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Akenac Park Master Plan Delaware Township, Pike County, PA



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Akenac Park Master Plan

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Akenac Park Master Plan

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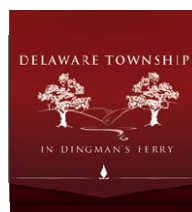
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1.0 Introduction

1.1 Project Overview

Akenac Park is owned and operated by Delaware Township. It is available to be used by both Delaware Township and Pike County residents. Akenac Park is maintained primarily as a nature-based park to allow visitors to experience and enjoy the vast natural resources. Recreation opportunities exist through boating, swimming, and fishing in Lake Marian, hiking on the nature trails, observing the multitude of wildlife, picnicking, playing on the playground, staying over-night in the log cabins, and hosting gatherings in the recreation center. Educational opportunities exist for learning about the natural environment.

1.2 Project Goals and Objectives

The goal of the Akenac Park Master Plan is to provide an evaluation of existing site amenities, to identify and address the Park's issues and needs, and to provide recommendations for the future growth of the Park. This master plan provides recommendations for exciting changes to the activities and infrastructure of the park. It also provides recommendations for important new physical features, and it describes a management strategy for operations and maintenance to ensure long-term viability and use of the Park.

Akenac Park is a unique resource for recreation and enjoyment of the natural environment. The majority of surveyed residents feel that the natural resources of Akenac Park should be maintained in a natural state, that the facilities should be developed and maintained for recreational use and to educate the public on the benefits of the natural environment. Residents also feel that "green technologies" should be applied to the development and/or rehabilitation of the Park to reduce impacts on natural resources and reduce energy costs. These priorities were utilized in developing the Akenac Park Master Plan.

The Akenac Park Mission Statement:

The Delaware Township supervisors developed the following mission statement for Akenac Park:

“At Akenac Park of Delaware Township our desire is to operate and maintain the park in an economically responsible way, to encourage passive and active recreational activities, and to maintain the park and facilities in a way that will preserve, protect, and enhance the beauty and natural features of the park.”

2.0 Community Background

2.1 Delaware Township

Delaware Township is located in Pike County, PA. The Township consists of 44.2 square miles (28,288 acres) of land. In addition to residential and commercial areas, it has a wide variety of natural resources consisting of woodlands, wetlands, streams, waterfalls, and lakes. The Township also contains valuable public resources such as Dingman's Falls and the Delaware Water Gap National Recreation Area. Additional facilities include a Municipal Building, Road Department, Library, and a Recreation Facility with several baseball/football fields, hiking trails, a skate park, a community garden, a playground and a pavilion.

According to the 2000 census, Delaware Township is made up of 6,319 residents, 2,244 households, and 1,748 families. The population density is 143.6 people per mile.

2.2 Akenac Park

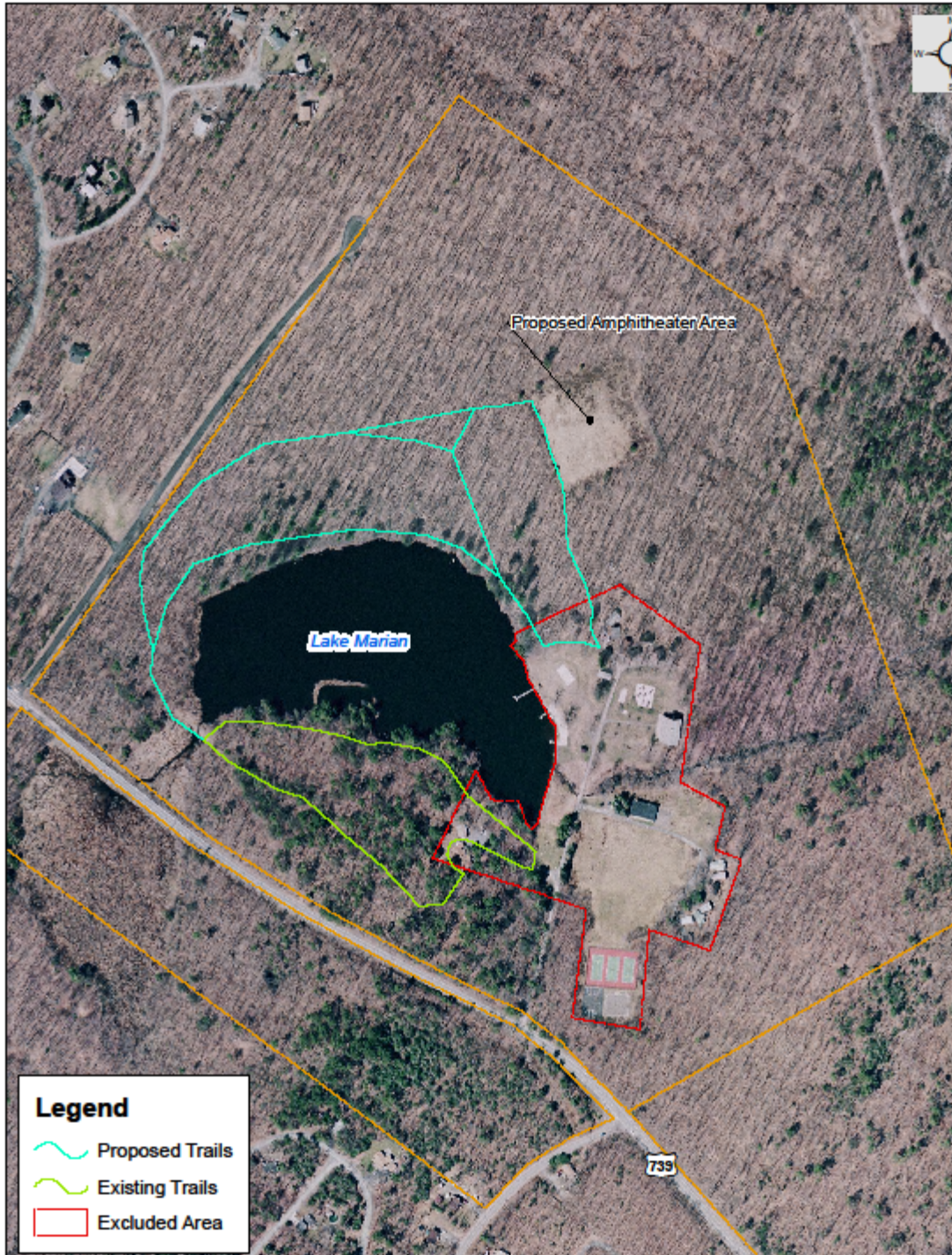
Akenac Park is located in the northeast corner of Delaware Township, Pike County, PA, just off of S.R. 739. The 198.6-acre park was sold to Hewlett Packard by the Catholic Church in 1975. Hewlett Packard maintained the park as a corporate employee retreat for 30 years from 1975 to 2005. Delaware Township purchased the land with the intent to develop a portion of the property into a town center, as suggested by the comprehensive plan. A 55 acre lot was subdivided from the parcel for development of a town center, leaving Akenac Park with 143.6 acres.

The park contains multiple buildings including a recreation center and 14 log and wood framed cabins. The centerpiece of the park is Lake Marian, which provides for boating, swimming, and wildlife viewing. The rest of the property is surrounded by mature forest.

2.3 Description of how Akenac Park fits into the overall park system

Though Delaware Township contains a portion of the Delaware Water Gap National Recreation Area, the Township itself did not own park lands (excluding the municipal recreation area) prior to the acquisition of Akenac Park. Akenac Park therefore is an important resource for the local and county-wide community.

Akenac Park



3.0 Existing Site Conditions and Analysis

3.1 General

Akenac Park consists of 143.6 gross acres and is located in the RR Rural Residential Zoning District. Adjacent land uses are residential or undeveloped. The Township also owns the parcel to the south of the tract, which is slated to become a town center. The Township plans to integrate the town center and the Park by connecting trails and parking areas. A conservation easement has been applied to 128 acres within Akenac Park.

3.2 Description of the Natural Environment

Akenac Park contains a wealth of natural resources including Lake Marian, wetlands, a stream, and mature woodlands. These resources provide important wildlife habitat for many kinds of wildlife including birds, deer and bears.

Lake Marian

The centerpiece of Akenac Park is Lake Marian, a 13-acre lake that provides boating, swimming and wildlife viewing opportunities. The lake is equipped with a boat dock, boat house, swimming beach and lifeguard station. The lake appears to be eutrophic as evidenced by excessive algae and macrophyte growth during the warm weather months. A lake management plan is contained in this report.

Wetlands

The site contains wetlands on the western side of the lake. Wetlands are defined as areas that have three factors; wetland vegetation, hydric soils and hydrology. Wetlands play an important role in the ecosystem by absorbing stormwater, filtering out pollutants, and providing important wildlife habitat.

According to the National Wetland Inventory, the wetlands in Akenac Park are classified as PFO1E, which are described as a palustrine system that is forested with broad-leaved deciduous plant material and has a water regime that is seasonally flooded and/or saturated. The National Wetland Inventory Map can be found in the Appendix of this report. The site contains both emergent and forested wetlands. Emergent wetlands are characterized as containing erect, rooted, herbaceous hydrophytes that are present for the most of the growing season in most years. Forested wetlands are characterized as containing woody vegetation that is at least six meters tall. Forested wetlands typically have an overstory of trees, an understory of young trees and shrubs, and a herbaceous

layer. A wetlands delineation has not been performed to determine the size and composition of existing wetlands.

Unnamed Tributary

A stream flows from the southeastern edge of the lake, and drains eastward over the property boundary. This unnamed tributary flows into Adams Creek and ultimately into the Delaware River.

