

Carolina North Proposed Conservation Area Descriptions

Submitted by Biohabitats, Inc.

for the University of North Carolina at Chapel Hill

Facilities Planning Department

July 29 2011

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Glossary

Conservation Areas- This term refers to the proposed Conservation Areas as defined by the Development Agreement between the Town of Chapel Hill and the University of North Carolina at Chapel Hill, July 2009.

Best Management Practices- This is a general descriptor of methods, techniques or devices found to be the most effective in achieving the objective of a reduction in ecological impact, natural resource disturbance or water pollution (also commonly referred to as BMPs).

Dominant- This is the term used to designate the tallest trees in a forest canopy.

Ephemeral- This is stream flow characterized as being solely supplied by storm water runoff. Groundwater is not conveyed in the channel, as with intermittent or perennial streams.

Emergent- This is a type of shallow-water wetland along the shores of lakes and streams characterized by emergent narrow- and broad-leaved herbs and grass-like plants as well as floating-leaved herbs.

Even-aged- A forest stand that is composed of trees of similar age is even aged; i.e. trees that germinated or were planted in the same year or within a few years of each other. Even-aged stands often develop after a disturbance or a clear cut.

Intermittent- This is a stream flow characterized as flowing only during certain times of the year, when either storm water and/or ground water provide flow. During dry periods, the groundwater water table elevation can drop below the bed of the stream, and no flow is present.

Incision (incised)- This is the state of a stream channel where the bed has eroded downward into the supporting substrate, increasing the height of the banks on either side of the stream. Incision leads to bank instability, bank failure, and increased sediment loads to the stream.

Invasive- This is the description of a plant species which indicates its ability to out-compete other vegetation and become dominant. Invasive species are often exotic, or non-native.

Multi-use trail- This trail supports a wide range of activities, including but not limited to, mountain biking, walking, running, dog walking, and hiking.

Palustrine- This is the descriptor of the system of inland, nontidal wetlands characterized by the presence of trees, shrubs, and emergent vegetation (vegetation that is rooted below water but grows above the surface). Palustrine wetlands range from permanently saturated or flooded land (as in marshes, swamps, and lake shores) to land that is wet only seasonally (as in vernal pools).

Perennial- This stream flow is characterized as flowing year-round (except in times of exceptional dryness). The groundwater water table elevation is above the stream channel elevation for all of a typical year and groundwater is the primary source of flow.

Singletrack trail- This trail is narrow enough to require single-file passage.

Single-track pedestrian-only trail- This trail is dedicated to walking or hiking only –no dogs or bikes. Currently only one such trail, the Nature Observation Trail, is located at Carolina North, in Area 6A.

Service road- This is a 12-foot wide gravel-surfaced road in a 30 foot-wide corridor that accommodates maintenance and risk reduction as well as multi-use recreational activities. All of the service roads in the Carolina North property are regularly used for community access to the single-track trails and land management routines. Maintenance vehicles include those for forest management, emergency response, fire control, and utility maintenance.

Trail- This is a single-track multi-use recreational trail. Trail surfaces are natural, typically earth and duff, and follow existing topography. Trails at Carolina North were created by the community over the past 30 years. UNC began managing the trails in 2007 and organized existing trail segments into several loop systems. All of the trails in the Carolina North property are heavily used with approximately 200 visitors per week and as many as 400 per week in peak seasons.

Uneven-aged- This is a description of a forest stand that is composed of trees of varying ages; i.e. trees ranging in age from 1 year to 50 years-old.

Xeric- Xeric is defined as very dry. This term is usually used to describe sites where there is low water availability and/or storage capacity in the soil. This can be due to climate, soil properties, site aspect or a combination of factors.

Executive Summary

The proposed Conservation Areas were established as a result of the Carolina North Development Agreement* between the University of North Carolina at Chapel Hill (University) and the Town of Chapel Hill; approved July 1, 2009. This is a 20-year agreement providing the terms and conditions by which the University is permitted to develop the Carolina North property. As per the Development Agreement (DA), and subject to the approval of the State of North Carolina, the University will place approximately 311 acres of its approximately 947 acre property known as Carolina North into conservation easements. Exhibit E from the DA (see page 7) illustrates the six Conservation Areas. The DA established three land use categories: Development Area (approximately 228 acres), Limited Development Area (approximately 408 acres), and the Conservation Areas (approximately 311 acres). Development is restricted in the Limited Development Area for 50 years, except for the area designated as 6B, which is restricted for 100 years. This document describes the attributes of the six proposed Carolina North (CN) Conservation Areas.

The underlying basis for the Conservation Areas on the Carolina North Tract was presented in the Ecological Assessment Report: Carolina North, produced in October of 2007 as part of the Carolina North Master Plan process (<http://research.unc.edu/carolina-north/plans-reports-studies/index.htm>). In the Ecological Assessment, areas of higher and lower ecological value were mapped, distinguishing areas most suitable for disturbance from areas most suitable for conservation. Four public and peer review sessions of the Ecological Assessment were held in November and December of 2006, and the report was finalized in October 2007.

