

HILLTOP RESERVATION MASTER PLAN



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FOREWORD

The Hilltop Reservation Master Plan has been commissioned by the Essex County Department of Parks, Recreation & Cultural Affairs to document all necessary improvements to the Reservation to maintain Hilltop Reservation as an important resource within the County Park system, to allow the allocation of current grant funding towards these improvements, and to apply for further grant funding or other fund raising methods towards the necessary improvements. In addition to documenting improvements to the Reservation, the Hilltop Reservation Master Plan reviews current conditions of the Reservation's landscape, facilities, wildlife, wildlife habitats, and other natural features. A majority of these topics have been previously covered by the, "Hilltop Reservation Ecological Health Assessment and Stewardship Recommendations" prepared by Michael Van Clef, Ph.D. This Master Plan will reference that report when discussing topics regarding current conditions that the Ecological Health Assessment has covered.

CME Associates conducted several site visits to assess the current conditions with regards to facilities and leftover infrastructure from prior land uses that require removal. The site visits spanned from May 2014 to July 2014. The information and data collected from those site visits were used in conjunction with existing documents of the Reservation to prepare the Master Plan. All recommendations made within this Master Plan have the intent to maintain the reservation in its natural state and to be used as a passive use park with improved ecological health. The Master Plan includes three separate plans including a plan to improve the environmental "landscape" of Hilltop Reservation by maintaining existing habitats and commencing new habitat restorations. Implementing a plan for Hilltop Reservation's infrastructure by improving, but not adding, necessary facilities and removing unnecessary or abandoned infrastructure to clean up the Reservation, sometimes referred to as "leftovers", from past land uses. Executing Hilltop Reservation's Master Plan will elevate Hilltop Reservation to become a more valuable asset to Essex County's Park system and a natural treasure for all of Essex County's residents to experience and enjoy.

EXECUTIVE SUMMARY

The primary purpose of this document is to assess the current conditions of the Hilltop Reservation, provide recommendations for improvements, and establish an action plan to implement the recommendations. This provides a basis to support future projects on the reservation that will address and improve the ecological health of the reservation, enhance the natural experience for visitors, and maintain Hilltop Reservation's natural undeveloped state far into the future. Currently, the health of the Hilltop Reservation has come under duress and is in danger of becoming unsustainable. There are numerous gaps within the woodland canopy which give invasive species an opportunity to gain a foothold on the reservation. These invasive species have exacerbated the deterioration of Hilltop Reservation's ecological health and have become a major problem. Coupled with excessive deer browse, Hilltop Reservation's native plant life and overall ecosystem is in decline. This threatens Hilltop's Reservation main use as a passive use park. The main goal of this Master Plan is to have Hilltop Reservation truly blossom to its full potential.

The recommendations set forth in this Master Plan have the potential to substantially improve the health of the Hilltop Reservation so that all fauna and flora can thrive in this ecological sanctuary and Essex County citizens can enjoy all that the Hilltop Reservation provides. These goals and objectives, or recommendations, establish the policies and actions that Essex County will pursue to enhance the Hilltop Reservation. The goals and objectives require the commitment of resources to rehabilitate and improve existing landscape, infrastructure, and protect ecological or natural resources located within the Hilltop Reservation.

The progress of the goals and objectives are recommended to be evaluated by annual reports with a pro forma financial statement. These reports should include current progress on removal of prior land use infrastructure, current and new wildlife habitats, and upgrades to facilities. The annual reports and pro forma will allow the County and Conservancy to keep track of all projects related to the Reservation and have a budget showing which projects are feasible within a given year.

GOALS AND OBJECTIVES

Goal: Implement the wildlife habitat restorations described herein, including any associated maintenance activities.

Objective: Monitor wildlife habitat restoration progress and management and implement a detailed plan to ensure ongoing restoration progress and success.

Objective: Implement the deer management efforts identified herein and monitor progress on an annual basis.

Goal: Protect the wildlife habitats and natural resources of the reservation.

Objective: Continually monitor and seek to identify necessary precautionary and enforcement measures to preserve wildlife habitat restoration and natural resources in the Reservation. This should include upkeep of wildlife habitats and preserving the Reservation in its natural state.

Goal: Implement multiple year plans to improve and revitalize the landscape, infrastructure, restoration, and management of the Hilltop Reservation.

Objective: Implement the detailed five year restoration/improvement and maintenance schedule for the highest priority items with cost estimates and monitor the progress each year.

Objective: Implement the detailed ten year plan with cost estimates for secondary priorities and monitor progress each year.

Goal: Implement recommendations under each plan to improve and rehabilitate the Hilltop Reservation to its full use and enjoyment for the County residents as a passive use park.

Objective: Remove all existing structures identified for removal or demolition herein and restore the underlying landscape to a safe and ecologically healthy condition.

Objective: Improve all existing entrances and hardscape areas while not increasing the amount of impervious coverage on Hilltop Reservation to preserve and enhance its natural state.

Objective: Improve the trail system with informational and way finding signage.

Objective: Implement the Green Acres grant for the restoration of the west side of Hilltop Reservation.

Goal: Delineate the borders of the reservation clearly to avoid dumping by abutting residential households by using existing maps and GIS resources to establish reservation border.

Goal: Use this master plan as a tool to pursue, federal, state, and local funding and grants to continue the improvement of the Hilltop Reservation.

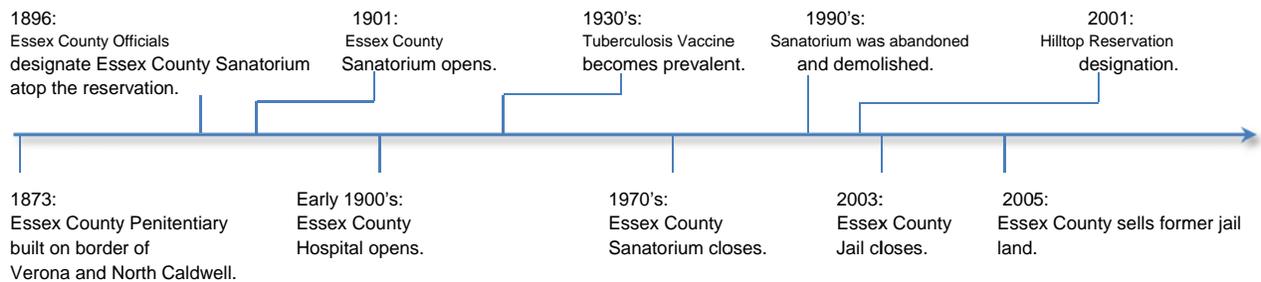
Objective: Identify potential grant and funding resources to be used towards the improvements mentioned in the recommendations and action plan.

Objective: Leverage monetary and in-kind grants or other funding resources to implement this Master Plan.

HISTORY OF HILLTOP RESERVATION

Historical Chronology

The recent history of the land that is now the Hilltop Reservation began several years before the turn of the 20th century. Many events over the course of the 20th century created several unique uses on the current Hilltop Reservation prior to Hilltop's preservation for open space. A brief historical chronology highlights some of these events and land uses.



Past Land Uses

In the late 1800's and early 1900's the south western portion, the area surrounding prisoner's pond was used as agricultural fields and pastures for animals. During this same period, Essex County built a penitentiary, a sanatorium, and a hospital. The County penitentiary occupied the southwestern portion and it was common for inmates to work the fields. The food cultivated from the fields would be used to feed the prisoners, patients at the Essex County Sanatorium and Essex County Hospital.

The Essex County Sanatorium opened in 1901 located on the summit of Hilltop Reservation. A majority of the remaining structures and infrastructure on the Hilltop Reservation come from the Essex County Sanatorium. The Sanatorium opened with the main purpose of treating patients with tuberculosis. The Sanatorium was completely self-sustaining and was comprised of numerous buildings and infrastructure, very similar to a campus style complex. This included its own water supply, storm water system, electric and gas facilities, garages, parking, laundry, food supply, tunnel system, housing for patients, nurses, and doctors. The Sanatorium continued to operate until the 1960's, and demolished in the 1990's. Ten years later the remaining buildings were demolished. During this time the Hilltop Reservation was permanently preserved via a Conservation Easement, but there are still a significant of structures and debris left over from the Sanatorium.

The Essex County Jail closed in 2003 due to the construction of a new jail in Newark. In 2005 the county sold the former Essex County Jail Annex and adjacent properties to developers. The land has now been developed into residential areas. A total of 10.6 acres of this land is used for recreation purposes. The Jail was located south of the Essex Mountain Sanatorium off of

Bloomfield Avenue.