Woodlands

The majority of the site is wooded with mature hardwood forest made up of deciduous and coniferous tree species. Woodlands are valuable because they intercept rain, absorb stormwater, reduce erosion, and provide wildlife habitat.

Pennsylvania Natural Diversity Inventory

The Pennsylvania Natural Diversity Inventory (PNDI) Environmental Review is a primary screening tool that searches for potential impacts to threatened, endangered, special concern species and special concern resources in Pennsylvania. The PNDI search indicated that the Park has no known impact on threatened or endangered species and/or special concern species and resources.

3.3 Description of the Park Facilities

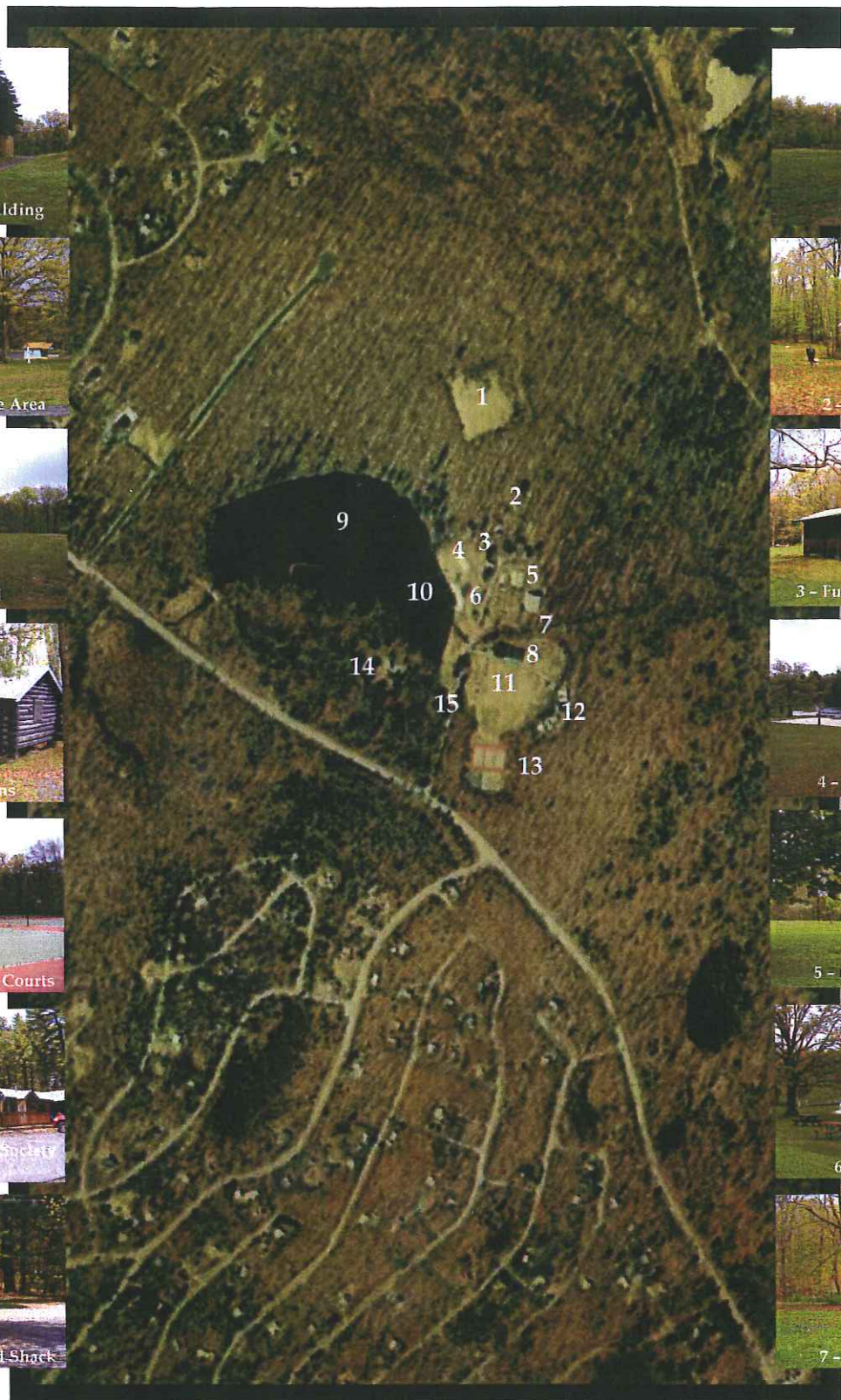
Existing Park Facilities:

Over the years and through its various owners, the park has evolved as a well developed camp complex that presents the user with recreational opportunities that are unique to being located all on one parcel. Akenac Park has become a recreational facility with a wide-array of active and passive amenities for all ages. The natural features on the property present a diverse ecosystem with a lake, woodlands, wetlands, and meadows, etc. The major goal of the park's future development is to insure preservation and conservation of these sensitive resources while providing the appropriate level of recreational opportunities to the community at large.

The active recreational amenities and support facilities include a variety of buildings and uses that add to the potential opportunities of the camp. These built amenities include the Library/Historical Society building, the Recreation Center, numerous camp cabins, the maintenance/storage building (formerly a chapel), the beach and boat dock, tennis and basketball courts, and a playground, etc. The lack of periodic maintenance has caused a decline in the physical condition of the older facilities in the park. The following is a general overview of the park facilities and their existing conditions.

Akenac Park Existing Conditions Plan

Delaware Township - Pike County - Pennsylvania



May 2010

Recreation Center

The Recreation Center is centrally located within the park. It occupies about a thousand square feet of building area and consists of a recreation room with games and game tables, a sitting area suitable for meetings and gatherings, a bathroom recently adapted for handicap accessibility and a large kitchen in need of updating. The recreation center is services with electric, well water and a septic system.

The building presents the park with a wonderful facility that can be used for a number of recreational functions. The building appears to be generally structurally sound and adequately serviced. Some discussions were presented to expand the building and to relocate the game tables to the expansion so that the great room would be free to use without the intrusion or inconvenience of moving the games when a function takes place. Updating the kitchen is the most critical and expensive building renovation needed to take advantage of the benefits of the structure. A complete renovation with new appliances and service utility upgrades is necessary to meet all code requirements.

Cabins

Located throughout the park are two distinct camping areas totaling 18 wooden cabins. Cabin Area 1 occupies a group of cabins that is located generally west of the entry drive and the entry building. It is tucked into the woods and secluded from the rest of the park. Cabin Area 2 is centrally located in the park in close proximity to the beach. This area provides a bathhouse and changing room in addition to the sleeping quarters. Charcoal picnic grills and tables are located with each cabin area to provide for picnicking. A separate cabin near the playground area has been identified as the site of a nature center museum for display of items of education and environmental interest.

While the cabins present a unique and diverse opportunity to provide a camping experience, renovations to upgrade the poor condition of the cabins appear to be costly and difficult. The "Peer-to-Peer Group Report" conducted an inventory and evaluation of each of the cabins and presented the necessary upgrades. Generally the cabins require structural improvements to the foundations, new or upgraded utilities and extensive adaption to comply with the requirements of ADA.

Church/Maintenance building

One of the more surprising and unique support facilities of the park is the presence of the existing Maintenance Building. The building was formerly used as the Chapel when the camp was owned and operated by the Catholic Archdiocese. The building is approximately 40' x 60' in dimensions and occupies about 2,400 square feet. The block masonry building is a one story building with

interior ceiling of about 24 feet in height. The interior roof/ceiling system has clear span so that no columns are located within the building floor area. This existing structure is generally in very sound condition and being used as storage for maintenance equipment and materials. It has electric and water provided to the building.

Library/Historical Society

The Library/Historical Society building is a more recent addition to the park complex. Located just off of the main entrance, it is easily accessed and effectively separates vehicular traffic from the active park uses. This one-story traditional wooden structure provides a meeting room and venue for historical display of the community's past. The parking is adequate and handicap access is appropriately provided for ADA compliance.

Playground

The installation of the playground area is another more recent addition to the park. The playground includes play equipment that is generally new and age appropriate for a wide range of ages. The safety surface encompasses an appropriate amount of sand and pea gravel that provides a sufficient surface within the fall zones. While the playground area is centrally located and in direct proximity to the drive and nearby parking, it appears not to meet the level of services required to accommodate the ADA.

Sand Beach & Swimming Area

The Sand Beach is a wonderful public recreational facility within the park. The beach is well groomed and the swimming area is demarked by buoys and ropes with a lifeguard stand as well. A diving platform in the lake provides another level of activity and recreational experience to the facility. Upon visiting and evaluating the beach, the facility is well used and provides swimming opportunity for all ages and skill levels. A sand volleyball court is stationed in close proximity to the beach and the lake offering an active game area for group participation. The beach does appear to be a bit small and may be over crowded when the park is discovered and more readily attended in the future.

Boat House & Boating

Naturally, the presence of the 13 acre Lake Marian is suitable for providing a boating experience. Through use of the lake, the park offers row boats, canoes and kayaks for rent to the public users. A small rental fee is required to use the boats. The supporting facility includes a small boat house where the attendant manages and operates the boating concession. Storage of the boats is accommodated liberally and sometimes within the cabins. Anticipating increased

demand with the future development of the park, expanding these facilities should be a consideration in the planning.

Tennis & Basketball Courts

At the entry to the park is the location of 3 hard-surface tennis courts and an asphalt basketball court, a volleyball court and a badminton court. The courts are surrounded by 8 foot chain link fencing that is marginal in its condition. Floodlighting on wooden poles is provided to the courts in this area. These facilities occupy an area of about 15,000 square feet of impervious surface and seem to have been installed a long time ago. Due to age, neglect and exposure to the elements, the condition of the tennis surface and the asphalt courts is in dramatic disrepair. The asphalt surfaces exhibit extreme cracking and heaving so that patching is an unlikely solution to their repair. The location, expansiveness and condition of these facilities must be evaluated as to the future development and operation of the park.