The Ecological Assessment process utilized a combination of field reconnaissance, statistical analysis and Geographic Information Systems (GIS) technology. First, ecological assets or attributes were grouped into ecological inventory categories such as water resources, soils, landscape ecology, tree stand age, and land use/land cover and mapped in GIS. The next step in the process was to assign the attributes of the ecological inventory to metrics. These metrics organized the ecological attributes into eight categories- streams, wetlands, groundwater, geomorphology, vegetation, landscape ecology, wildlife habitat and cultural and historic, and also assigned a classification or point value to each ecological attribute's mapped area. Maps were produced for each of the eight metrics that showed relative ecological values for their associated areas on the site. Then all eight metric maps were overlaid over the site and a statistical analysis was done on the map to differentiate five Weighted Suitability Index Categories. These categories are:

- Category A –Suitable for Disturbance,
- Category B –Suitable for Disturbance with limited BMP's,
- Category C –Suitable for Disturbance with BMP's,
- Category D –Suitable for Conservation,
- Category E –Most suitable for Conservation

The Weighted Suitability Index Categories were assigned a color shade, ranging from light (Category A) to dark (Category E) and shown on a composite map. The dark areas, which correspond to Categories D and E – areas suitable for conservation, roughly correspond to the proposed Conservation Areas as shown in Exhibit E of the Development Agreement.

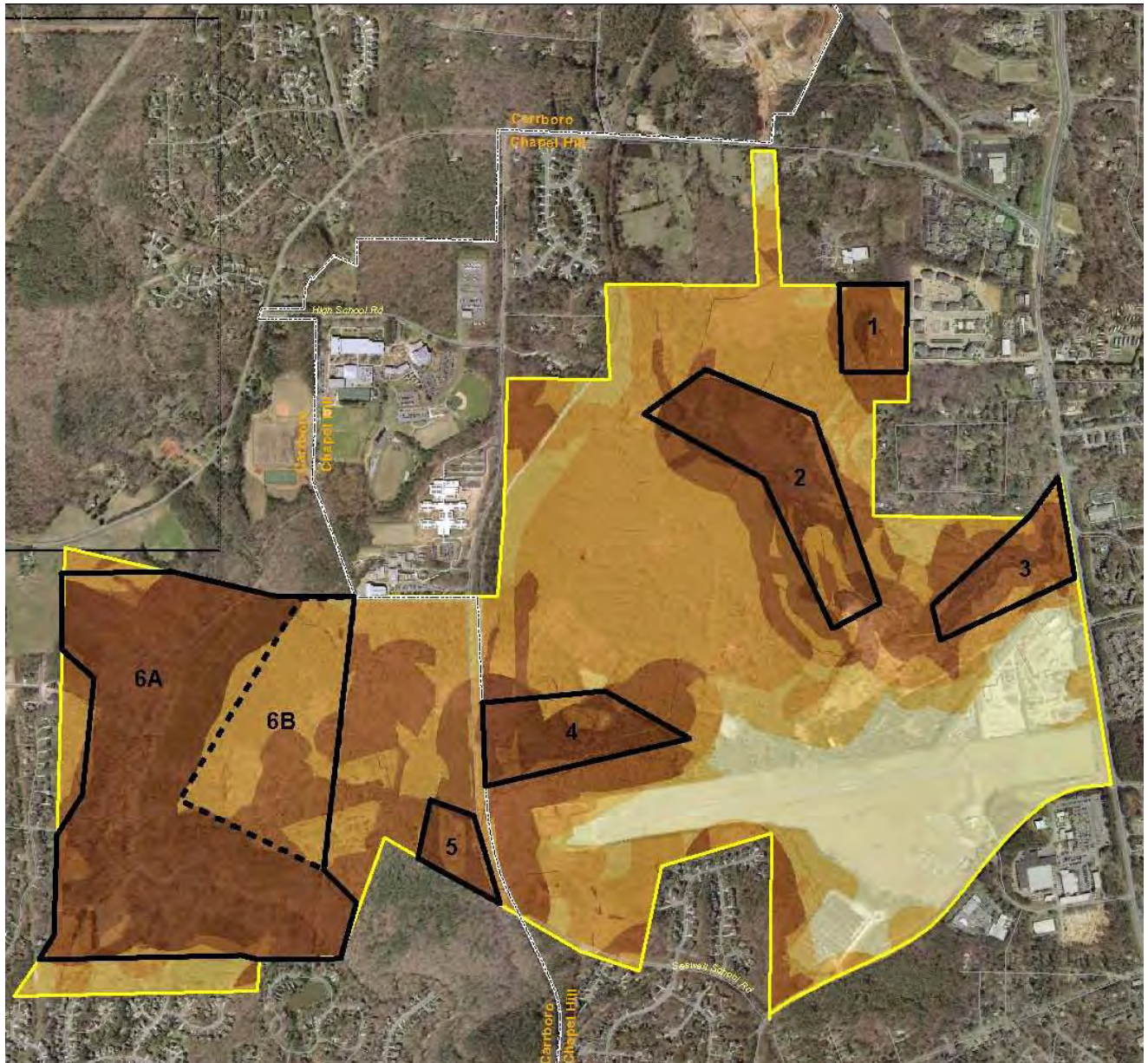
Many areas are ranked in categories D and E due to the high ecological value of streams and their corridors. During the Ecological Assessment, stream and wetland mapping was based on available GIS data. The exact locations of many wetland and stream features across the site were surveyed during the preparation of the U.S. Army Corps of Engineers and North Carolina Division of Water Quality Individual Permit process, which was done after the Ecological Assessment maps were produced. The Weighted Suitability Index Categories from the Ecological Assessment were updated based on the new location data for those streams and wetlands. The updated Weighted Suitability Index Categories are shown in multiple maps in this document.