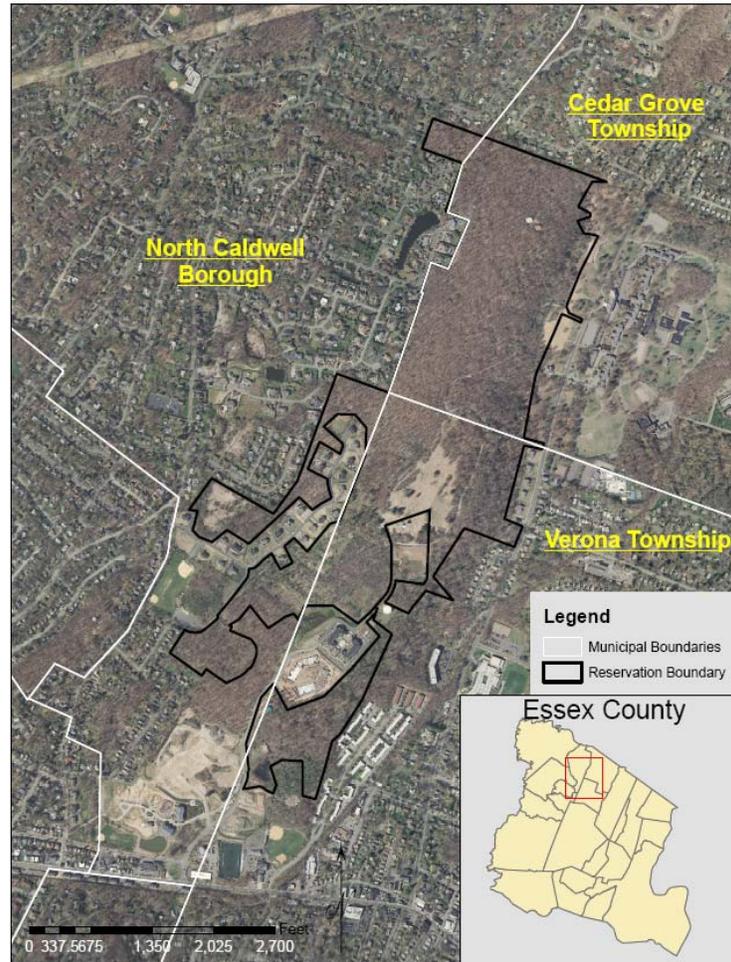
Other uses of the current Hilltop Reservation include a leaf dump/compost in the 1980's, and timber harvesting. All of these prior land uses have significantly contributed to the Reservation's current landscape.

Evolution of Hilltop

Over the entire 20th century and into the 21st century, the Hilltop Reservation has progressed from farming and timber harvesting, to county land for a Sanatorium, Hospital, and Jail to support the facilities in Newark City, to a protected Reservation. The many different land uses on this portion of the Second Watchung Mountain have dramatically shaped the Reservation into what it is today. Unfortunately, past land uses such as agriculture and tilling have allowed many invasive species to grow rapidly throughout Hilltop Reservation and currently threatens the ecological health of the tract. These invasive species have spread almost completely unabated and threatens Hilltop's passive use. Since the Reservation was never planned or designed to be used for passive recreation, it lacks some of the amenities found on other reservations and parks in Essex County. This makes this Master Plan crucial to further improving the Hilltop Reservation in its continuing evolution.

HILLTOP RESERVATION LOCATION

Reservation Location



The Hilltop Reservation is located on the border of North Caldwell, Verona Township, and Cedar Grove Township in Essex County, New Jersey. The Hilltop Reservation is in the northern part of Essex County. Municipalities surrounding Hilltop Reservation within Essex County include Fairfield, West Caldwell, West Orange, and Montclair. Surrounding municipalities north of Hilltop Reservation in Passaic County include Little Falls, Clifton, and Passaic. The Hilltop Reservation connects to other reservations via the Lenape Trail, which is immediately east of the Reservation border, including the South Mountain Reservation and Eagle Rock Reservation in Essex County.

The Hilltop Reservation is a 284-acre preserved section of Essex County that is predominately surrounded by fully developed land mostly comprised of single family residential uses. The reservation encompasses a small portion of what is known as the Second Watchung Mountain. The Second Watchung Mountain is part of the Watchung Mountain group that stretches from Somerville, New Jersey northeast to Mahwah, New Jersey. Hilltop Reservation provides Essex County residents with a mostly undisturbed natural sanctuary within one of the most densely

populated regions within the nation.

The Hilltop Reservation was preserved via a Conservation Easement in 2001, by NJDEP, permanently dedicating it for recreation and conservation purposes. Since the execution of the 2001 Conservation Easement designation, Essex County and the Hilltop Conservancy have worked to improve the reservation since it was not originally designed to be used for passive recreation. These improvements include debris removal, seasonal plantings, control or eradication of invasive species, clearing and maintaining trails, habitat restorations, and general maintenance. This Master Plan builds upon these improvements and sets a long term plan in motion to continue the improvement of the Reservation's natural landscape including infrastructure, landscape, and overall ecological health improvements.

It is important to note that the Reservation contains 33 acres of land to the east of Fairview Avenue away from the main contiguous Reservation. This Master Plan is only applicable to the 251 acres of contiguous Hilltop Reservation land area. The reservation's location is shown on the map in Appendix A.

CURRENT ENVIRONMENTAL "LANDSCAPE" CONDITIONS

The "Hilltop Reservation Ecological Health Assessment and Stewardship Recommendations" prepared by Michael Van Clef, Ph.D. covers Hilltop Reservation's ecological communities, water features, vegetation, and current wildlife populations. This report can be found in Appendix F. The following narratives give a small description from the report, found on pages iii, 1, 4, 5-8, and 15-16.

Inventory of Ecological Communities

With 98 percent of the reservation consisting of natural land cover, the Hilltop Reservation provides an opportunity to enhance the landscape to become an excellent ecological community within a dense suburban landscape. The combination of forest, meadow, and shrub land habitats provide fauna and flora a good opportunity to flourish. A map in Appendix B shows land cover in more detail. The following three sections breakdown the ecological communities of the Hilltop Reservation into water features, vegetation, and current wildlife populations.

Assessment of Water Features

The Hilltop Reservation contains approximately an acre of open water, including Prisoner's Pond which is the largest water body on the reservation and several small streams that run for a total of 4,600 feet within the reservation. Prisoner's Pond is a natural pond that draws its water source from a natural spring that comes from below the pond. It is named Prisoner's Pond due to its location behind the now demolished County Jail. Debris is still present immediately north of Prisoner's Pond. Water quality may have been and may continue to be affected by the debris. Many of the streams on the reservation are unnamed tributaries with some being fed by the former sanatorium's storm water management system through drains and swales.

It is important to note that the Prisoner's Pond area is slated to be part of a land swap with Verona Township. Essex County may receive the land that is currently part of the 3.2 acre meadow restoration project while giving Verona Township the land surrounding Prisoner's Pond

in exchange. The exchange is approximately an equal amount of land for both parties.

Assessment of Vegetation

The current vegetation situation is precarious and potentially devastating to the Reservation. Many native species are dying and being wiped out by non-native or invasive species. The Ecological Health Report in Appendix F includes tables or lists of current native and non-native vegetation.

Assessment of Current Wildlife Populations

Hilltop Reservation has a variety of wildlife within its borders and also wildlife that only visit during migration. Therefore the Hilltop Reservation is an excellent local resource for those who wish to see different types of animals or plants in their natural environment. Anyone or any organization can conduct nature walks or educational activities on this large reservation full of natural wildlife habitats.

Prior reports for the Reservation identified several mammals on the Hilltop Reservation. One report observed directly Eastern Chipmunk, Eastern Gray Squirrel, Dusky Salamander, and White-tailed Deer. The report continues to list smaller mammals that are probable including Virginia Opossum, Raccoon, Striped Skunk, Woodchuck, shrews, mice, voles, amphibians, snakes, and bats.

Butterflies are very common on the Hilltop Reservation, especially in the meadow areas of the reservation. Members of the North American Butterfly Association (NABA) hiked the Hilltop Reservation and recorded a number of butterfly sightings. The full list from this hike can be found below.

NABA Sighting List at Hilltop Reservation

Monarch – 7
American Lady – 8
Painted Lady – 1
Black Swallowtail – 1
Eastern Tiger Swallowtail – 2
Cabbage White – 150+
Clouded Sulfur – 3
Orange Sulfur – 11
Summer Azure – 11
Silver Spotted Skipper – 15
Zabulon Skipper – 1
Mourning Cloak – 2
Little Wood Satyr – 3
Red banded Hairstreak – 2
Banded Hairstreak – 1
Eastern Tailed Blue – 8
Common Buckeye – 1
Eastern Comma – 2

Skippers:

- Dun – 2
- European – 12
- Little Glassywing – 2
- Least – 2
- Northern Broken Dash – 1

Hilltop Reservation has been certified by the University of Kansas’ Monarch Watch program as a ‘Monarch Waystation’. Milkweed stands supply nectar for migrating monarch butterflies, and provides a hosting site for their eggs. This makes Hilltop Reservation an important resource for monarch butterflies, and many other butterfly species. This also places Hilltop Reservation as an excellent local resource for studying butterflies and other species in their natural environment. It can be an outdoor classroom for local students and local organizations to conduct learning activities, research, or nature walks.

The wildlife with the largest presence on the Hilltop Reservation is white-tailed deer. This is due to subdivisions providing a very safe and abundant habitat that allows them to thrive along with no large predators, such as mountain lions or wolves, to keep their numbers in check.

Current Deer Management Evaluation

According to the 2013 Deer Management Program for Essex County, New Jersey Final Report, 1,515 deer have been killed from 2008 to 2013 in the South Mountain, Eagle Rock, and Hilltop Reservations. The following table (Table 1) from the Deer Management Program breaks down the harvest.