Trails

The presence of an extensive trail system is a most desirable facility for almost any community park. To date through volunteer services, only limited trails segments have been developed and provided within the park. Because of the wonderful diversity of eco-systems, natural resources and recreational opportunities, an extensive trail system that is appropriate for all ages and complying with the ADA should be a high priority for the future development of the park.

Forest Clearing

Carved out of the woodlands in the higher elevations of the park, is the location of a level clearing of lawn. This gently sloping area provides an open lawn area of about 1 or 2 acres where community events and festivals can now occur. This level clearing is valuable as an open play area and or an informal sports area. Previous park facility programming has identified this site as a potential location for the construction of an amphitheater. Further investigation into its appropriateness as an amphitheater will present our evaluation of this proposal.

Roadway & Parking

Vehicular access to the park is provided to the park off of State Route 739. The entry road is a gravel surface and is approximately 12 feet in width. The entry drive penetrates into the park and provides access to all facilities and drop-off needs. The lack of a substantial driveway system helps to preserve the open space characteristic of the naturalistic area.

There is very little designated parking available throughout the site. Minimal parking near the Entry Guard Shack is provided on a small stoned area with the parking overflow accommodated on the lawn area adjacent to the stone area. Some parking is located near the Recreational Center for deliveries and handicap parking. Providing adequate parking amounts and locations is significant to the future efficiency of the park.

3.4 Description of Deed Restrictions

The Akenac Park site contains a conservation easement entered into between Delaware Township and the Delaware Highlands Conservancy. The conservation easement was adopted in 2010 and covers 128 acres of the 143 acres of land within the parcel. The boundaries of the park and the associated Conservation Easement boundaries are depicted on a previous map in this document. The general purpose of the conservation easement is *“To preserve open space and to preserve the land area for outdoor recreation by, or the education of, the general public”*.

Defined conservation objectives are included for water resources, forest and woodland resources, wildlife resources, scenic enjoyment, sustainable land uses, and compatible land use and development. The easement permits the existing improvements and the existing agreements to be maintained, repaired, or expanded or relocated so long as the modifications do not inhibit the Conservation Objectives.

Additional improvements with strict limitations are permitted to the park such as fences, walls and gates; vegetable plots; access drives and site improvements; signage; trails; footbridges and stream crossings; wildlife habitat improvements; utility improvements; and improvements generating and transmitting renewable energy, etc. The installation of a proposed amphitheater area is specifically permitted and located within the conservation easement area.

Carved out of the conservation easement area is a 38 acre parcel of land that is designated as an “Excluded Area” from the regulations of the easement. Most of the existing active recreational facilities are located within this “Excluded Area” and encompass the recreation hall, the chapel/maintenance building, the cabins, the playground, the beach area, tennis and basketball courts, the parking area, etc.

As it relates to the preparation of this Master Plan, *“The Holder reserves the right to review and approve the Master Plan for the property, so as to insure consistency with the Master Plan and the Conservation Easement.”*

4.0 Activities and Facilities Proposed for the Site

4.1 “Peer to Peer” Study Committee

A Peer to Peer Study Committee was assembled to discuss the future of Akenac Park. This group was made up of 18 members, representatives of the Township, community, and County, as shown below in Table 1.

Table 1- Peer to Peer Study Committee Members	
Name	Position
Sally Corrigan	Pike County Office of Community Planning
Scott Crandall	Pike County Office of Community Planning
Jeannette McBryan	Pike County Office of Community Planning
Liz Forrest	Aid to John Siptroth, Rep
Ileana Hernandez	Delaware Township Supervisor
Thaddeus Parsell	Delaware Township Supervisor
Robert Luciano	Delaware Township Supervisor
Trish Dorner	Delaware Township Clerk
Luis Barrios	Akenac Park Maintenance
Debbie Ryan	Recreation Committee
Chris Schlegel	Recreation Committee
Cathy Cancelino	Recreation Committee
Ronnie Hoey	Recreation Committee
Joise D’Alessandro	Delaware Township Resident
Maria Moffa	Delaware Township Resident
Roy Hull	Century 21
Mike Adsit	Developer
Tom O’Grady	Teacher

The goals of the Peer to Peer Study Committee were to receive input from the community on needs and desires for the development and use of Akenac Park, to determine the operations and maintenance duties required to maintain and improve the Park, and to determine the feasibility and cost of new improvements.

A Key Person Interview survey was conducted in the recent past. Surveys were submitted to 20 Township residents to obtain feedback on how the Park should be maintained and improved. The majority of residents felt that existing amenities should be improved and upgraded, but that new development should be limited to maintain the natural resources of the Park. Concerns were

expressed about the cost of maintenance and whether a fee should be applied for use of the Park or for renting out the facilities.

The Peer to Peer Study Committee determined the following general goals: to preserve the natural aesthetics and attributes of the Park, to improve and restore existing structures, to utilize “green” and renewable resource technologies, to utilize best management practices, and to provide amenities that contribute to the cost of running the Park.

4.2 “Peer to Peer” Committee Approach

The main areas of concern of the “Peer to Peer” group included the following:

- 1) Community input to determine areas of interest, programs of importance, development ideas, short and long term suggestions, etc.
- 2) Akenac Park as a whole and all of the amenities and operational issues that make up the park.
- 3) The tennis, basketball, badminton, and volleyball athletic areas,
- 4) The sixteen cabins and all the maintenance, operational, rental, and safety issues of concern.
- 5) Lake management aquatic weeds, fisheries, wetlands, physical, chemical, and biological issues, and swimming and boating discussions.
- 6) Playground recommendations, and general safety problems.
- 7) Recreational and management programs.
- 8) Recreation Center safety, rental, and management requirements.
- 9) Trail development priorities, wetland issues, construction priorities, and maintenance tips.

The most important developing factor was the need to keep the Master Park Plan simple in all areas of concern. Start small and open what is possible keeping a well-managed and maintained operation. The “Peer to Peer” Committee wanted a Master Plan that set priorities for implementing the Plan, resulting in a safe and beneficial park that maximizes the use of the park’s many attractions and features.

This Master Plan is built upon the work performed by the “Peer to Peer” Committee. It addresses the main areas of concern expressed by the Committee.

5.0 Park Master Plans

5.1 Overall Concept Plans

Overview

To prepare an effective Park Master Plan for Akenac Park, we must consider the impact and future development of both sites that comprise the contiguous parcels owned by Delaware Township. To that end, the planning and design process must consider both the 143 acre Akenac Park site and the additional contiguous 55 acre site that is programmed for future development as a mixed-use “Town Center”. These two sites present the Township with an opportunity to prepare a comprehensive land use plan that will enhance the potential for economic development as well as recreation enhancement and open space preservation. Therefore, this report presents a general Conceptual Plan for the Town Center that respects and identifies some of the more important design criteria for consideration in the planning of Akenac Park.

Town Center Concept

The Town Center site occupies about 50 acres of land with vehicular access provided from State Route 739 directly in front of the property. The site is gently sloping with maturing woodlands and a portion of the site encompassed by wetlands and stream corridors. It is the primary goal of the Town Center Concept to be developed into a mixed-use land use that respects and conserves the sensitive natural features while realizing the economic development opportunities of the land. It is anticipated that this long-range project will be accomplished through a public-private partnership. Through site analysis and discussions with municipal representatives, the vision of the mixed-use Town Center may be considered to include the following:

- The new location of a Municipal Complex in Town Center that incorporates a number of municipal administrative functions that are currently accommodated in other locations and buildings. This Municipal Complex becomes the hub of Township activity and the generator of future development.
- The incorporation of a Mixed-Use Commercial/Office/Residential land use component in the Town Center that may be privately developed to infuse tourism, retail and residential opportunities in the center.
- The development of a Medium or High-density Residential component in the Town Center that creates a neighborhood-like residential enclave taking advantage of the mixed-use services that are provided within the Town Center.

- The preservation, conservation and interpretation of the sensitive natural resource eco-system in the Town Center and establishing them as a “Green” focal point or identity feature for the overall design and identity of the Town Center.

The general display of the Town Center concept is depicted on the “Concept Plan” that is included in this report. The plan depicts four distinct areas for development that include the Town Center Municipal Complex of approximately 5 acres; the Mixed-Use Commercial/Office/Residential complex occupying about 15 acres; the Higher-density Residential Community occupying about 10 acres, and the Environmental Protection Area that preserves and protects the sensitive natural resources of the site.

Primary access to the Town Center is proposed as a combined access roadway from the existing entry road of Camp Akenac. Combining the access roadway for the Park and the Town Center reinforces the interrelationship of the two sites as a master plan. Vehicular access is to be provided by a main interconnecting roadway that provides direct access to the Park facilities and to the Municipal Complex in the Town Center. Shared parking for both sites is intended to be conveniently located with interconnecting pedestrian trails located throughout both the Park and the Town Center.