The following descriptions of each proposed Conservation Area include information on size of the area, general character, ecological features such as wetlands, streams, forest type, age of forest, utilities, adjacent land uses, cultural/historic sites, and other specific information where applicable. Overall, the UNC Office of Forestry Management maintains the trails, service roads, invasive species and property in general.

The various maps in this document which purport to depict the boundaries of the proposed Conservation Areas were derived from a map that was drawn without precision. These lines were not surveyed and are only an approximation of the location of each Area. Thus, the Conservation Areas will require surveying and potential realignments.

*The Carolina North Development Agreement in full is located at: <http://www.fpc.unc.edu/CarolinaNorth.aspx>. The language specific to the Conservation Areas is located in Section 5.5.1 entitled "Conservation Area" (p.16).

EXHIBIT E. Map: Conservation Areas



Note: Composite Map – Weighted Analysis from Ecological Assessment, with smoothed boundaries and upland hardwood borders

Approximate acreage:

Area	1	2	3	4	5	6A	(6B)
Acres	12	42	19	24	9	205	(53)

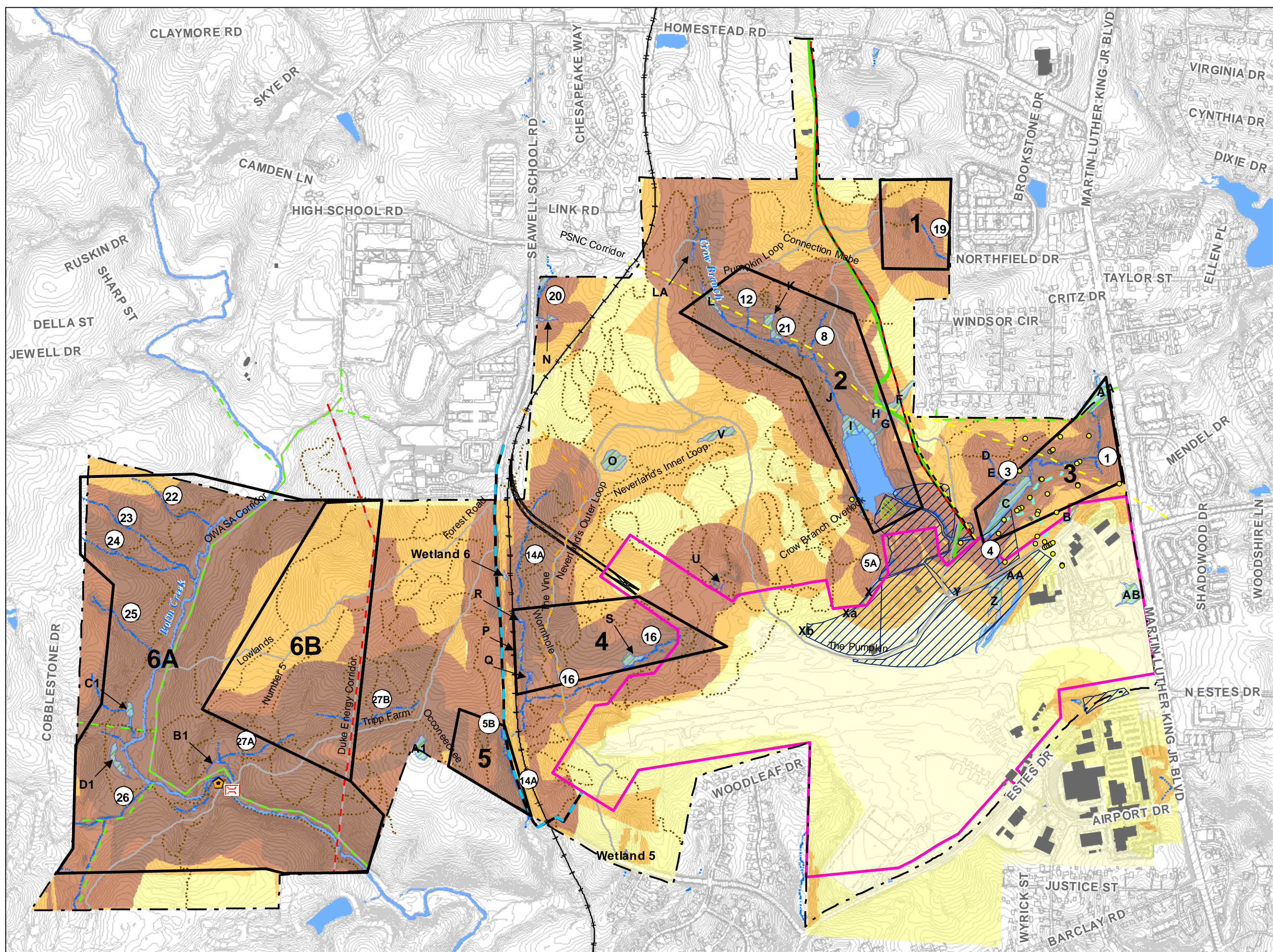
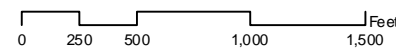