ESSEX COUNTY DEER MANAGEMENT PROGRAM Multi-Year Summary								
	Harvest	2008	2009	2010	2011	2012	2013	Total to date
South Mountain Reservation	Deer:	213	83	44	48	50	43	481
	Fetuses:	147	55	15	26	29	19	291
	Total:	360	138	59	74	79	62	772
Eagle Rock Reservation	Deer:			19	19	23		61
	Fetuses:			23	13	18		54
	Total:			42	32	41	0	115
Hilltop Reservation	Deer:			97	120	102	61	380
	Fetuses:			54	113	52	29	248
	Total:			151	233	154	90	628
All properties combined	Deer:	213	83	160	187	175	104	922
	Fetuses:	147	55	92	152	99	48	593
	Total:	360	138	252	339	274	152	1515
Venison donated to Community FoodBank	lbs.	8,000	3,000	5,717	4,824	4,572	2,291	28,404

The County of Essex has made excellent strides in curbing the deer population on these reservations, including Hilltop Reservation. This has helped the Hilltop Reservation begin to rebound from the ill effects of over deer population. These ill effects include:

- Vegetation over-browse resulting in a loss of biodiversity;
- Loss of vegetation due to over-browsing forces a decline in number of animal species that depend on shrub layers of the forest;
- Over-browsing of native tree seedlings precludes growth of new trees;
- Loss of vegetation increases the rate and volume of storm water runoff exacerbating erosion and flooding issues;
- Loss of native vegetation is enabling the growth of invasive exotic plants which

- outcompete native species and provide no benefit to native wildlife; and
- Deer-related motor vehicle accidents result in personal injury or potential loss of human life, significant property damage, and mortality of many deer.

Each year Essex County reviews its Deer Management Program. Therefore, we recommend following the county guidelines for deer management for The Hilltop Reservation.

CURRENT INFRASTRUCTURE CONDITIONS

Human Circulation Systems

Hilltop Reservation has two circulation systems within the reservation including a road system with 2 parking lots, and a trail system with two official entrances. There are additional parking lots and road systems for the Highlands Apartment Complex and also for municipal or county uses. Additionally, there are several access points for the Reservation that are not official entrances. The map contained in Appendix C shows these Human Circulation Systems for Hilltop Reservation.

TRAILS

The Hilltop Reservation trail system includes 11 interconnected trails of varying distance and difficulty. The table below displays the trail system.

Trail Name	Distance	Difficulty
Arrowhead	1.1 Miles	Medium
Meadow	0.3 Miles	Easy
Old Hilltop	1.8 Miles	Hard
Peace	1.3 Miles	Medium
More Peace	0.3 Miles	Easy
C-29	0.7 Miles	Easy
2nd Mountain	0.3 Miles	Medium
Spruce-Inner Loop	0.7 Miles	Medium
Spruce-Outer Loop	0.6 Miles	Medium
Switchback	1.0 Mile	Hard
White Rock	0.5 Miles	Easy

As the map in Appendix C shows, the trail system is extensive and offers a wide variety for visitors. The Hilltop Reservation is part of a larger trail system within Essex County. The Lenape Trail links a dozen county and municipal parks within Essex County. The Lenape Trail goes through Verona Park and continues along the eastern side of the Hilltop Reservation.

Hilltop Reservation's trail system has two entrances with parking for the Reservation and another three access points that have parking nearby. The entrance that many residents use is the Eastern Park Entrance which has a parking lot off of Fairview Avenue across from the abandoned Essex County Hospital. The current condition of the access road leading to the

parking lot and the parking lot itself is extremely poor. The road is crumbling and has numerous pot holes which can damage cars driving to the parking lot. This may deter Reservation visitors from using this entrance. The parking lot is in poor condition with crumbling asphalt, forest debris around the lot, and invasive species encroaching onto the lot creating an unaesthetically pleasing situation. Additionally there are light posts that are bent over and covered in plant species which are mostly invasive to the Reservation. Overall this entrance does not provide an inviting situation for visitors and makes the Reservation difficult to access by vehicle due to the entrance road and parking conditions. However, this entrance to the Hilltop Reservation has great potential to attract visitors to the Reservation.

The next entrance is the Western Park Entrance and parking lot located off of Courter Lane adjacent to Hilltop Park in North Caldwell and gives visitors access to the park via the Arrowhead Trail, also known as the western route. This is the more adequate of the two parking facilities. Although the parking is also for the Mountain Avenue Field in North Caldwell, it has enough capacity to accommodate visitors of the Reservation. The road leading to the parking lot and the lot itself are both properly paved and in good condition.

The other three access points are located across from Verona High School where the Lenape Trail passes, at the Highlands Apartment Complex, and to the south near the Verona Community Center. There is parking near Verona High School however it is mainly reserved for the High School and most visitors do not use this parking lot. The parking lot for the Verona Community Center can be used by visitors if they wish to start on the Old Hilltop Trail. Regardless of how often visitors use these alternative entrances, they are not under the ownership of the County, and therefore cannot be improved by the County.

Hilltop Reservation's road system is minimal and is only used for maintenance or emergency response vehicles. The entrance road from Fairview Avenue leads to the eastern entrance and parking lot. This service road continues up the hill to the loop road. This loop road surrounds the land of what used to be the main building of the Essex County Sanatorium and includes the current 10 acre meadow restoration project. The current condition of the loop road on the eastern side of the Reservation is deteriorating and becoming difficult for maintenance and emergency vehicles to use. This is the only road system within the Hilltop Reservation border. Additionally, parts of the loop road are not plowed during the winter and ice is a large problem because the existing Sanatorium storm water system no longer works. The combination of ice and snow make the Hilltop Reservation nearly inaccessible for visitors or emergency vehicles.

Finally, there are some bridges or culverts on the western portion of the Hilltop Reservation. There are two culverts on the Arrowhead Trail leading up to the top of the mountain. These culverts can currently support pedestrian traffic but most likely cannot support vehicles. Under the Green Acres grant, the culvert integrity can be checked and repaired or upgraded as needed. The Fish and Wildlife Service or other outside agencies may be able to assist with this task or raising additional funds.

Existing "Landscape" Structures

There are a significant amount of existing structures on the landscape within the borders of Hilltop Reservation. The map and table in Appendix D and H show the locations and describe

each of these remaining structures. It is important to note that this Master Plan only includes discussion of structures visible from the ground surface, as subterranean structure identification and evaluation is not within the scope of this Master Plan.

The following narrative gives further information regarding each infrastructure item listed in the table in Appendix H including current status, location, photograph, and potential action.

Cistern: The cistern is a large piece of infrastructure left over from the Essex County Sanatorium. It is located on the east side of the reservation, north of the eastern parking lot. The Cistern is a large hole in the ground with a diameter of approximately 70 feet and a depth of 15 feet into the ground. Currently it is filled with a significant amount of debris including the cistern's roof which collapsed in the recent past. The Cistern is surrounded by a fence but this can be easily overcome. Due to its size and condition the cistern may represent a hazard. As noted in our recommendations, before demolition the cistern should be completely cleared of all debris from its collapsed roof and any other surrounding debris. An expert should be consulted on the best practice to safely demolish the cistern. Also a demolition plan should be considered to be prepared by a professional engineer in order to safely implement this recommendation. If possible the cistern could be pushed in on itself, and then filled with top soil to complete the demolition.



Outdoor Restroom: The outdoor restroom is a remnant of the Essex County Sanatorium. This structure is located near the intersection of the service road and the Switchback trail. The structure itself is still intact and is boarded up. There are definite signs of breaking into the structure as seen through large holes and gaps in the boards. This structure poses as a potential hazard from twisted metal, nails, and other debris that could potentially injure a reservation visitor. It is recommended this structure be demolished and all debris be removed.



Barbeque Pits: Across the service road from the outdoor bathroom are two masonry barbeque pits left over from the Sanatorium. Both structures have deteriorated significantly and have scattered debris around the area. It is recommended that both structures be demolished and surrounding debris be removed. The County or Hilltop Conservancy may be able to salvage the masonry bricks as reusable materials to raise money for future projects for the reservation.



County Water Towers: Near the northern border of the Reservation are two County water towers that are significant in size. One of these towers is decommissioned while the other is still in use but is set to be decommissioned by the County in the near future. Both water towers are in a state of degradation. They have rust staining their paint and their gates do not offer any protection from trespassers. Both gates have been moved so that trespassers can crawl or slide through. This creates a potential safety hazard. It is recommended that once the water tower currently in use is decommissioned, both water towers be demolished. The demolition of these towers may impose a large cost to the County. This cost may be reduced by having a qualified demolition company salvage any reusable materials. Once the towers, tower gates, and surrounding debris are cleared, the concrete bases are recommended to be demolished and filled with topsoil. This will create a large area with no tree canopy. The area should control or eradicate any invasive species and plant large saplings with deer guards to restore the area to a forest habitat.



Concrete Foundations of Previous Sanatorium Water Towers: The concrete foundations of these previous water towers can be found at the top of the Reservation where the service road splits at the north end of the loop. The foundations are of no value and should be demolished. There is a water pipe, chamber, and manhole near the foundations. This should also be cleared and filled as necessary.



Sanatorium Outbuilding #1: This support building leftover from the County Sanatorium can be found on the eastern portion of the loop road. It seems this support building was used for the equipment needed to bring utilities to the Sanatorium complex. The building is below the loop road and is difficult to reach because of the steep slope of the mountain. Demolishing this building may pose logistical challenges. It is recommended to prepare a demolition plan by a qualified professional to ensure the structure can be safely demolished.