Akenac Park Concept

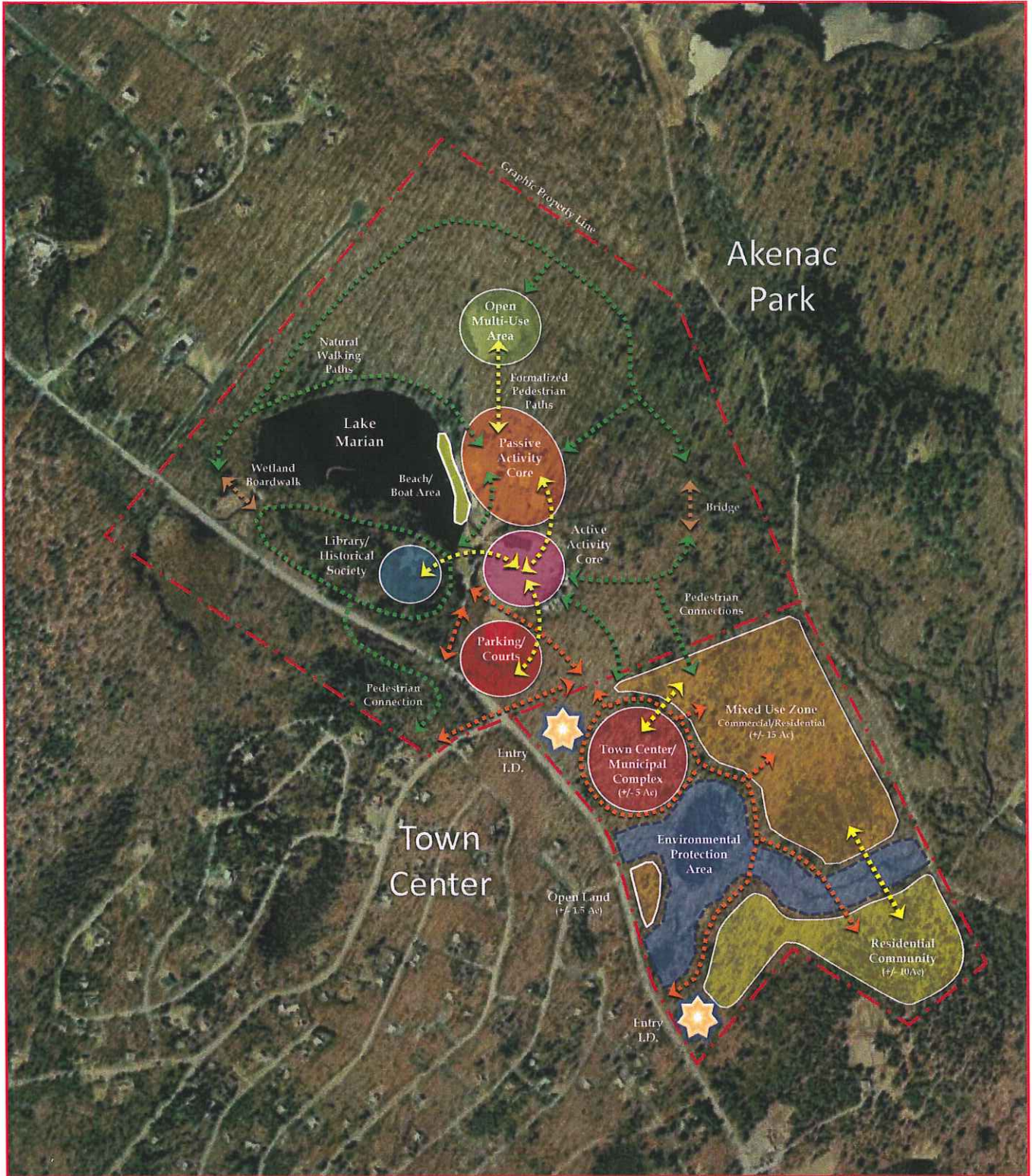
As shown on the “Concept Plan”, Akenac Park will include both active and passive activity areas. The plan includes the following:

- Recreation Center and Kitchen Upgrade
- Environmental Center
- Maintenance Building Modifications
- Creation of Amphitheatre
- New Tennis and Basketball Courts
- Picnic Area Upgrades, Pavilions, and Council Fire Ring
- Playground Modifications
- Relocated Boat House and Boating Area
- Sand Beach and Swimming Area Upgrade
- Three Levels of Walking Trails
- Multi-Purpose Free Play Area
- Roadway and Parking Upgrades
- Lake Marian Management Plan
- Innovative Stormwater Management

Each of these master plan elements, shown on the “Concept Plan”, is described in Section 5.2 – Park Master Plan.

Akenac Park Concept Plan

Delaware Township - Pike County - Pennsylvania



May 2010

5.2 Park Master Plan

Akenac Park Master Plan

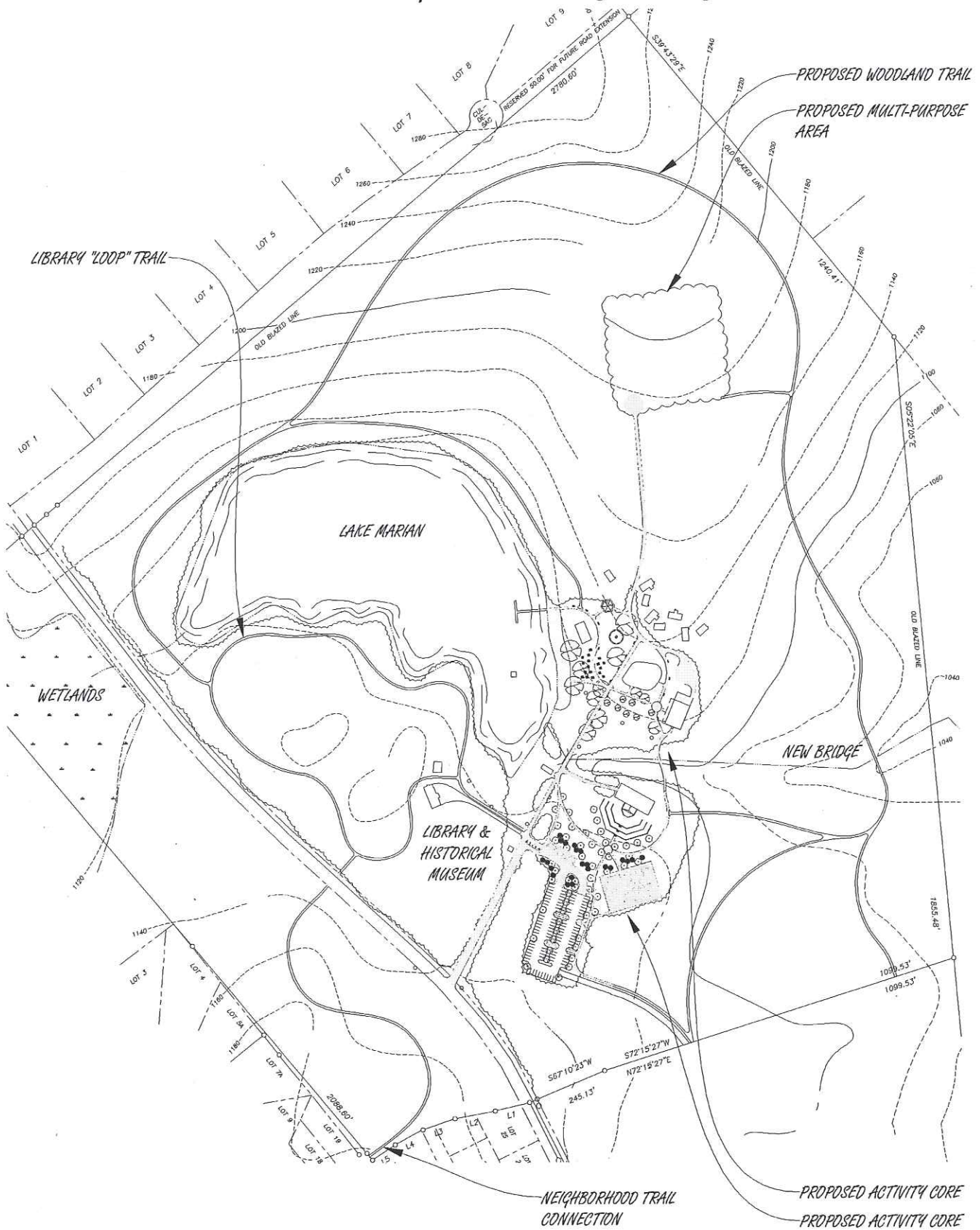
Akenac Park is fortunate to have been developed over time as a retreat and a camp for varied institutional and corporate owners. This ownership was able to develop the facilities at the camp to provide a number of significant and useful amenities. While the overall condition of some components of the park has been under-maintained, the park's general condition is rather well preserved. The recommendations included in this Master Plan Report have been created through on-site inspections, research from Peer to Peer Group findings and through public presentations to the community.

One of the primary goals of the master plan is to adhere to the strict regulations included in the Conservation Easement for the preservation and development of Akenac Park as a park that respects and preserves the natural resources while providing appropriate recreational experiences for the public. The recommendations for the future development of the park are presented on the "Akenac Park Master Sketch Plan" included in this report.

A more detailed description of the existing and proposed park facilities in the active core areas of the park is presented in the "Akenac Park Activity Core Sketch Plans", which are presented in two separate plans, each showing a different portion of the park plan. These plans show and annotate the various modifications to existing park facilities and the addition of new park facilities that are being proposed.