Ecological Analysis Proposed Conservation Areas Overview

Legend

- Carolina North Boundary
 - Conservation Area
 - Development Area
 - Existing UNC Buildings
 - Federal/State delineated streams
 - Open Water
 - Wetlands Delineated on CN Property
 - Railroad
 - Proposed Rail Spur
 - Landfill
 - Waste Reduction Recycling Storage
 - Bridge
 - Castlebury Mill Site
 - Monitoring Wells
 - Proposed Greenway
 - Existing Trails
 - Existing Gravel and Service Roads
 - Existing Duke Energy Corridor (Approx)
 - Existing OWASA Sanitary Sewer
 - Existing Telecom - Direct Buried
 - Existing UNC Lines for Groundwater Treatment
 - Existing PSNC Natural Gas - Mowed Corridor
 - Proposed Electric/Telecom Ductbank
 - Proposed Natural Gas
 - Proposed Water Mains
- Weighted Index Categories**
- A - Suitable for Disturbance
 - B - Suitable for Disturbance with Limited BMP's
 - C - Suitable for Disturbance with BMP's
 - D - Suitable for Conservation
 - E - Most Suitable for Conservation

Date: 6/2/2011



Proposed Conservation Area 1

Size: Approximately 12 acres

General Character: This is the second smallest Conservation Area, located in the northeast corner of the Carolina North tract. It is mostly wooded and contains an intermittent stream.

Streams: Stream 19, an intermittent stream, is the only stream in this Conservation Area. Its channel is incised, but relatively stable, due to low flows. Stream 19 exits University property and then flows through an open rippapped channel on the adjacent Chapel Ridge property for approximately 150 feet. This stream is an unnamed tributary to Booker Creek.

Wetlands: There are no jurisdictional wetlands in this Conservation Area.

Topography and Watershed: This Conservation Area receives stormwater runoff from the Orange County Human Services Building to the north. The west side of the Area slopes steeply to the east, towards the stream.

Vegetation: The estimated forest cover in this Conservation Area is 99%. This Conservation Area is entirely occupied by a combination of uneven-aged mixed hardwood/pine and mixed pine/hardwood stands, between 50 and 75 years old. Common species are sweet gum (*Liquidambar styraciflua*), yellow poplar (*Liriodendron tulipifera*) and loblolly pine (*Pinus taeda*). The dominant trees in this Conservation Area are approximately 50-60 years old. There are some older trees scattered throughout.

Utilities: There are no utilities in this Conservation Area.

Adjacent Areas: This Conservation Area is bordered on the north by Orange County property containing the Southern Human Services Center Complex and the Seymour Senior Center. It is bordered to the east by the Chapel Ridge apartment complex. Carolina North property borders to the west and south. The Glen Heights subdivision is located approximately 250 feet south of the proposed Conservation Area.

Cultural/Historic Sites: An old home site is located approximately 150 yards northeast of the origin of the intermittent stream.

Trails/Service Roads: This Conservation Area contains 240 linear feet of service road known as the 'Pumpkin Loop.' This Conservation Area also contains approximately 1,136 linear feet of multi-use single-track trail.

Other: Not Applicable



Ecological Analysis Proposed Conservation Area 1

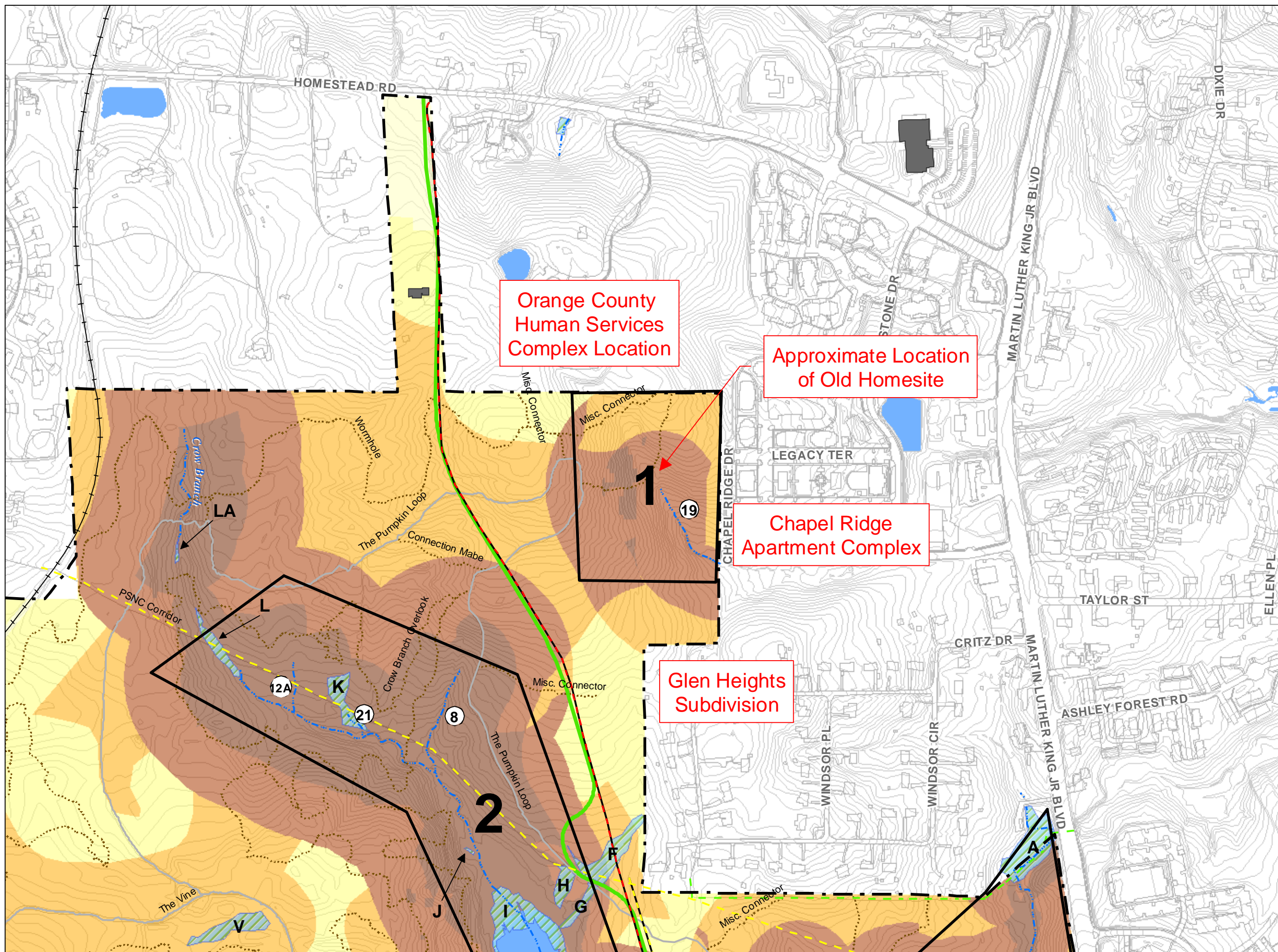
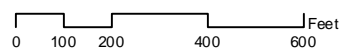
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- Proposed Electric/Telecom Ductbank
- Proposed Natural Gas
- Proposed Water Mains

