALUATED	BY	CONDITION & REMARKS
Rock slope protection - riprap failures	NAC	None, upstream slope in good condition
Unusual movement or cracking at or near toes		None
Unusual embankment or downstream seepage		2 wet areas along downstream toe at right side of embankment
Piping or boils		None
Foundation drainage features		None
Toe drains		None
Instrumentation systems		NAC
<u>SPILLWAY</u>		
Condition of Concrete	PR	Fair
Spalling		None
Erosion		Minor surface erosion
Cracking		Minor transverse cracks on crest. Two longitudinal cracks 1/4" wide on downstream apron.
Rusting or staining of concrete		None
Visible reinforcing		None
Efflorescence	None	
Seepage	PR	Right side of downstream end of apron 15 to 20 gpm

APPENDIX B

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