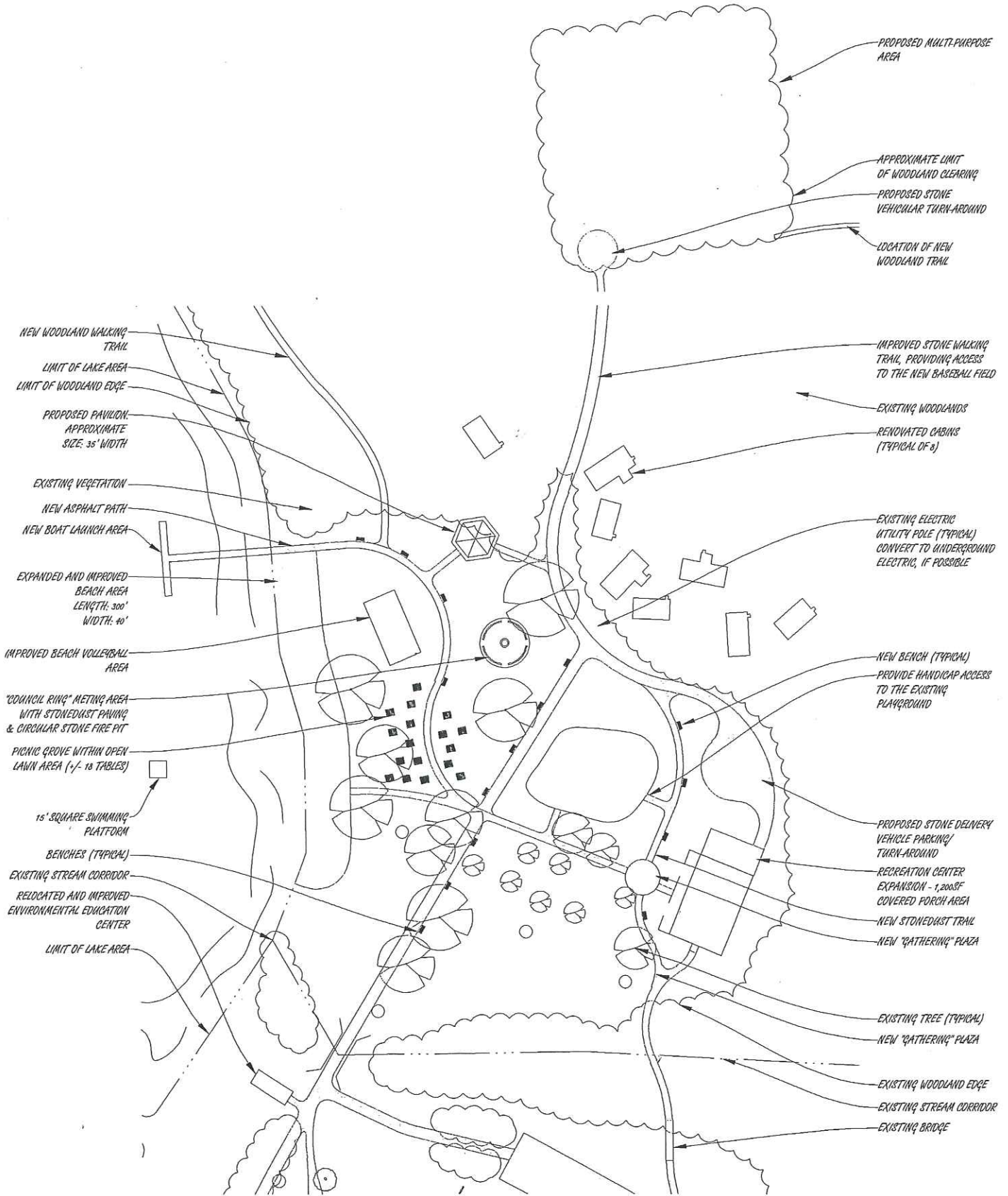
Akenac Park Master Sketch Plan

Delaware Township - Pike County - Pennsylvania



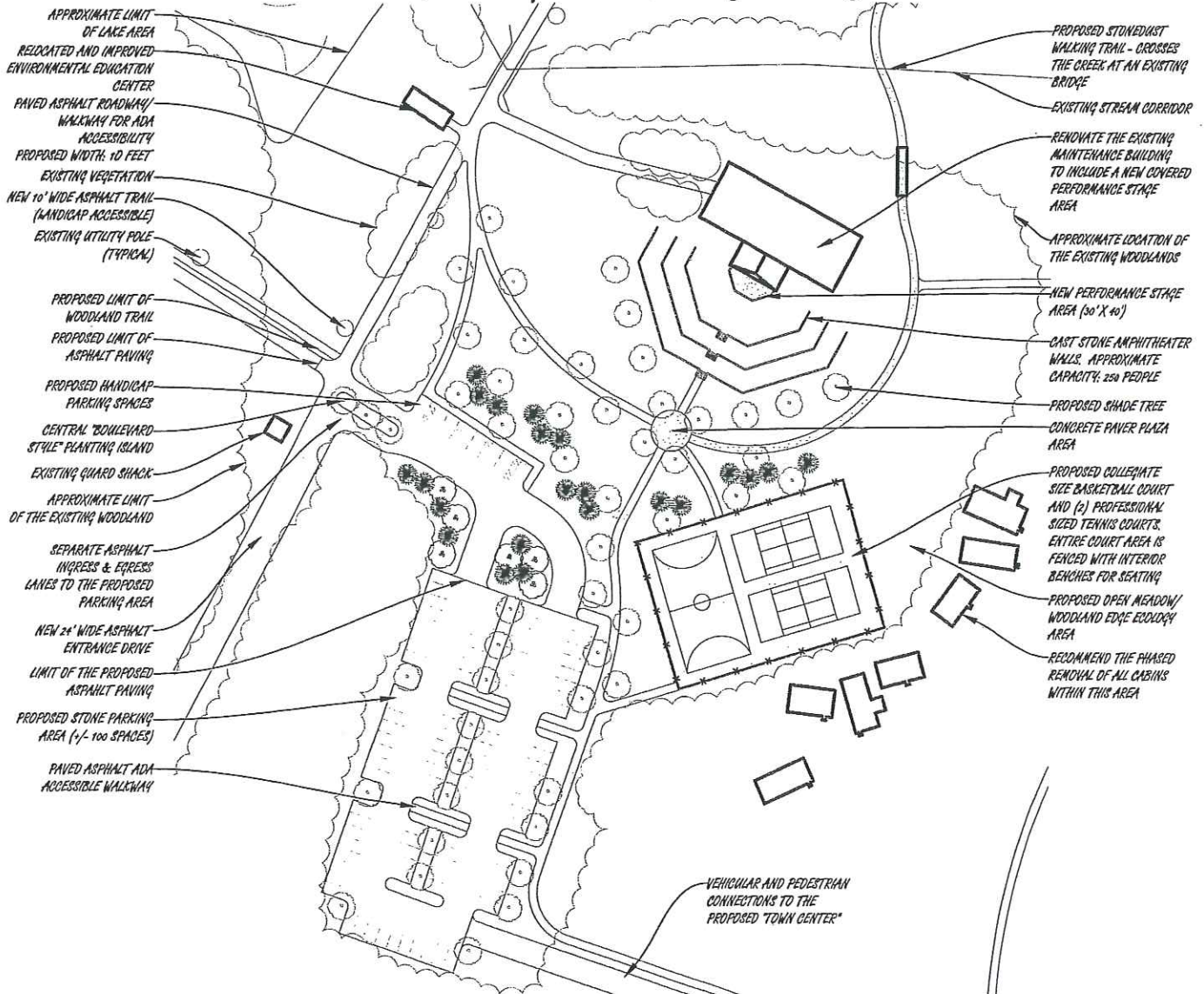
Akenac Park Activity Core Sketch Plan

Delaware Township - Pike County - Pennsylvania

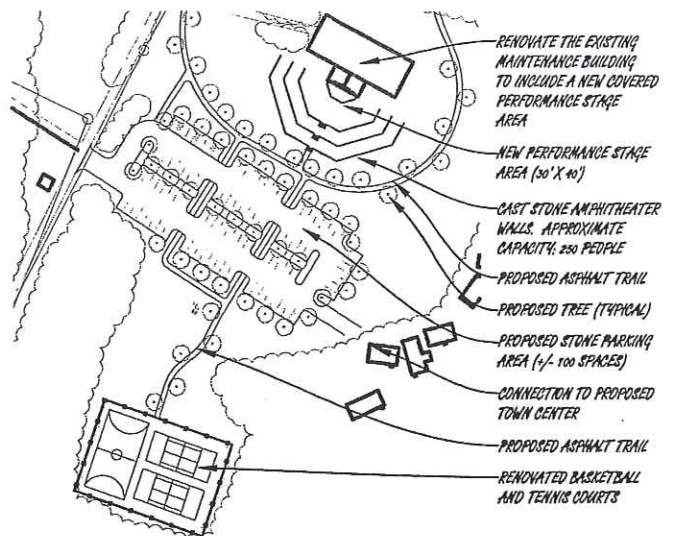


Akenac Park Activity Core Sketch Plan

Delaware Township - Pike County - Pennsylvania



Alternate Layout



Recreation Center

To take full advantage of the amenities of the Recreation Center, the major reconstruction of the kitchen facility should be a high priority for future funding. The current condition of the kitchen is not only unusable but presents a liability to the Township. The improvements should include new building surfaces, upgraded utilities and the purchase and installation of new appliances. All of the upgrades and renovations should adhere to the current International Building Codes and other applicable standards. It is recommended that the Township contract with an architect to prepare preliminary and final construction plans to accomplish these building renovations.

A second recommendation that ranks below the kitchen renovations includes the construction of a “Game Room” addition to the Recreation Center. Currently, the location of the table games intrudes on the usage of the main hall so that when other functions are planned the game tables must be removed to clear the space for the special event. The addition of a game room is intended to house the games and to free up the main hall for on-going undisturbed uses. It is recommended that a plan be prepared to design and detail this game room addition.