Weighted Index Categories

- A - Suitable for Disturbance
- B - Suitable for Disturbance with Limited BMP's
- C - Suitable for Disturbance with BMP's
- D - Suitable for Conservation
- E - Most Suitable for Conservation

Date: 6/2/2011



Photos of Proposed Conservation Area 1



Typical hardwoods along northern border of Conservation Area



Chapel Ridge apartments to the east



Old home site: including old foundation, building and debris



Looking north on Stream 19, approximately 250 feet upstream from where it exits the property

Proposed Conservation Area 2

Size: Approximately 42 acres

General Character: This Conservation Area contains:

- a 3.8-acre impoundment, located in the southern portion of the Conservation Area (see below in the “Other” section for more details on the impoundment),
- a portion of the University’s Waste Reduction and Recycling Storage Area,
- a portion of the closed Chapel Hill Municipal Landfill,
- a Public Service of North Carolina (PSNC) gas line and easement in the northern section and
- a sizable portion of the upper reach of Crow Branch and the surrounding forested watershed.

Streams: A portion of the upper reaches of Crow Branch (perennial flow) and three intermittent tributaries (8, 12A and 21) are contained in this Conservation Area. All the streams are somewhat incised, but the banks are stabilized throughout by mature trees adjacent to the channel.

Wetlands: All or parts of seven wetlands (F, G, H, I, J, K and L) are contained in this Conservation Area, making it one of the more wetland-rich Conservation Areas. From Cowardin (1979) the wetlands are classified as palustrine forested, except for I, which surrounds the impoundment, and is a palustrine emergent wetland. The northwest, southwest, and eastern borders cross wetlands.

Topography and Watershed: This Conservation Area contains a sizable portion of the upper reach of Crow Branch and the surrounding forested watershed. Crow Branch is a tributary of Booker Creek.

Vegetation: The estimated forest cover in this Conservation Area is 89%. There is an emergent wetland that surrounds the impoundment on the north, east and west. Loblolly pines, approximately 40 years old, occupy the southwestern border area. The riparian or streamside areas of Crow Branch contain mixed hardwoods and pines, approximately 40-60 years old. The northeastern section of the Conservation Area supports a vegetative community that is unique to the property, a xeric hardwood forest. The dominant tree species there are white oak (*Quercus alba*), post oak (*Quercus stellata*), blackjack oak (*Quercus marilandica*) and hickories (*Carya* spp.).

There are invasive species present, such as microstegium (*Microstegium vinimeum*), chinaberry (*Melia azederach*), and tree of heaven (*Ailanthus altissima*) near the UNC-CH Office of Waste Reduction and Recycling site in the southern part of the Conservation Area.

Utilities: This Conservation Area contains approximately 2,050 continuous linear feet of existing PSNC natural gas utility corridor, which is 30 feet wide. PSNC maintains the corridor by mowing periodically.

Adjacent Areas: Conservation Area 2 is completely surrounded by the Carolina North property. The Glen Heights single-family residential development is located 175 to 500 feet east of Conservation Area 2. The Carolina North Development Area is located 40 to 200 feet south of Conservation Area 2. An old home site is located just outside the northwest corner of the Conservation Area.

Cultural/Historic Sites: The University’s Research Laboratories of Archaeology investigated a 3-acre area adjacent to the southeast of the impoundment and Conservation Area in 2009. While none of the sites investigated were eligible for listing in the National Register of Historic Places, the area contains prehistoric

sites dating from the Early and Late Archaic periods as well as recent historic components with research potential to yield important information about the lives of people living in the Carolina North property prior to acquisition by UNC.

Trails/Service Roads: This Conservation Area contains approximately 4,250 linear feet of multi-use single-track trail known as the 'Crow Branch Overlook' trail. It also contains approximately 1,450 linear feet of the service road known as the 'Pumpkin Loop' (30-foot width). Additionally, this Conservation area contains approximately 350 linear feet of a proposed greenway.