Concrete Stairway: The concrete stairway is also located on the eastern portion of the loop road. The stairway is still in excellent condition and it includes approximately 100 feet of concrete paved sidewalk path that continues into the 10 acre meadow wildlife restoration project. In order to continue the 10 acre meadow wildlife restoration project, the County would want minimal human disturbance and a path currently exists into the 10 acre meadow. It is recommended that the staircase and sidewalk path be demolished.



Concrete Foundation Remnant: The foundation remnant is located across the loop access road from the concrete stairway. The structure itself is in excellent condition, but similar to the concrete staircase, no longer provides a significant purpose for the reservation. It is recommended that the structure be demolished.



Tunnel Access: Immediately adjacent to the concrete retaining wall is a tunnel access leftover from the Sanatorium tunnel system. The access is large enough for a person to enter the tunnel. This poses a potential safety issue and it is highly recommended that this tunnel be filled with suitable material so that it is sealed and no longer accessible. The tunnel should be inspected immediately prior to demolition to confirm it is vacant.



Sanatorium Decorative Retaining Wall: At the southern portion of the access road between the 10 acre meadow restoration project and the 3 acre meadow restoration project is a decorative wall from the Essex County Sanatorium. The wall is in decent condition with some parts of the structure in need of repair. The decorative wall adds a piece of history and is aesthetically pleasing to those who visit the reservation. It is recommended to keep and repair the decorative wall instead of demolishing it. Repairing the wall would be significantly less expensive than demolishing it. This recommendation has the added benefit of potentially enhancing the quality of the reservation.



Debris and Rubble Pile: South of the 3 acre meadow restoration project and north of the water tower owned by Verona Township is a large pile of debris consisting of masonry, metal, and other materials. This was most likely another support structure for the Sanatorium that was similar in nature to the other existing support buildings. There is a significant amount of debris that is recommended to be disposed of, and if possible, salvaged as any reusable materials to increase funds for other Hilltop Reservation projects.



Sanatorium Outbuilding #2: This support building is located east of the Reservation access from Arbor Road and west of the western portion of the loop access road. The support building is in similar condition to the first support building and has similar equipment and piping. The building is in a degraded state and is a potential hazard because of the sharp metal on the building and surrounding debris. We recommend the same course of action as the first Sanatorium Outbuilding, except a demolition plan may not be necessary.



Small Concrete Stairway: This stairway is located on the western side of the Reservation north of the second support building. The staircase does not currently serve any purpose. It is recommended that the staircase be demolished.



Tennis Court Poles: North of the small concrete stairway noted above are metal poles leftover from the Sanatorium Complex's tennis courts near the doctor's residence. There is also a small concrete structure near the poles and an old light fixture. It is recommended that all of these structures, poles, and any other nearby debris be removed.



West Side Kitchen Parking Lot: On the western portion of the loop access road is an old parking lot from the sanatorium that is currently covered with mulch and scattered branches. Underneath this is an asphalt parking lot. Also there is a guardrail or steel cable along the parking lot border that is a potential hazard. It is recommended that the asphalt parking lot be removed along with nearby debris including any concrete rebar or steel cable.



Debris Pile: North of Prisoner's Pond is an area with substantial amounts of debris including metal, pipes, telephone poles, and other debris. We recommend that this area be cleared of all debris to improve the ecological health of the reservation. However, this area may be subject to a land swap with Verona Township. The County and Verona Township can discuss how to clear the area of debris and potentially improve the area.



Facilities

The facilities currently on the Hilltop Reservation include parking at entrances, trash containers along the service road, placards, information kiosks with interpretive signage, and small trail markers. There is parking at two entrances located on the eastern and western sides of the Reservation, but the eastern entrance parking lot needs to be repaired, as well as the service road leading to the parking lot, because of numerous pot holes and scattered debris.



Of the two official entrances to the Reservation, both have information kiosks, trash containers, and interpretative signage. An unofficial third entrance exists on the private property of the Highlands at Hilltop. We do not recommend any improvements as this is not owned by the County.

Loop Road: The Loop Road is a road that surrounds the existing sanatorium site for many of the buildings within the sanatorium complex. The eastern portion where the Sanatorium Outbuilding #1 is located, among other remaining infrastructure, is degrading and in need of repair. It is recommended that this section of the road depicted in the photograph below be repaved to ensure it remains accessible to emergency vehicles.



It is recommended all trash containers remain and possibly be upgraded to eco-friendly trash and recyclable receptacles. It is also recommended the information kiosks and signage be updated as noted later in the recommendations section.

The trail markers are small pieces of carved metal, each denoting the current trail, nailed to trees on each trail. These trail markers are insufficient and difficult to see. Also the trails are not clearly defined so it can be difficult to stay on the trail without previous experience. It is recommended the trail markers be upgraded as noted in the recommendations section.

The Hilltop Reservation does have one placard across from the decorative wall and in front of the former Essex County Sanatorium site, where the current 10 acre meadow restoration is occurring. This placard gives information on the Sanatorium, but there are no other placards throughout the reservation. Currently, Hilltop Reservation has no lighting for any entrances or park interior. The County may consider adding LED fixtures near the eastern and western entrances, as needed. The lighting could help to demarcate entrance & exit locations for easy egress from the property at dusk.

Borders

A few homeowners surrounding the Hilltop Reservation may be unknowingly adding public land to their lawns by extending beyond their property lines. Some homeowners are dumping refuse behind their homes or placing swing sets or other types of lawn infrastructure onto public property due to unknown property lines. Several maps of the borders of the reservation along with tax map parcel data has been created to properly delineate public and private land to help elucidate the Reservation boundaries so that the dumping of refuse can be avoided (See Appendix E). The maps provided in Appendix E use GIS data to show the current Reservation boundary according to Essex County parcel data. A 10 foot buffer has been added onto County land for properties abutting the reservation boundary. It is recommended an appropriate marker be placed in this buffer area to inform property owners that they have entered Essex County land.

It is recommended that a boundary survey be completed in the future, separate from this master plan. A boundary survey would be more effective in properly delineating boundary lines, along with the addition of signage, and should be considered as a future item for Hilltop Reservation.

CURRENT LANDSCAPE RESTORATION AND MAINTENANCE ACTIVITIES

Current Wildlife Habitat Restoration

There are currently seven (7) ecologically healthy early successional habitats or habitats that have the potential to be ecologically healthy early successional habitats within the Hilltop Reservation. All of the habitats and restoration projects mentioned in this section of the Master Plan were identified in Michael Van Clef's Ecological Health Assessment, which can be found in Appendix F, on pages 20-38. The current wildlife habitat restoration projects include a 10-acre native grassland, a 3.2 upland meadow restoration, an open woodland restoration, and four

wetland restoration projects.

Current Maintenance Activities

All maintenance activities for Hilltop Reservation are organized and completed by Essex County or the Hilltop Conservancy. Maintenance activities that are managed or completed by Essex County include monthly trash pick-up, wood chip drop-off, tree-cutting and chipping, mugwort mowing, support for annual bike races managed by Hilltop Conservancy, annual deer management program including bi-annual forest health assessments, deer fencing supplies, supplying dumpsters for concrete removal, assistance with installing signage, assistance with Green Acres grant and other grant opportunities, installation of signage and kiosks at major entrances, and occasional patrols by Sherriff's Department. A majority of these activities only occur several times a year or as they are required.

The Hilltop Conservancy manages and completes maintenance activities relating to trail network maintenance, wildlife habitat restoration, reservation clean-ups, updating public information for kiosks and signage, and security management. The costs associated with these maintenance activities are raised by the Conservancy through membership dues, fundraising, grants, and personal contributions. All work completed by the Conservancy is through unpaid volunteer time by volunteers of the conservancy or volunteers from other groups including Boy Scouts, local corporations, local schools or universities, and other organizations. The table below illustrates calendar year expenditures relating to trail maintenance and wildlife habitat restoration for the Hilltop Conservancy. The table gives a good viewpoint of ongoing efforts on Hilltop Reservation and a basis for the cost of future improvements similar in scope.

Expenses	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Trail Maintenance	\$0	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50	\$50
Habitat Restoration	\$0	\$0	\$0	\$1,666	\$3,646	\$2,342	\$2,737	\$3,810	\$8,482*	\$5,331
Total Income	\$118	\$574	\$594	\$2,281	\$3,756	\$2,552	\$3,257	\$4,105	\$8,682	\$5,531

*\$4,143 covered by grant. \$4,339 covered by Hilltop Conservancy

An average of \$3,474 is spent each year for Hilltop Reservation maintenance or improvements. This average does not include the first three years, 2004 to 2006, because the Conservancy had not initiated its restoration work. As the Conservancy continues its wildlife habitat restoration projects and adds more, it can be expected that these annual costs will rise or remain the same.

The Hilltop Conservancy has historically contributed 1,000 hours of unpaid volunteer hours per year in order to maintain and improve Hilltop Reservation. This total does not include administrative activities such as dues or donations solicitation, regulatory reporting, or meetings. Approximately 250 hours are attributed to trail network maintenance. 50 hours are attributed to security such as issue reporting, gate, and lock management. Updating Hilltop Reservation signage and kiosks with public notices and other public information requires 20 hours of volunteer time. Also 20 hours of unpaid volunteer work went towards overall Reservation clean-

up, which picks up trash and removing institutional “leftovers” or structures from past land uses. Finally, approximately 660 volunteer hours has been attributed to wildlife habitat restoration. Wildlife habitat restoration activities include working with volunteers and contractors on the meadow, woodland, and wetland restoration project sites, foreign invasive plant control, deer control program, and best practices implementation. These volunteer hours give a good basis for the amount of man-hours needed to complete similar activities or recommendations herein regarding Hilltop Reservation maintenance.