Cabins

The location and the condition of the existing cabins create an interesting dilemma for the future development of the park and its facilities. On the surface, the presence of the cabins may appear to be amenities that are highly desirable and maybe even profitable. The Township’s Peer to Peer Group conducted a very comprehensive analysis of the cabins and their findings showed that extensive renovations to these structures would be required to bring them up to building standards and ADA compliance. Keeping in mind that the Township does not intend to develop this park as a tourist venue nor a Boy Scout Campground, the expenditure for their remediation may be less compelling.

It is recommended that the one cabin identified as the potential location of the New Environmental Center be upgraded and adapted to facilitate the new Museum/Environmental Center. In addition, should the Township be inclined to preserve and adapt all or any of the cabins for future use, we recommend that the reconstruction of the cabins centrally located near the lake be of the higher priority for reconstruction. These cabins are centrally located, provide a bath house for swimming, and efficiently share water and sewer facilities.

Maintenance Building and Amphitheater

The existing Maintenance Building presents Akenac Park with a building in sound condition that can be utilized as a multi-use support structure. While the building

can continue to provide storage for maintenance equipment, its uses can be expanded to include offices and a venue for events during inclement weather.

The most promising of the new uses for the Maintenance Building is as a supporting structure for the installation of an amphitheater. The construction of an amphitheater for concerts and outdoor performances has been identified as a primary feature to be included in the master plan. Since the building is currently serviced by water and electric, it is uniquely equipped to be expanded to support the amphitheater needs. The amphitheater concept design locates the theater stage outside of the building using the outside wall as the backdrop. The seating can be accomplished by grading terraces into the hillside directly in front of the stage and in proximity to the new parking area.

Tennis and Basketball Courts

The asphalt court area include three tennis courts, one full-size basketball court and additional volleyball and badminton courts which occupy over an acre of impervious coverage. The physical condition of this vast amount of hard surface is beyond easy repair and should be removed and reconstructed to insure longevity and appropriate conditions for play. In addition, the location and number of these facilities were appropriate when the camp was first built but the new use does not justify the ongoing utilization of these courts.

Since it is not cost effective to repair the large expanse of asphalt, it is recommended that the asphalt top surface be removed. This asphalt may be salvaged, milled and reused as base material for park driveways or parking areas. It is recommended that a new full-size basketball and two tennis courts be relocated and constructed adjacent and below the current location of the tennis courts. It is also recommended that an appropriate stormwater management plan be developed and implemented to reduce the volume and pollutant load of stormwater runoff from the new courts. Stormwater management options, depending on the soil characteristics, could include porous pavement, infiltration practices or rain gardens.

Picnic Area/Pavilions

Currently the picnicking facilities are dispersed and located adjacent to each individual cabin. Each merely includes a small grill and picnic bench. By this arrangement, the opportunity for a family gatherings or community picnic event has generally been eliminated. Recommended improvements for the picnic area include development of a picnic grove with numerous picnic tables, a new 35' wide pavilion, a "Council Fire Ring" and newly installed stone dust pathways.

Library/Historical Society

The Library/Historical Society building is a recent addition to the park. As such its physical condition and the uses that it can accommodate are appropriate and lack the need for any major structural or programmatic changes. Partially paving selective areas of the parking lot to provide handicap parking and access may be considered. It is recommended that the Township look for opportunities to market and expand the uses of the building.

Playground

The new playground area provides a variety of active play structures that respond to users in the age bracket from tots through age eight. The equipment is state of the art and constructed by acceptable and knowledgeable manufactures. The installation includes sand fall protection and wood edging. It is recommended that a safety audit be conducted by approved inspectors to determine if the play area meets safety standards. In addition, it appears that the playground and its equipment may not meet the ADA requirements. It is recommended that a landscape architect be hired to prepare a plan that insures the appropriate level of handicap accessibility.

Sand Beach and Swimming Area

The sandy beach that abuts the lake is a wonderful amenity for swimming and for use as a boat launch. Maintenance of the beach is generally good and well groomed. As users increase with popularity and increased use of Akenac Park, expanding the limits of the beach may be desirable and even necessary. Additional improvements to the beach area may include upgrading of the sand volleyball court, incorporation of a community fire pit, and even installation of a gazebo or picnic structure. In addition, expansion of the area to accommodate more picnicking may be a well used expansion.

Boat House and Boating

The boat house and boat dock provide a stimulating water related program for the park users. The widely used amenity is a focal point of the beach area and generates a fair amount of use during the season. This report recommends the relocation of the boat dock to accommodate the expansion of the beach and permit better and safer interaction of boaters and swimmers. The installation of new interconnecting trails is also recommended for this area.

Trails

One of the highlights of the park facilities should be its trail system. A trail map has been prepared for the park and should be constructed as resources and budget become available. Taking into account for the diverse eco-systems in the park, a trail that presents interpretive features with varying levels of difficulty would be a valued amenity. The trail system should connect the entire park and all of its interesting facilities and natural resources. The pedestrian system should acknowledge the future development of the Town Center and project a connection to it.

The trail could have three levels of difficulty including a handicap accessible walkway system connecting major facilities, a mid level trail of stone dust for mid level users to surround the lake etc. and a difficult trail with a low-impact groomed surface that traverses into the woods at steeper slopes. A number of trail support facilities may be required to complete the trail system. A wetland boardwalk through the wetlands and a bridge over any creeks or swales may be needed. Interpretive signage should be displayed as an educational tool for the users.

Forest Clearing

As mentioned, this clearing in the forest befits a number of valuable uses within the park. This area was initially evaluated as a potential site for the proposed amphitheater; however, the location adjacent to the maintenance building appears to be a far superior location for the proposed amphitheater. This clearing is inaccessible to parking and pedestrians, has no utilities, and requires extensive site grading to implement. It is recommended that this area remain as an open lawn area and function as a multi-purpose free play area. The gravel road should be extended to the clearing, and a vehicular turn-around for deliveries and services should be installed.

Roadways and Parking

A primary goal for vehicular circulation is to prohibit internal vehicular movement throughout the park except when needed for maintenance, deliveries and emergency access. Currently, vehicular circulation and parking are not designed to adequately accommodate the future use of the park. The current vehicular circulation pattern permits direct access to the park's interior often creating conflict with pedestrian users. It is recommended that the current roadways remain as a gravel surface that is widened, groomed and upgraded while restricted through signage and check-in at the Entry Guard House.

It is projected that the use of the park facilities will increase significantly when the park is expanded and open to the community. This increase in the number of users will require an increase in the parking area. Currently, a minimal amount of

parking is accommodated by a small gravel lot adjacent to the Entry Guard House with the parking overflow directed to the lawn area in close proximity. It is recommended that a new gravel parking area be constructed over the site of the relocated tennis and basketball courts. It is projected that a well-landscaped, phased, parking area of about 100 vehicles should be constructed to accommodate the increased use. Handicap parking should be conveniently located with accessible walks for appropriate handicap access. The driveway to this parking area should be located so as to be patrolled and directed by the Entry Guard House attendant. Although the proposed larger parking lot will be constructed of gravel, it will still create additional stormwater runoff. It is recommended that an appropriate stormwater management plan be developed and implemented to treat and control stormwater runoff from the parking lot. Stormwater management options, depending on the soil characteristics, could include infiltration practices or rain gardens.

6.0 Lake Management Plan

6.1 Description of Problem

The centerpiece of Akenac Park is Lake Marian, a 13-acre lake that provides boating, swimming and wildlife viewing opportunities. The lake is equipped with a boat dock, boat house, swimming beach and lifeguard station. The lake appears to be eutrophic as evidenced by excessive algae and macrophyte growth during the warm weather months. Each year Delaware Township has the lake chemically treated to reduce the excessive algae and macrophytes. This is a band-aid solution that does not address the causes of the eutrophic conditions or the long-term ecological health of Lake Marian.

6.2 Lake Ecology Primer

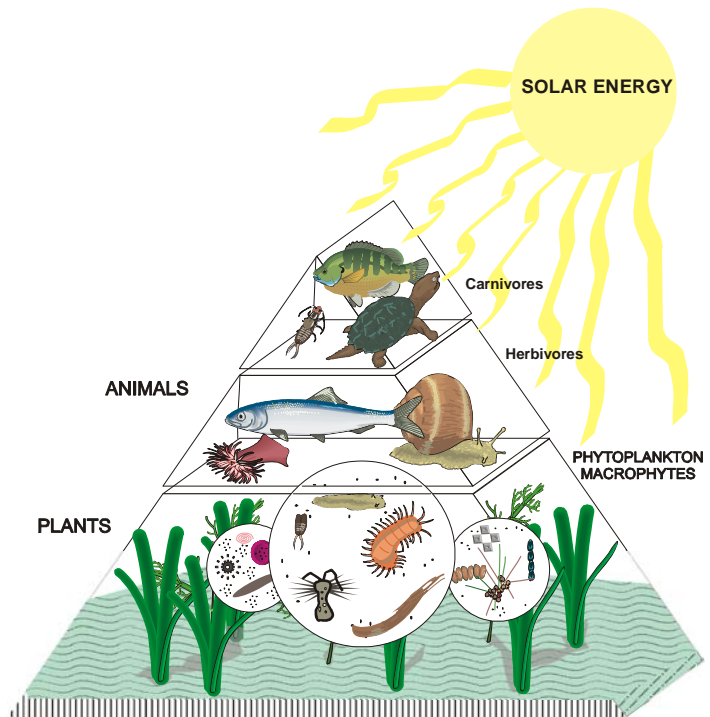
Ecological Cycle

In a lake, a basic ecological cycle exists. Aquatic plants like algae (microscopic aquatic plants) and macrophytes (large aquatic plants) require nutrients such as phosphorus and nitrogen along with sunlight to grow. Small aquatic animals such as invertebrates (rotifers, protozoa, etc.), snails and insects eat the algae and reproduce. Small forage fish eat the small animals, and, in turn are eaten by larger game fish and other animals. This relationship is called the ecological, or energy pyramid. In a healthy lake, this ecological system exists in proper balance.