Other: A 3.8-acre impoundment is located on the south end of the Conservation Area. It was created when Crow Branch was dammed with construction debris during the 1970's. The impoundment does not have an engineered berm or dam structure or overflow structures such as a spillway. There are several informal seating/gathering areas along the perimeter of the impoundment that are frequently enjoyed by recreational visitors.

The area immediately south of the impoundment is occupied by the closed, pre-regulatory Town of Chapel Hill landfill. Also, this area south of the impoundment is currently occupied by the University's Office of Waste Reduction and Recycling Storage Area. This 0.33-acre fenced area is used to store dumpsters and other material-handling equipment. The Waste Reduction and Recycling Storage Area is located on top of the closed, old Town of Chapel Hill landfill.



Ecological Analysis Proposed Conservation Area 2

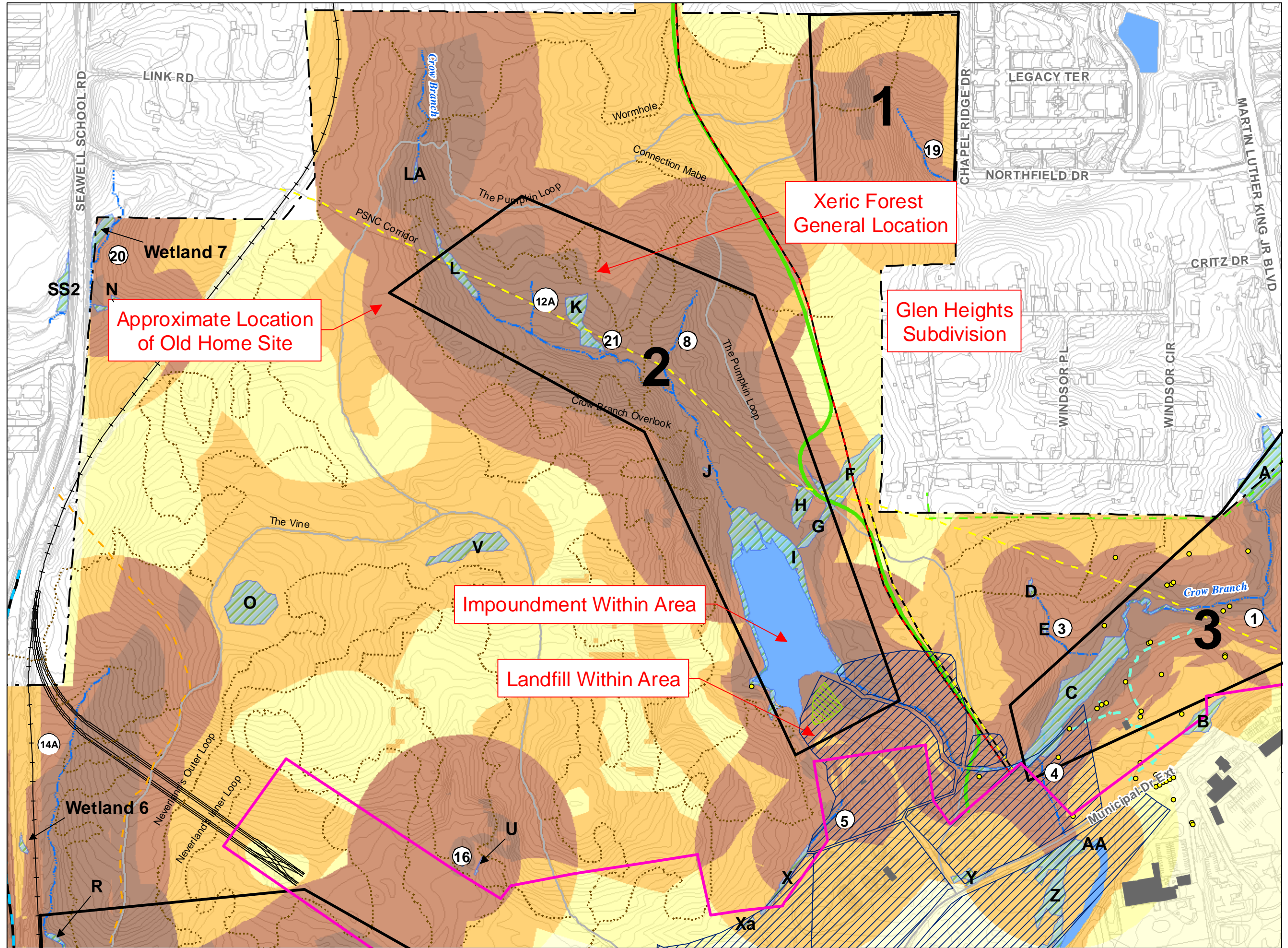
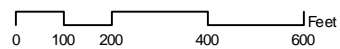
Legend

- Carolina North Boundary
- Conservation Area
- Development Area
- Existing UNC Buildings
- (21) Federal/State delineated streams
- Open Water
- Wetlands Delineated on CN Property
- Railroad
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Weighted Index Categories

- A - Suitable for Disturbance
- B - Suitable for Disturbance with Limited BMP's
- C - Suitable for Disturbance with BMP's
- D - Suitable for Conservation
- E - Most Suitable for Conservation

Date: 6/2/2011



Photos of Proposed Conservation Area 2



View looking south from north end of impoundment



Looking northwest at the intersection of the Pumpkin Loop (right) and the PSNC gas line easement (left), near Wetland H



Looking southeast (downstream) on Crow Branch, just upstream of the confluence of Stream 8



Xeric forest in northeast section of Conservation Area

Proposed Conservation Area 3

Size: Approximately 19 acres

General Character: This Conservation Area contains groundwater monitoring wells associated with the closed Airport Road Waste Disposal Area, a groundwater treatment facility also associated with the remediation project, and a portion of the closed pre-regulatory Town of Chapel Hill landfill. Areas north of Crow Branch generally support a more mature forest (40 or more years old), while areas south of Crow Branch are occupied by less mature forest (approximately 20-40 years old).