Current Reservation Use

Hilltop Reservation is used by Essex County residents for a number of different activities such as dog walking, nature observation, class field trips, jogging, cycling, research, bird watching, butterfly observing, hiking, walking, and wildlife preservation. These activities occur throughout the year on Hilltop Reservation.

Of the site visits conducted on the Reservation, two site visits noted low number of visitors on the Hilltop Reservation. However, these observations were performed during the week during work hours and do not provide a realistic assessment of actual Reservation use. The time frame for this Master Plan does not allow for year round assessments of park visitors. The County has allowed the use of available data trends along with our limited amount of visits. Using the Census data illustrated below, the Hilltop Reservation has the potential to increase its utilization by the public over the coming years.

Demographics

Essex County is located in the northeastern part of New Jersey and includes 26 municipalities. As of the 2010 United States Census, the population was estimated to be 783,969, which represents a decrease of 9,664 residents from the 2000 Census.

The three municipalities that have land or property on Essex County’s Hilltop Reservation have a total of 32,039 people according to the 2012 American Community Survey 5-Year Estimates. The table below breaks down the population by municipality for 2012 and 2000. Each town shows a slight decrease in population between the year 2000 and 2012 and an overall decrease of 1,169 or 3.5%.

Table 4: Population by Municipality		
MUNICIPALITY	2012 POPULATION	2000 POPULATION
Cedar Grove	12,432	12,300
North Caldwell	6,276	7,375
Verona	13,331	13,533
Total	32,039	33,208

Although there was a decrease in population between 2012 and 2000, the “Plan 2040 Forecasts: Population, Households, and Employment” tables drafted by the NJTPA Regional Transportation Plan for Northern New Jersey, dated April 2013, show that Essex County’s population will significantly increase by the year 2040. The report states that Essex County’s population for 2010 was 784,000. The 2040 population projection is 916,000 which is a 0.5% annualized population change between 2010 and 2040. This trend of increased population

enlarges the chances of raised utilization of the Reservation by Essex County residents over the next two decades. Along with this trend, it is recommended to continue advertising the Reservation and organizing volunteer activities to increase utilization by Essex County residents. Additionally, the recommendations for improvements to the landscape or trails may raise visitation frequency at Hilltop Reservation.

MULTI-YEAR LANDSCAPE AND INFRASTRUCTURE RESTORATION AND MANAGEMENT PLAN

Environmental “Landscape” Restoration and Management Plan

PROBLEMS AND ISSUES

The environmental landscape of Hilltop Reservation is ecologically unhealthy due to previous land uses, over browsing of under story flora by white tailed deer, invasive species, and associated impacts to ecosystems. This section will focus on continuing current wildlife habitat restoration projects, creating new wildlife habitat restoration projects, planting native species, and recommendations regarding white-tailed deer.

Additionally, in order for the completion of all objectives to be possible, it is crucial to have mechanisms to monitor the progress and success of the plan and ensure accountability using County and Conservancy resources. It is recommended after each year of the Environmental “Landscape” Restoration and Management Plan is completed, all tasks completed are evaluated by the County and Conservancy in an annual report containing a pro forma. All tasks that were not completed are recommended to be incorporated into the following year of the plan, pending budget constraints, or the plan be revised due to results of prior task completion.

The next section of this plan will lay out recommendations that address the major problems and issues related to the ecological health of Hilltop Reservation.

RECOMMENDATIONS COMMENCING DURING YEARS 1-5

1. Maintain and continue all wildlife restoration habitat projects

The Ecological Health Assessment and Stewardship Recommendations by Michael Van Clef Ph.D. extensively cover each of the 7 restoration areas on Hilltop Reservation. For the restoration areas labeled #11, #12, #13 & #17 in the report on pages 20-34, it is recommended to follow all of his expert advice for these restoration areas.

Assumptions: Once any remaining infrastructure and invasive species are removed in these restoration areas, most notably restoration areas #11 and #13, native species will need to be planted to help prevent invasive species regaining a foothold.

Tasks:	Preliminary Cost Estimate:
Tree and Shrub Plantings	\$10,000
Tree Tubes	\$4,000

Planting	\$2,000
Further Maintenance	\$2,000
Total:	\$18,000

Total Estimated Project Duration: 2-3 years

2. Fulfill grant contract with US Fish and Wildlife Service and Green Acres for Restoration Areas #14, #15, and #16

A grant has been awarded to Essex County to upgrade the western route of the Hilltop Reservation. This includes three open wetland areas (Restoration Areas #14, #15, and #16) totaling 7 acres that will be upgraded to remove invasive species and create vernal habitats for areas #14 and #16. It is recommended that all of the Green Acres funds be utilized in conjunction with a match by the County, to fulfill the contract agreed upon with the U.S. Fish and Wildlife Service. This will significantly upgrade and restore the western entrance and trail into the Reservation.

Assumptions: The western route will be upgraded and the open wetland areas will be restored via a pending agreement with the US Fish & Wildlife Service. This assumes it is possible for the County to use the Green Acres Funds for the work illustrated in the US Fish and Wildlife agreement.

Tasks:	Preliminary Cost Estimate:
Wetland Seed Mix	\$1,500
Seeding (In-kind)	(\$1,000)
Technical Assistance (In-kind)	(\$500)
Tree and Shrub Plantings	\$2,500
Tree Tubes	\$1,000
Planting (In-kind)	(\$500)
Vernal Pond Excavation/Installation (In-kind)	(\$4,000)
Site Preparation Mowing (In-kind)	(\$300)
Herbicide Application	\$1,000
Total Cash:	\$6,000

Total Estimated Project Duration: 2 years

The tasks and preliminary cost estimates above are in reference to the Habitat Restoration Project Costs found in the first enclosure of the Ecological Health Assessment entitled, "Fish and Wildlife Habitat Restoration Agreement". There are further improvements recommended for the Western Route under the same grant that are detailed later in this section.

3. Partner with Roseland Management Services to Naturalize Highlands Detention Basin

The Hilltop Conservancy has attempted to work with Roseland Management

Services to naturalize the detention basin. The detention basin is private property not part of the Reservation and has not been draining properly since it was constructed in 2008. This has caused the basin to become an eyesore, ecologically unhealthy, and increases mosquitos in the area. It creates significant long-term algae infestation and requires manual clearing of the clogged basin outlets several times a year. We recommend following the recommendations made in Appendix F of the Ecological Health Assessment and memo written to Roseland Management Services from the Hilltop Conservancy. Following these recommendations will be beneficial to both parties and create a more ecologically healthy Hilltop Reservation.

Assumptions: The estimated costs and projected savings for naturalizing the Highlands Detention Basin would include a one-time \$3,000 investment by Roseland Management Services that will improve the basin’s appearance and reduce annual mowing costs by \$2,400. This would reduce the number of times Roseland Management Services has to manually unclog the basin outlets. This assumes Roseland Management Services will agree to this proposal and the County will incur no costs.

Total Estimated Project Duration: **2 weeks**

RECOMMENDATIONS COMMENCING DURING YEARS 6-10

1. Provide Deer Exclosures on Hilltop Reservation

Deer exclosures can be used in conjunction with the ongoing Essex County Deer Management Program. Exclosing significant areas of the reservation with large canopy gaps would give native species a significant advantage in being able to grow and mature into trees and plants, creating a healthy canopy and understory. Within these exclosures, the County or Conservancy could plant additional native species to expedite the process of reviving the understory and woodland canopy. It is our recommendation to follow the recommendations provided in the Ecological Health Assessment for deer exclosures.

Assumptions: The placement of six deer exclosures, suggested by Michael Van Clef in the Ecological Health Assessment on page 20, in combination with the Essex County Deer Management Program will substantially increase the understory and canopy gaps found throughout Hilltop Reservation and improve the overall ecological health of Hilltop Reservation. All forest or deer exclosures are illustrated on the map found in the Ecological Health Assessment.

Tasks:	Preliminary Cost Estimate:
Forest Enclosure 1:	
Purchase and Install Fencing Materials for 4.4 acres	\$66,000
Re-vegetation within enclosure	\$154,000

Forest Enclosure 2:		
Purchase and Install Fencing Materials for 2.2 acres		\$33,000
Re-vegetation within enclosure		\$77,000
Forest Enclosure 3:		
Purchase and Install Fencing Materials for 1.6 acres		\$24,000
Re-vegetation within enclosure		\$56,000
Forest Enclosure 4:		
Purchase and Install Fencing Materials for 3.8 acres		\$57,000
Re-vegetation within enclosure		\$133,000
Forest Enclosure 5:		
Purchase and Install Fencing Materials for 2.2 acres		\$33,000
Re-vegetation within enclosure		\$77,000
Forest Enclosure 6:		
Purchase and Install Fencing Materials for 2.1 acres		\$31,500
Re-vegetation within enclosure		\$73,500
Total:		\$815,000

Total Estimated Project Duration: 3 weeks per enclosure

2. Partner with Verona Township for Restoration Area #18

In the Ecological Health Assessment by Michael Van Clef Ph.D. is Restoration Area #18 on page 35. This area is planned to be part of a land swap with the County and Verona Township. Therefore, the recommendations laid out for this area may not be able to be completed by the County which is why no costs have been included. It is our recommendation that Essex County partner with Verona Township to acquire approval and commitment to restore the area. Verona Township may consider improving the area to become an attraction by providing a path around the pond with minor amenities such as benches.