When too many nutrients enter a lake, the algae and/or large aquatic plants grow to a point of excess.

With a larger population of algae one would expect a nice, large population of fish. However, in reality the excessive plant life is not transferred up the food chain. The small aquatic animals do not eat much of the excess algae (they do not like some of the algae, especially the blue-green algae). Therefore, algae and other plants build up in the lake and destroy the ecological balance of the lake ecosystem. This can result in a reduction in the fish population. It often results in a change in the type of fish found in the lake.

THE ENERGY PYRAMID



In order to understand the processes that occur in a lake, we must first understand the concept of lake succession or aging.

Lake Succession Over Time

All lakes go through an aging process called ecological succession. Succession is a natural process whereby a lake starts out as an “ecologically” young lake with little vegetation, few nutrients, clear water, and very little unconsolidated (loose) sediment on the bottom. It should be noted that ecological age is different than chronological age. The chronological age is simply the number of years a lake has existed. The ecological age, on the other hand, is a measure of the physical, chemical, and biological conditions of a lake. A lake may be chronologically young (i.e. built only 3 years ago), but it could be ecologically old.

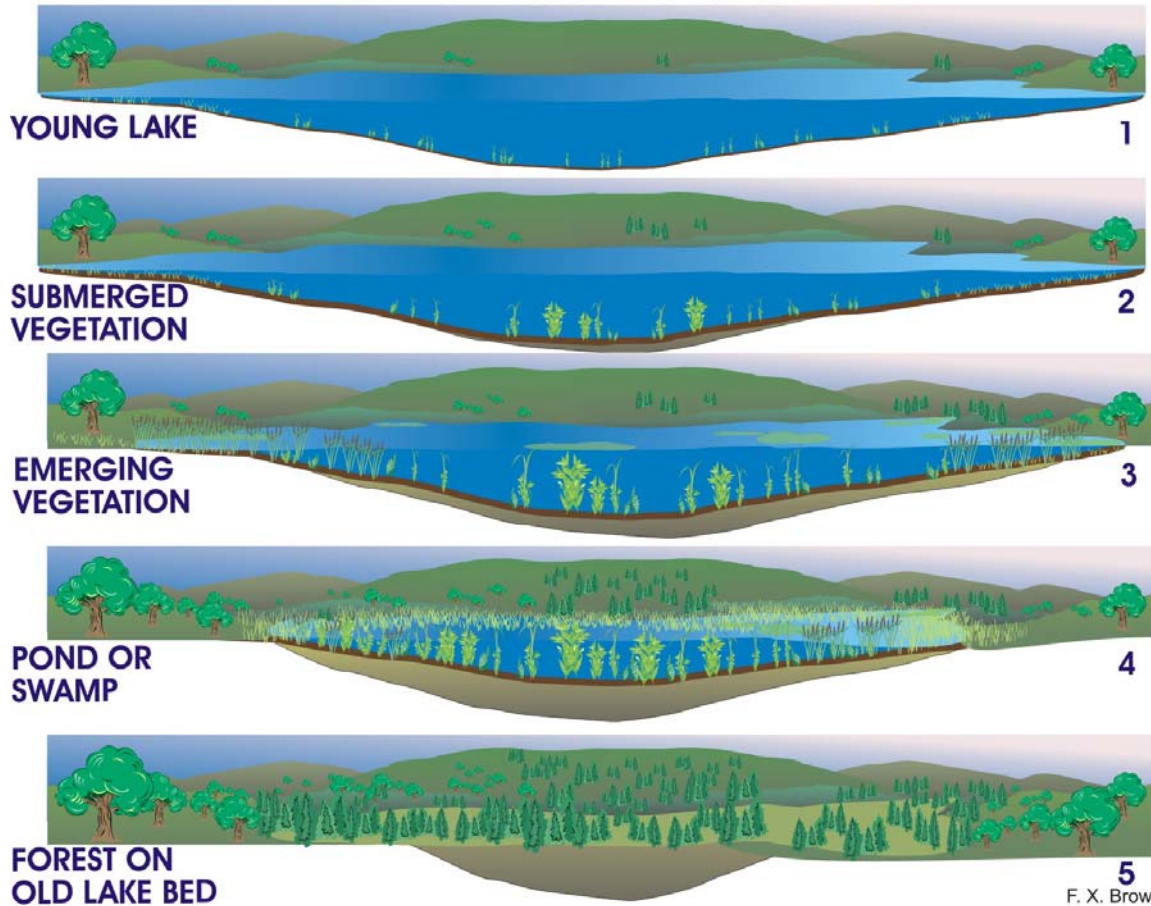
As a lake ages, more nutrients and sediments enter the lake from the surrounding watershed. Usually, the additional nutrients, such as phosphorus and nitrogen, cause an increase in the amount of algae and aquatic weeds. The additional sediment entering the lake settles to the bottom of the lake, increasing the amount of sediment on the lake’s bottom.

Thus as a lake ages, it slowly starts to fill up with sediments, algae and aquatic weeds. Initially, the aquatic vegetation is submergent vegetation, beneath the water surface. As the lake fills up further with sediment, emergent vegetation appears above the water surface.

Ultimately, the lake fills in completely with incoming sediment from the watershed and from dying algae, aquatic plants, and animals. The lake transforms into a pond or swamp and eventually, over hundreds or thousands of years, into a forest.

LAKE SUCCESSION

TIME

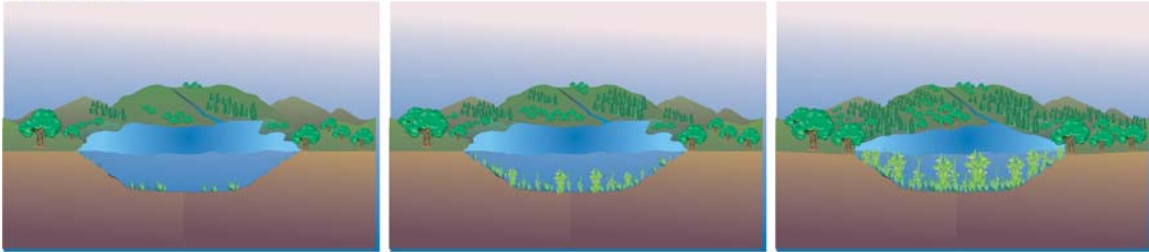


Lake Aging

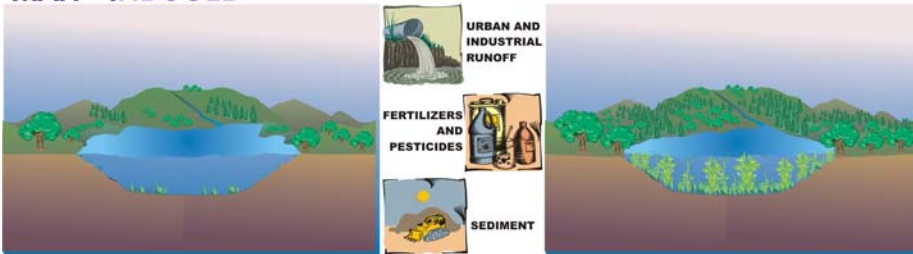
Lake succession or aging is a natural process that occurs in all lakes. However, the influence of human activities in the watershed can significantly accelerate the aging process. The lake aging process is accelerated by wastewater treatment plant discharges, malfunctioning septic systems, construction activities, agricultural activities, roadways, parking lots, streambank erosion, and developed land.

Human activities in a watershed can add sediments and nutrients such as phosphorus and nitrogen to a lake, resulting in accelerated aging or “cultural eutrophication”.

LAKE AGING NATURAL



MAN INDUCED



F. X. Browne, Inc.

Lake Classification

Lakes are classified by the amount of nutrients (or food) contained in the lake. The Greek word for food is “trophic”. Therefore, we classify lakes by their “trophic” or food/nutrient state. Such as:

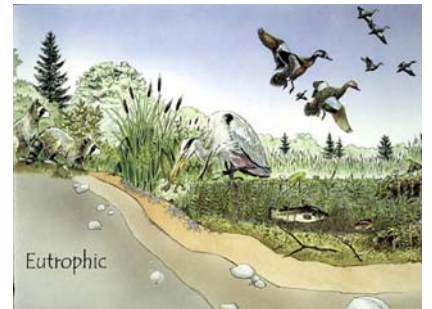
- Oligo = little (little nutrients)
- Meso = medium (medium nutrients)
- Eu = too much (too much nutrients)

The trophic state refers to the “ecological” age of the lake, not its chronological age. Therefore, an oligotrophic lake is a lake that is ecologically young. Lakes are classified by nutrient level and the presence of aquatic plants as described below.

- Oligotrophic lake
 - ecologically young lake
 - low level of nutrients
 - low population of algae and aquatic plants

- Mesotrophic lake
 - ecologically middle-aged lake
 - moderate level of nutrients
 - moderate population of algae and aquatic plants

- Eutrophic lake
 - ecologically old lake
 - high level of nutrients
 - high population of algae and aquatic plants



Lake Problems

Excessive nutrients entering a lake from its watershed cause algae blooms, excessive aquatic plants (macrophytes), lake siltation (settling of sediments in lake, loss of lake volume and capacity), and fishery problems (low dissolved oxygen levels change the fish from game fish to trash fish such as carp). This results in loss of recreation and other lake uses, and can even cause health problems for those in contact with the lake water.