Streams: Crow Branch, a perennial stream, flows through Conservation Area 3. Three small intermittent tributaries (1, 3 and 4) flow into Crow Branch in this Conservation Area. All the stream reaches have some areas of instability due to channel incision, but the majority of the channel lengths are stable. The reach of Crow Branch immediately adjacent to the closed, pre-regulatory Town of Chapel Hill landfill has an increased presence of iron oxidizing bacterial growths, indicating potentially elevated iron levels in the water or pollution, and algal growths, which could indicate elevated nutrient levels. After exiting the Carolina North property, Crow Branch flows through a culvert under Martin Luther King Jr. Boulevard.

Wetlands: Wetland C, a palustrine forested wetland (approximately 1.7 acres), is located in the floodplain of Crow Branch. Wetland A is located in the northeast corner of the Conservation Area.

Topography and Watershed: Conservation Area 3 includes a portion of the Crow Branch stream valley and watershed. Crow Branch is a tributary of Booker Creek. Stormwater runoff from the Glen Heights development flows south into Stream 3, an intermittent stream channel on the northwest corner of the Conservation Area.

Vegetation: The estimated forest cover in this Conservation Area is 90%. Approximately 90% of this Conservation Area is a mixed hardwood/pine forest, between 50-75 years old. Species diversity is relatively high. *Wisteria (Wisteria spp.)* an exotic invasive, is present in the southwestern portion of the Conservation Area.

Utilities:

- Natural Gas- This Conservation Area contains approximately 750 continuous linear feet of existing PSNC natural gas utility corridor (30 foot width). PSNC maintains the corridor by mowing periodically.
- UNC water lines for Groundwater Treatment- A groundwater treatment building (pump house) and over 1000 linear feet of onsite water lines and 150 feet of sewer lines associated with the Groundwater Treatment operation are located in Conservation Area 3. Conservation Area 3 also contains 28 monitoring wells associated with the groundwater treatment operation.
- Sanitary Sewer- The northeast corner of Conservation Area 3 contains 525 linear feet of OWASA Sanitary Sewer, which includes a 30-foot utility corridor maintained by OWASA.

Adjacent Areas: The eastern border of Conservation Area 3 abuts the Martin Luther King, Jr. Boulevard right-of-way for 975 linear feet. The eastern border, as drawn, does not take into consideration the N.C. Department of Transportation right-of-way. Municipal Drive and the proposed Carolina North Development Area are located 0 to 200 feet south. To the north is a parcel containing a PSNC utility service area. Also to the north is Carolina North property. The Glen Heights single-family residential development is located 0 to 800 feet north. To the west is the Pumpkin Loop service road, the Development Area, and the closed pre-regulatory Town of Chapel Hill landfill.

Cultural/Historic Sites: There are no cultural or historic sites in the Conservation Area.

Trails/Service Roads: This Conservation Area contains 990 linear feet of service road (30-foot width) for the Ground Water Remediation Building and access to monitoring wells.