Assumptions: It is assumed that the land swap between Essex County and Verona Township will take place within the next several years. In order for the recommendations to be completed, it is assumed that Essex County can agree with Verona Township on how to restore the area. Please note that the Task Schedule is referenced from the Ecological Health Assessment by Michael Van Clef Ph.D.

Tasks:	Preliminary Cost Estimate:
Remove remaining debris	TBD
Repair dike breach	TBD

Control invasive species and plant native canopy species	TBD
Complete eradication of invasive trees and large shrubs	TBD
Plant native small trees for understory	TBD
Plant native herbaceous species that are deer-resistant	TBD
Control and monitor invasive species	TBD
Total:	TBD

Total Estimated Project Duration: 3 years

3. Restore Area #19 to Native Meadow

In the Ecological Health Assessment, Restoration Area #19 on page 37 is owned by K. Hovnanian. It has recently come to light that some of this land may be given back to the County to be added to the Hilltop Reservation. It is our recommendation that if any land is added back to the County, it should be contiguous land so that the recommendations for restoring the area to a native meadow can be completed.

Assumptions: Restoration Area #19 is a large piece of property stretching outside the reservation border on the west side of Fairview Avenue. This recommendation assumes Essex County will come to an agreement with K. Hovnanian to acquire a portion of this restoration area to be added to the reservation. It is also assumed that the land acquired with K. Hovnanian will be contiguous with the rest of Hilltop Reservation.

Tasks:	Preliminary Cost Estimate:
Seeding	\$1,000
Planting native species	\$2,500
Total:	\$3,500

Total Estimated Project Duration: 3 years

4. Augment Forest Canopy

Hilltop Reservation's forest canopy has significant gaps throughout the Reservation. It is recommended to install saplings with deer guards in areas with significant canopy gaps.

Assumptions: None

Tasks:	Preliminary Cost Estimate:
Sapling and Planting Cost	\$300 per sapling
Install Deer Guards	TBD
Total:	TBD

Total Estimated Project Duration: 1 year

Additional Restoration Areas – Upon the completion of the restoration areas identified above, additional restoration areas should be identified and subsequently be implemented in accordance with a restoration plan for said areas. The additional restoration areas should be prioritized in order to maximize their potential positive impacts on the ecosystems within Hilltop reservation. For example, the additional restoration areas may be targeted to address the most prevalent remaining invasive species areas and/or toward areas that are contiguous with restoration areas completed at that time in order to expand the restored areas and create larger swaths of restored habitat.

Grants and Funding – The County of Essex and the Hilltop Conservancy should continue to monitor potential grants and funding opportunities from public and private sector sources to help fund projects on the Reservation. This may be accomplished by designating a volunteer from the Conservancy to monitor grants and funding opportunities in coordination with County grants and funding personnel.

Table 5: 5 YEAR LANDSCAPE PLAN SUMMARY TABLE	
Item	Cost Estimate
Maintain and continue all wildlife restoration habitat projects	\$18,000
Fulfill Grant Contract with Green Acres and U.S. Fish & Wildlife Service for Restoration Areas #14, #15, & #16	\$6,000
Naturalize Highlands Detention Basin	\$0
TOTAL:	\$24,000

Table 6: 10 YEAR LANDSCAPE PLAN SUMMARY TABLE	
Item	Cost Estimate
Provide Deer Exclosures on Hilltop Reservation	\$815,000
Partner with Verona Township for Restoration Area #18	TBD
Restore Area #19 to Native Meadow	\$3,500
Augment Forest Canopy	TBD
TOTAL:	TBD

Infrastructure Restoration and Management Plan

PROBLEMS AND ISSUES

The amount of leftover infrastructure from past land uses, especially the sanatorium, has created potential hazards for reservation visitors and contributed to the abundance of invasive species. Demolishing a majority of these structures would be optimal. However, this plan prioritizes demolition of structures that pose a high liability or are dangerous hazards to reservation visitors.

Additionally, in order for the completion of all objectives to be possible, it is crucial to have mechanisms to monitor the progress and success of the plan and ensure accountability using

County and Conservancy resources. It is recommended after each year of the Infrastructure Restoration and Management Plan is completed, all tasks completed are evaluated by the County and Conservancy through an annual report and pro forma. All tasks that were not completed are recommended to be incorporated into the following year of the plan.

RECOMMENDATIONS COMMENCING DURING YEARS 1-5

1. Eastern Entrance and Parking Lot

Demolish current paved surface and replace access road and parking lot with asphalt. It is recommended the parking area add a maximum of two spaces, or 16 feet, to the parking area for additional visitors. These spaces can be added in the grassed area between the service road and existing parking lot. We recommend a disposable bag dispenser be installed at the eastern entrance near the existing kiosk. Also a sign is recommended to be placed stating all visitors must clean up after their animals and bring all trash out of the reservation. An eco-friendly trash and recyclable receptacle should be placed at this entrance to encourage carry in/carry out policy. Additionally, we recommend replacing the current kiosk or updating the kiosk with a comprehensive trail map with way finding and points of interest highlighted. It is important to note that if additional land east of the parking lot is acquired for the Hilltop Reservation, the parking lot may be better suited closer to Fairview Avenue.

Assumptions: These recommendations assume that improving this entrance adding amenities such as signs to the entrance will improve the quality of Hilltop Reservation.

Tasks:

Preliminary Cost Estimate:

Remove/Replace parking lot and access road with asphalt	\$21,800
Install disposable bag dispenser	\$400
Install signage, informational kiosk, and eco-friendly trash can	\$1,500
LED Lighting	\$2,000
Plant native species to improve landscape quality	\$4,000
Total:	\$29,700

Total Estimated Project Duration:

2 months

2. Loop and Access Road

These roads are recommended to be repaved, but not widened or extended in any way, to allow better access for emergency and maintenance vehicles. It is also recommended that the Loop and Access Road continue to only be used by emergency and maintenance vehicles. No local traffic should be on these roads in order to maintain pedestrian safety, protect wildlife, and maintain the natural park setting.

Assumptions: This recommendation assumes that upgrading the loop and access road

will improve access for maintenance and emergency vehicles.

Tasks:	Preliminary Cost Estimate:
Remove/Replace with 55 Tons of Surface Course and 115 Tons of Base Course (assumes 300 linear feet of Road to be repaved)	\$13,600
Total:	\$13,600

Total Estimated Project Duration: 6 weeks

3. Fulfill grant contract with US Fish and Wildlife Service and Green Acres for Hilltop Reservation Improvements of Western Route

A grant has been awarded to Essex County to upgrade the western route of the Hilltop Reservation. This includes a large portion of the western entrance and trail that provides public access to visitors from North Caldwell. It is recommended to use all of the Green Acres funds, in conjunction with a match by the County, to fulfill the contract agreed upon with the U.S. Fish and Wildlife Service. This will significantly upgrade and restore the western entrance and trail into the Reservation which will potentially increase its use as a passive recreation area.

Assumptions: The western route will be upgraded and the open wetland areas will be restored via a pending agreement with the US Fish & Wildlife Service. This assumes it is possible for the County to use the Green Acres Funds for the work illustrated in the US Fish and Wildlife agreement. The following task schedule and costs are in reference to the cost estimate found in the “Nonprofit Assistance Application Form” submitted to NJDEP Green Acres Program on July 6, 2010. This document can be found in Appendix G entitled “Western Route Grant”.

Tasks:	Preliminary Cost Estimate:
Repair entrance gate at western park entrance	\$583 (already completed)
Install entrance signage and amenities	\$1,457 (already completed)
Resurface asphalt segment of pathway on both sides of pedestrian crossing over White Rock Road	\$1,457
Create pedestrian crossing on asphalt segment of Hilltop Drive	\$583
Install movable bollards across pathway	\$1,457
Repair western pathway gravel roadbed (crushed stone)	\$72,857
Repair/upgrade bridge and two culverts as needed	\$145,713
Create driveway/ramp connecting route to existing service roadway at end of route	\$29,143
Clear and remove brush and debris along entire route	\$14,571
Foreign invasive species control	\$14,571
Planting of native trees, shrubs, and plants	\$43,714
Restore three wetland areas bordering the route	\$87,428
Contingency 20%	\$82,707

A&E 13% \$53,759
Total: \$550,000

*The above costs are illustrated in further detail in Appendix G

Total Estimated Project Duration: 2 years

RECOMMENDATIONS COMMENCING DURING YEARS 6-10

1. Re-grade Access Road between Eastern Entrance and Beginning of Loop Road and Re-construct or Clear swale and culverts for Improved Storm water Drainage

It is recommended the access road going up the mountain be re-graded to allow for proper storm water drainage to avoid ice cover in the winter.

Assumptions: Our recommendation is based on the assumption that re-grading will improve the storm water drainage.