6.3 Lake Management Plan

Overview

A lake management plan consists of both watershed management and in-lake management. The goal of watershed management is to reduce the amount of sediment and nutrients (nitrogen and phosphorus) that enter the lake each year. Generally, in the absence of major septic systems, most of the sediment and nutrients enter a lake from stormwater runoff and erosion. Watershed management, therefore, is usually aimed at diverting, reducing, or treating stormwater runoff before it enters the lake. In-lake management consists of the implementation of short-term practices that kill algae and aquatic plants (chemical treatment) and long-term practices that address the causes of the problems (lake aeration, nutrient inactivation, dredging). Since there is no existing information on the present ecological condition of Lake Marian, the first step in a lake management plan is to perform a lake and watershed study to obtain the required scientific data on the lake and its watershed. Once this information is obtained, a more comprehensive lake and watershed management plan can be developed.

Lake and Watershed Study

The lake and watershed study should include lake monitoring, watershed delineation and evaluation, and riparian buffer/shoreline vegetation evaluation. It is important to identify the type and amount of nutrients in the lake water and bottom sediments. Since certain types of algae (Cyanobacteria/blue-green algae) are dangerous to the health of humans, even if the algae are treated with algaecides, it is important to identify the types of algae present in Lake Marian to protect swimmers and boaters.

Lake Monitoring

The lake monitoring plan for Lake Akenac includes collecting water samples at one station in the lake during July and August. Each water sample will be analyzed for the following parameters:

- Total Phosphorus
- Nitrite/Nitrate Nitrogen
- Total Kjeldahl Nitrogen
- Ammonia Nitrogen
- Conductivity
- pH
- Chlorophyll *a*
- Phytoplankton (algae)
- Zooplankton

In addition to the above parameters, a dissolved oxygen and temperature profile will be measured at the lake sampling station. The Secchi disk transparency of the lake will also be measured. A sediment sample will be collected from the lake bottom and analyzed for total phosphorus, dissolved reactive phosphorus, total nitrogen, total iron, and total manganese.

During August, a macrophyte (aquatic weed) survey will be conducted to identify the types of plants in the lake and to determine the areal coverage of the plants. Additionally, a bathymetric survey will be performed to determine the depth of the lake, the volume of water in the lake, and the volume of sediment that has accumulated in the lake. A digital macrophyte map and bathymetric map will be prepared.

All water quality data will be computerized and analyzed. Carlson's trophic state index (TSI) will be calculated to determine the trophic condition (ecological health) of the lake. All the lake data will be analyzed and evaluated.

Watershed Survey

The watershed of Lake Marian will be delineated and the land uses in the watershed will be identified using USGS maps and County data. The land uses will indicate the relative magnitude of the non-point sources of sediments and nutrients entering the lake.

Riparian Buffer/Shoreline Vegetation Survey

The type and relative abundance of riparian and shoreline vegetation around the lake will be identified. This is important since the riparian and shoreline vegetation can be an excellent filter for the removal of sediments and nutrients in stormwater runoff. Understanding the type and abundance of this vegetation will allow us to evaluate the condition of the riparian and shoreline vegetation to determine whether it is sufficient for stormwater filtering.

Final Report

A final report will be prepared. It will include all of the lake and watershed data and maps, along with conclusions and recommendations for additional lake and watershed management activities to protect Lake Marian.

Lake and Watershed Management Alternatives

Once the results of the lake and watershed study are obtained, we will recommend in-lake and watershed management alternatives. In-lake alternatives may include lake aeration, sediment removal, nutrient inactivation (alum addition), and other in-lake practices. It may also include the temporary continuation of the present approach of adding chemicals to control algae and aquatic plants. Watershed management alternatives may include modifying the riparian and shoreline vegetation to provide better filtration of stormwater runoff.

7.0 Cost Analysis and Phased Implementation Program

7.1 Development Costs

Table 2 presents an itemized cost estimate of the proposed recommendations and improvements that are described in the report. This cost estimate is intended to set the framework for establishing municipal budgets for capital improvements and for long- range fiscal planning and project implementation.

Table 2- Akenac Park Master Plan Cost Estimate

Delaware Township, PA

DePallo Design & Planning, LLC

April 15, 2011

ITEM DESCRIPTION	UNIT	QTY.	UNIT PRICE	COST	SUBTOTAL COST
Upgrade Recreation Center Kitchen					
Interior Improvements	SF	600	\$100.00	\$60,000.00	
Utility Upgrade	LS	1	\$100,000.00	\$100,000.00	
New Appliances	LS	1	\$100,000.00	\$100,000.00	
					\$260,000.00
New Recreation Center Game Room					
	SF	1500	\$200.00	\$300,000.00	\$300,000.00
Cabins New Env. Center					
	SF	400	\$75.00	\$30,000.00	\$30,000.00
Amphitheater / Stage Etc.					
Stage	SF	2000	\$20.00	\$40,000.00	
Grading & Seating	CY	400	\$50.00	\$20,000.00	
Utilities/Lights Etc.	LS	1	\$25,000.00	\$25,000.00	
					\$85,000.00
Playground Upgrades					
	LS	1	\$20,000.00	\$20,000.00	\$20,000.00
Tennis / Basketball Courts					
Grading/Paving	SF	15000	\$5.00	\$75,000.00	
Stormwater Management	LS	1	\$20,000.00	\$20,000.00	
Fencing	LF	500	\$50.00	\$25,000.00	
					\$120,000.00

Sand Beach Improvements					
Expand Beach	SF	15000	\$5.00	\$75,000.00	
New Fire Pit	LS	1	\$25,000.00	\$25,000.00	
Picnic Pavilion	LS	1	\$75,000.00	\$75,000.00	\$175,000.00

Trail System					
Low Impact Groomed Trail in woods	LF	6000	\$5.00	\$30,000.00	
Med Difficult Stone Dust Trail in brush	LF	4000	\$10.00	\$40,000.00	
ADA Asphalt Trail in lawn	LF	2000	\$15.00	\$30,000.00	
					\$100,000.00

Upgrade Gravel Roadway	SF	40000	\$1.50	\$60,000.00	\$60,000.00
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New Gravel Parking & Drive					
Demo/Grading	CY	2,000	\$20.00	\$40,000.00	
New Gravel Parking & Drive	SF	50,000	\$2.00	\$100,000.00	
Stormwater Management	LS	1	\$25,000.00	\$25,000.00	
Landscaping	LS	1	\$25,000.00	\$25,000.00	\$190,000.00

Miscellaneous					
Signage	LS	1	\$10,000.00	\$10,000.00	
Misc.	LS	1	\$10,000.00	\$10,000.00	
					\$20,000.00

Legal, Survey, Design & Engineering (10%)				\$130,000.00	\$130,000.00
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TOTAL ESTIMATE				\$1,490,000.00	\$1,490,000.00
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OPTIONAL FOR DISCUSSION ONLY

Cabins Upgrades All	EA	18	\$25,000.00	\$450,000.00	\$450,000.00
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GRAND SUM ESTIMATE					\$1,940,000.00
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7.2 Phased Implementation Program

Table 3 identifies a prioritization of the proposed recommendations that are identified in the report. The chart identifies the proposed recommendation, its priority ranking and the associated cost estimate for that improvement. The implementation strategy is broken into three components as follows:

Highest Priority – These recommendations are most significant improvements that are proposed to be implemented immediately within the first 1 to 3 years. They either address a safety or liability concern or will provide the park with a significant immediate benefit when accomplished.

Medium Priority – These recommendations are important improvements that are proposed to be implemented as soon as possible within the first 3 to 5 years. They are desirable improvements that will provide the park with substantial benefits when accomplished.

Lower Priority – These recommendations are desirable improvements that are proposed to be implemented within the first 5 to 10 years. They are intended as long-range improvements that will provide the park with good user benefits when accomplished.

Table 3 - Phased Implementation Program		
Prioritization of Recommendations	Description of Recommendations	Approximate Cost
Highest Priority – Immediate Improvements		
Renovation or Removal of Cabins:	The existing cabins pose a significant safety liability. Renovations are very expensive and not cost effective. Removal of the cabins is a high priority.	Undetermined
Recreation Center Renovations:	The renovations to the RC are very critical. This facility is substandard and its use poses a liability and loss of income generating amenity.	\$560,000
Upgrade Existing Gravel Parking and Driveways:	With the expectation of more use, the grooming of the existing parking lot and driveways through the park should be a high priority.	\$60,000
Medium Priority – Short Term Improvements		
New Environmental Center:	One existing cabin is programmed as an environmental center. This is a feasible renovation on a small scale and should be pursued.	\$30,000
Sand Beach/Picnic Area Improvements:	The recommended improvements to the beach and picnic area will offer a majority of the users with an enjoyable and multi-use experience.	\$175,000
Playground Upgrades:	While the playground is a recently installed amenity, it should be retrofitted to insure ADA compliance.	\$20,000
New Trail System:	A trail system that is appropriate for all ages and abilities will offer users a most desirable amenity providing exercise and environmental awareness.	\$100,000
Lower/Long Range Priority – Future Improvements		
Tennis/Basketball Court Renovations:	The renovations to the tennis and basketball courts are an expensive endeavor. Complete reconstruction and incorporation with new parking facility is recommended.	\$120,000
Construction of Amphitheater/Stage	The new amphitheatre and stage design will provide a venue for cultural, educational and theatrical performances for all ages.	\$85,000
New/Expanded Gravel Parking and Stormwater Mgmt.	This will accommodate the expected increase in visitors and protect the environment from stormwater runoff.	\$190,000