Tasks:	Preliminary Cost Estimate:
Clearing Site	\$10,000
Soil Erosion Control	\$10,000
Clear and Re-dig Uphill Swale	\$19,000
Dense Graded Aggregate Base Course	\$27,825
Hot Mix Asphalt Surface Course	\$39,375
Hot Mix Asphalt Base Course	\$82,500
Reconstruct Existing Culverts	\$6,000
Fertilizing and Seeding, Type G	\$3,750
Straw Mulch	\$3,000
15% Contingency	\$30,217.50
Total:	\$231,667.50

Total Estimated Project Duration: 5 months

Table 7: 5 Year Infrastructure Restoration Summary	
Item	Cost Estimate
Eastern Entrance and Parking Lot	\$29,700
Loop and Access Road	\$13,600
Fulfil grant contract with US Fish and Wildlife Service and Green Acres for Hilltop Reservation Improvements of Western Route	\$550,000
TOTAL:	\$593,300

Table 8: 10 Year Infrastructure Restoration Summary	
Item	Cost Estimate
Re-grade Access Road and Re-construct swale and culverts	\$231,667.50
TOTAL:	\$231,667.50

Hilltop Reservation Clean-Up and Removal Plan

1. Demolish Cistern

It is recommended the cistern, shown on the map in Appendix D, be demolished as it currently is a hazard to Hilltop Reservation visitors. An expert should be consulted on the best practice to safely demolish the cistern. This expert may prepare a demolition plan to analyze the geotechnical stability and environmental impacts that may stem from the demolition of the cistern. If possible the cistern could be pushed in on itself, and then filled with top soil to complete the demolition. Any valuable materials from the cistern are recommended to be salvaged to raise funds for wildlife restoration projects or invasive species management.

Assumptions: Our recommendation is based on the assumption that the cistern is able to be demolished safely and without any harm to person or property. It is assumed that a structural or geo-technical engineer determine the ground is stable enough to bring in demolition equipment and prepare a demolition plan.

Tasks:	Preliminary Cost Estimate:
Geo-technical Assessment and Demolition Plan by Professional	\$15,000
Demolition and debris removal assuming 70' x 15' deep dimension	\$10,000
Clean Fill of 775 cubic yards	\$7,750
Total:	\$32,750

Total Estimated Project Duration: **2 months**

2. Demolish Outdoor Restroom

The outdoor restroom is recommended to be demolished because the structure and surrounding debris have become hazardous to visitors. Also, the stability of the structure is unknown. It currently serves no purpose to the Hilltop Reservation. Once demolished, any valuable materials from the restroom are

recommended to be salvaged to raise funds for wildlife restoration projects or invasive species management. It is our recommendation to demolish the structure.

Assumptions: Our recommendation assumes the structure is unstable and requires demolition.

Tasks:	Preliminary Cost Estimate:
Demolish Structure	\$2,500
Debris Removal	\$500
Total:	\$3,000

Total Estimated Project Duration: 1 day

3. Demolish Two Masonry Barbecue Structures

These two structures have become a hazard because of the loose and scattered debris, and are recommended to be demolished. Any valuable materials from the structures, such as reuse of the bricks, are recommended to be salvaged to raise funds for wildlife restoration projects or invasive species management.

Assumptions: This recommendation assumes the loose and scattered debris are a potential hazard to visitors of Hilltop Reservation and warrants removal by Essex County.

Tasks:	Preliminary Cost Estimate:
Demolish Structures	\$1,000
Remove Debris	\$400
Total:	\$1,400

Total Estimated Project Duration: 1 day

4. Demolish Concrete Foundations from Sanatorium's Water Towers (4 foundations per tower)

These foundations are recommended to be demolished in order for the nearby wildlife habitat restoration projects to continue unabated. Removing these structures will allow for the removal of invasive species through mowing, seeding & planting, and potential prescribed burning. Any valuable materials from the structures are recommended to be salvaged to raise funds for wildlife restoration projects or invasive species management.

Assumptions: Our recommendation assumes the removal of these foundations will aid the wildlife habitat restoration project planned for this area. It is also assumed that planting native species in place of the foundations will help control invasive species.

Tasks:	Preliminary Cost Estimate:
Demolish all 8 foundations	\$1,000 per foundation = \$8,000
Remove Debris	\$1,800
Demolish Water Pipe, Manhole, & Chamber	\$1,500
Remove Debris	\$1,000
Plant Native Species	\$3,000
Total:	\$15,300

Total Estimated Project Duration: 3 weeks

5. Address Sanatorium Outbuilding #1 (“Gas House”)

A Geo-technical or structural engineer should assess the area for stability and prepare a demolition plan. Any valuable material from the structure is recommended to be salvaged to raise funds for wildlife restoration projects or invasive species management.

Assumptions: It is assumed the rusting metal inside the building pose a hazard to visitors.

Tasks:	Preliminary Cost Estimate:
Structural Assessment and Demolition Plan	\$5,500
Demolish structure	\$7,500
Remove Debris	\$2,000
Plant Native Species	\$1,500
Total:	\$16,500

Total Estimated Project Duration: 1 month

6. Concrete Foundation Remnant and Tunnel Access

The concrete foundation remnant and tunnel access on the eastern side of the loop road pose potential hazards to visitors. It is recommended that both structures be demolished or filled. The stability of the foundation remnant is unknown and visitors could easily access the tunnel and potentially injure themselves. The tunnel is recommended to be filled, as well as any other tunnel access that is found in the future. The tunnel should be immediately inspected to confirm it is vacant prior to any work. A geo-technical or structural engineer should assess the tunnel and prepare a demolition plan.

Assumptions: Our recommendation assumes that visitors who try to access the tunnel may injure themselves. The foundation remnant is assumed to be in poor condition and potentially unstable.

Tasks:	Preliminary Cost Estimate:
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Determine stability of concrete foundation remnant and tunnel through preparation of demolition plan by professional	\$5,000
Demolish foundation remnant and re-grade	\$2,500
Fill in tunnel with suitable material	\$8,000
Plant Native Species	\$2,000
Total:	\$17,000
Total Estimated Project Duration:	3 weeks

RECOMMENDATIONS COMMENCING DURING YEARS 6-10

1. Debris and Rubble Pile

The debris and rubble pile located immediately south of the 3.2 acre meadow restoration project is recommended to be removed as the loose and scattered debris could pose a hazard to visitors of Hilltop Reservation. Any valuable material from the debris pile is recommended to be salvaged to raise funds for wildlife restoration projects or invasive species management.

Assumptions: Our recommendation assumes that the debris pile could be a hazard to visitors of Hilltop Reservation and should therefore be removed.

Tasks:	Preliminary Cost Estimate:
Remove debris and rubble pile assuming 1,000 square feet of debris	\$5,000
Plant Native Species	\$1,500
Total:	\$6,500

Total Estimated Project Duration: 3 days

2. Sanatorium Outbuilding #2

We have the same recommendations for this outbuilding as the first outbuilding.

Assumptions: It is assumed the rusting metal inside the building pose a hazard to visitors.

Tasks:	Preliminary Cost Estimate:
Structural Assessment and Demolition Plan	\$5,500
Demolish structure	\$7,500
Remove Debris	\$2,000
Plant Native Species	\$1,500
Total:	\$16,500

Total Estimated Project Duration: 1 month

3. West Side Loop Road Kitchen Parking Lot

It is recommended that the asphalt underneath the wood chips and mulch of what is the existing parking lot for the Sanatorium on the west side of the loop road be removed along with all nearby debris. The steel cable in this area is hazardous and should be removed along with the asphalt.

Assumptions: This recommendation assumes removing the asphalt and steel cable will improve the Hilltop Reservation to its natural state.

Tasks:	Preliminary Cost Estimate:
Remove asphalt and steel cable	\$4,000
Plant Native Species	\$2,500
Total:	\$6,500
Total Estimated Project Duration:	2 weeks

4. County Water Towers

There are two county water towers located in the northern part of Hilltop Reservation, and northwest of the Cistern. One of these water towers is decommissioned, while the other is still in use. The water tower currently in use may be decommissioned in the next 10 years, once the remaining hospital buildings are demolished. It is recommended that both water towers be addressed simultaneously, once the second tower is decommissioned, to maximize efficiency and lower the overall cost. Both water towers should be demolished by an expert demolition crew once they are decommissioned. Any valuable materials from the water towers are recommended to be used to potentially offset demolition costs. After the removal of the water towers, the concrete foundations are recommended to be demolished and filled with topsoil.

Assumptions: It is assumed that the second water tower will be decommissioned in the near future after the demolition of the remaining hospital buildings. The cost of this project will depend upon the approach proposed by the demolition consultant and may vary substantially due to cost changes in labor and materials overtime. Therefore, as the proposed implementation date of this project is not known, all costs for the demolition are "To Be Determined (TBD)".

Tasks:	Preliminary Cost Estimate:
Preparation of Demolition Plan	TBD
Demolish Water Towers (assumes no hazardous materials)	TBD
Demolition of Concrete Foundations	TBD
Plant Native Species and large saplings	\$4,000
Total:	TBD

Total Estimated Project Duration:

3 months

5. Concrete Stairway

This structure is located on the eastern side of the loop road. The stairs serve no function and lead out to the 10 acre meadow restoration project. It is recommended that the stairway and the concrete paved sidewalk be demolished as it does not serve a purpose to the Reservation.

Assumptions: In order to continue the 10 acre meadow wildlife restoration project, the County would want minimal human disturbance. Demolishing this staircase and sidewalk path may help prevent visitors from venturing into the meadow.

Tasks:

Preliminary Cost Estimate:

Demolish structure and debris removal

\$750

Plant Native Species

\$1,500

Total:

\$2,250

Total Estimated Project Duration:

1 day

6. Sanatorium Decorative Retaining Wall

The decorative retaining wall left over from the Sanatorium, located in between the 10 acre and 3 acre meadow restoration projects, is still in relatively good condition. It is recommended that the small amount of upkeep be completed for the retaining wall, including repairing the small fractures of concrete at minimum cost to the County.

Assumptions: This recommendation assumes the small repairs to the wall are necessary.

Tasks:

Preliminary Cost Estimate:

Repair 100 Linear Feet of Retaining Wall

\$2,500

Total:

\$2,500

Total Estimated Project Duration:

1 day

7. Small Concrete Stairway

This stairway is located on the western side of the Hilltop Reservation near the old tennis courts of the Sanatorium. It is recommended that this structure be demolished.

Assumptions: The demolition of the stairway will be beneficial in bringing the Hilltop Reservation back to its natural state.

Tasks:	Preliminary Cost Estimate:
Demolish structure and remove debris	\$1,000
Plant Native Species	\$1,500
Total:	\$2,500
Total Estimated Project Duration:	1 day

8. Tennis Court Poles

It is recommended that the tennis court poles and the small concrete structure underneath the poles be removed along with all nearby debris. There is also an existing non-functioning light post nearby that should be demolished along with the concrete structure. All of these structures may interfere with any woodland restoration projects and thereby becoming an impediment to improving the woodland canopy. In addition, they represent a minor hazard to visitors due to their rusted condition.

Assumptions: This recommendation assumes the removal of the poles and small concrete structure will allow for the planting of native species to help control invasive species.

Tasks:	Preliminary Cost Estimate:
Remove Poles	\$1,000
Demolish Small Concrete Structure	\$500
Plant Native Species	\$1,500
Total:	\$3,000
Total Estimated Project Duration:	2 days

Table 9: 5 YEAR CLEAN-UP & REMOVAL PLAN SUMMARY TABLE	
Item	Cost Estimate
Demolish Cistern	\$32,750
Demolish Outdoor Bathroom	\$3,000
Demolish Two Masonry Barbecue Structures	\$1,400
Demolish Concrete Foundations from Sanatorium's Water Towers (4 foundations per tower)	\$11,800
Address Sanatorium Outbuilding #1 ("Gas House")	\$16,500
Concrete Foundation Remnant and Tunnel Access	\$17,000
TOTAL	\$85,950

Table 10: 10 YEAR CLEAN-UP & REMOVAL PLAN SUMMARY TABLE	
Item	Cost Estimate
Debris and Rubble Pile	\$6,500
Sanatorium Outbuilding #2	\$16,500
West Side Loop Road Kitchen Parking Lot	\$6,500
County Water Towers	TBD
Concrete Stairway	\$2,250
Sanatorium Decorative Retaining Wall	\$2,500
Small Concrete Stairway	\$2,500
Tennis Court Poles	\$3,000
TOTAL:	TBD

HILLTOP RESERVATION PASSIVE USE PLAN

PROBLEMS AND ISSUES

The Hilltop Reservation Passive Use Plan details recommendations to improve the amenities used by visitors and to address safety and vandalism issues on the Reservation. In order to reduce vandalism within the reservation, it is recommended that all project designs should factor the risk of vandalism into the design elements, such as using large boulders as sitting areas to reduce the possibility of unauthorized removal from Hilltop Reservation. The following recommendations aim to improve the quality of the Hilltop Reservation for visitors from Essex County and other areas.

RECOMMENDATIONS COMMENCING DURING YEARS 1-5

1. Western Entrance and Trail

The Western Entrance and Trail is mainly covered in the scope of the Green Acres grant, but we still have some small recommendations. This includes similar recommendations to the Eastern Entrance including disposable bag dispenser be installed near the existing kiosk. A sign is recommended to be placed stating all visitors must clean up after their pets and bring all trash out of the reservation. An eco-friendly trash and recyclable receptacle should be placed at this entrance to encourage carry in/carry out policy. Additionally, we recommend replacing the current kiosk or updating the kiosk with an extensive trail map with way finding and points of interest highlighted.

Assumptions: These recommendations will improve the quality of Hilltop Reservation as a passive use park and increase park utilization by Essex County Residents.

Tasks:	Preliminary Cost Estimate:
Install disposable bag dispenser	\$400
Install signage, informational kiosk, and eco-friendly trash can	\$1,500
Total:	\$1,900

Total Estimated Project Duration: 1 week

2. Trail System

We recommend a sign be placed at trail intersections on the Reservation. The trail signs should indicate a change of trail as well as way finding information of other points of interest on the Hilltop Reservation, such as wildlife restoration projects. Periodic signs stating carry in/ carry out policy and clean up after animals are recommended to be installed on trail access points. All trails should be further maintained and cleared by trail master to improve walkability.

Assumptions: These recommendations will improve the quality of Hilltop Reservation.

Tasks:	Preliminary Cost Estimate:
Install signage on trail intersections	\$1,000
Install Trail Map signs and intermittent informational signage	\$1,000
Initial Trail Clearing and Maintenance	\$1,000
Total:	\$3,000

Total Estimated Project Duration: 2 weeks

3. Add Natural Sitting Area at Top of 2nd Mountain Trail

At the top of the 2nd Mountain Trail, a natural sitting area is recommended be constructed to allow visitors to rest. Granite sitting rocks or sitting tree stumps are recommended to be installed at this location. A maximum of two sitting rocks or stumps is recommended. Using large boulders or tree stumps that are difficult to move may reduce vandalism that sporadically occurs within the reservation.

Assumptions: This recommendation assumes both Essex County and Hilltop Conservancy agree they will enhance the quality of Hilltop Reservation while maintaining its natural state.

Tasks:	Preliminary Cost Estimate:
Install two sitting rocks or tree stumps	\$800
Total:	\$800

Total Estimated Project Duration: 2 days

RECOMMENDATIONS COMMENCING DURING YEARS 6-10

4. Outreach Program

Hilltop Reservation is under-utilized as a passive use park. It is recommended Essex County and the Hilltop Conservancy promotes the great qualities of Hilltop

Reservation by hosting events such as walks or inviting a grade school field trip. This could raise the number of visitors to the park.

Assumptions: None

Tasks:	Preliminary Cost Estimate:
Continue and expand outreach program through volunteers	\$0
Total:	\$0
Total Estimated Project Duration:	Ongoing

Table 11: 5 YEAR PASSIVE USE PLAN SUMMARY TABLE	
Item	Cost Estimate
Western Entrance and Trail	\$1,900
Trail System	\$3,000
Add Natural Sitting Area at top of 2 nd Mountain Trail	\$800
TOTAL	\$5,700

Table 12: 10 YEAR PASSIVE USE PLAN SUMMARY TABLE	
Item	Cost Estimate
Outreach Program	\$0
TOTAL:	\$0

INVASIVE SPECIES MANAGEMENT PLAN

PROBLEMS AND ISSUES

The biggest problems and issues in regards to landscaping and infrastructure for Hilltop Reservation include the removal of left over infrastructure and debris from the Essex County Sanatorium, and the removal of invasive species/replacement of invasive species with native species. If these problems can be remedied, the Hilltop Reservation will be in a greatly improved situation in terms of ecological health and value to Essex County’s residents. Currently, there are numerous areas throughout the reservation that contain invasive species on various scales. According to the Ecological Health Report, there are at least 10 dense invasive species located within the Hilltop Reservation, and many other areas with foreign species.

Dense Invasive Species Infestations

The NJ Invasive Species Strike Team (ISST) offer recommendations for the removal of dense invasive species infestations. The Strike Team is funded by the USDA to help protect the natural flora and fauna from established and emerging invasive species. The group provides a service as a centralized organizing entity to coordinate activities between public and private environmental stewards. The methodology they use, Early Detection and Rapid Response (ED/RR) is recognized worldwide. The Strike Team should be contacted to work between Essex County and the Hilltop Conservancy. GIS mapping information can be linked to their website

databases to aid in mapping and eradicating non-native plant materials from New Jersey. It should be stressed that a key component to eradication will be the reforestation of the infestation areas. Without native seed mix, understory shrubs and/or trees installed, these foreign species will continue to spread to eradicated areas.

Having visited the Reservation a few years after the invasive species were originally mapped and described, it appears these species have continued to spread beyond these areas. We recommend a detailed foreign invasive management plan be completed in 2015 to properly update, manage, and eradicate invasive species on Hilltop Reservation.

CONCLUSION

The recommendations set forth in each section above are anticipated to enable the County and Hilltop Conservancy to achieve virtually all of the goals and objectives of this Master Plan. However, it is crucial that an annual report with a pro forma be completed to monitor the progress and success of the plan and ensure accountability using County and Conservancy resources. This entails due diligence by all parties involved in implementing the recommendations herein for Hilltop Reservation. Evaluating on an annual basis, the progress made to achieve the goals and objectives for Hilltop Reservation can be completed by County officials using measurable indicators. Such indicators could include square footage of areas with invasive species that are controlled or eradicated, number of native species planted and areas covered, remaining woodland canopy gaps, remaining infrastructure improvements, infrastructure, or “leftovers”, removed, and similar measurable indicators for Hilltop Reservation.

Achieving all of the goals and objectives herein has the potential to vastly improve Hilltop Reservation’s ecological health, and therefore its natural landscape for the benefit of Essex County. At the core of all these recommendations is the recognition of Hilltop Reservation’s current natural and undeveloped state and the potential to improve and maintain that state for the benefit of all.