Other: Not Applicable



Ecological Analysis Proposed Conservation Area 3

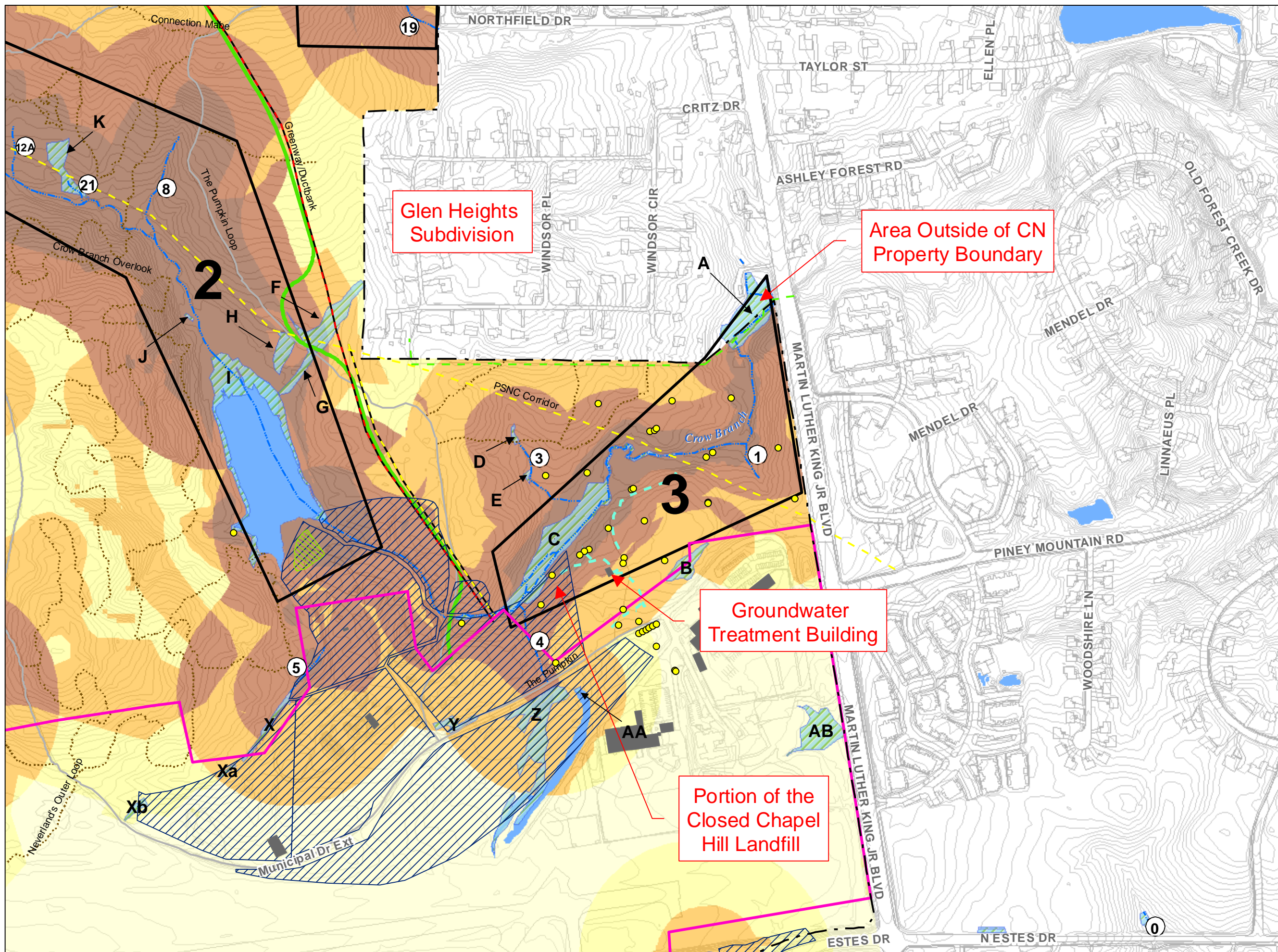
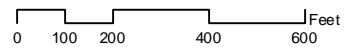
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Date: 6/2/2011



Glen Heights Subdivision

Area Outside of CN Property Boundary

Groundwater Treatment Building

Portion of the Closed Chapel Hill Landfill

Photos of Proposed Conservation Area 3



Wisteria infestation near the south border (vines, purple flowers)



Groundwater Treatment Building, south border



Old Town of Chapel Hill Landfill area, located in the southwest corner of the Conservation Area



Looking downstream on Crow Branch, just downstream of the confluence of Stream 4

Proposed Conservation Area 4

Size: Approximately 24 acres

General Character: The western edge of this Conservation Area includes the railroad tracks; the eastern edge is defined by the old runway. To the north is Carolina North property, to the south is the active runway of Horace Williams Airport. This Conservation Area includes two segments of intermittent stream channel and four wetland areas. There is a sizable area of mature pine/hardwood forest along the stream in the eastern end of the Conservation Area. The Conservation Area is dissected by the Vine service road.

Streams: There are two intermittent stream channel segments in the Conservation Area (14A and 16). Stream 14A flows south, parallel and adjacent to the railroad tracks. This channel is quite stable in its upper reaches, and becomes more incised nearer its confluence with Stream 16. Stream 16 flows west, from where it exits the culvert underneath the old runway. This stream is more highly incised, but is stabilized by mature trees and their roots on both banks.

Wetlands: There are three small palustrine forested wetlands along Stream 14A (P, Q and R) on the western border of the Conservation Area, and one approximately ¼-acre palustrine forested wetland (S) located just to the north of Stream 16.

Topography and Watershed: Streams 14A and 16 are unnamed tributaries to Bolin Creek. Part of the watershed for 14A is Category E from the Ecological Assessment, but is not included in the Conservation Area.

Vegetation: The estimated forest cover in this area is 98%. There is an area of mature pine/hardwood forest along the stream in the eastern end of the Conservation Area. Approximately 85% of this Conservation Area is a mixed pine/hardwood stand, approximately 50-75 years old, with scattered individual trees that are somewhat older. Approximately 15% of the Conservation Area is a loblolly pine stand, approximately 30-40 years old.

Utilities: Telecom direct buried fiber optic cable (with #12 copper locator wire) is located in the Vine Service Road.

Adjacent Areas: The railroad right-of-way, which includes active tracks, abuts the west side of Conservation Area 4. The west border, as drawn, does not take into consideration the railroad right-of-way. The currently active airport runway is to the south; this area is proposed for Carolina North development. An abandoned airport runway of the Horace Williams Airport is immediately northeast and is within the Carolina North Development Area. Fill material for the abandoned runway is in the Conservation Area. There is also a substantial length of stream immediately south of Conservation Area 4 that is not included in the Conservation Area. A substantial area of ecological value is located north of the northwest corner of the Conservation Area, but within the Carolina North property.

Cultural/Historic Sites: There are no designated cultural or historic sites in this Conservation Area.

Trails/Service Roads: This Conservation Area contains approximately 780 linear feet of the service road known as the 'Vine'. There are approximately 4,372 linear feet of multi-use single-track trail in Conservation Area 4, including 'Neverland's Inner Loop', 'Neverland's Outer Loop', and 'Wormhole'.

Other: Not Applicable



Ecological Analysis Proposed Conservation Area 4

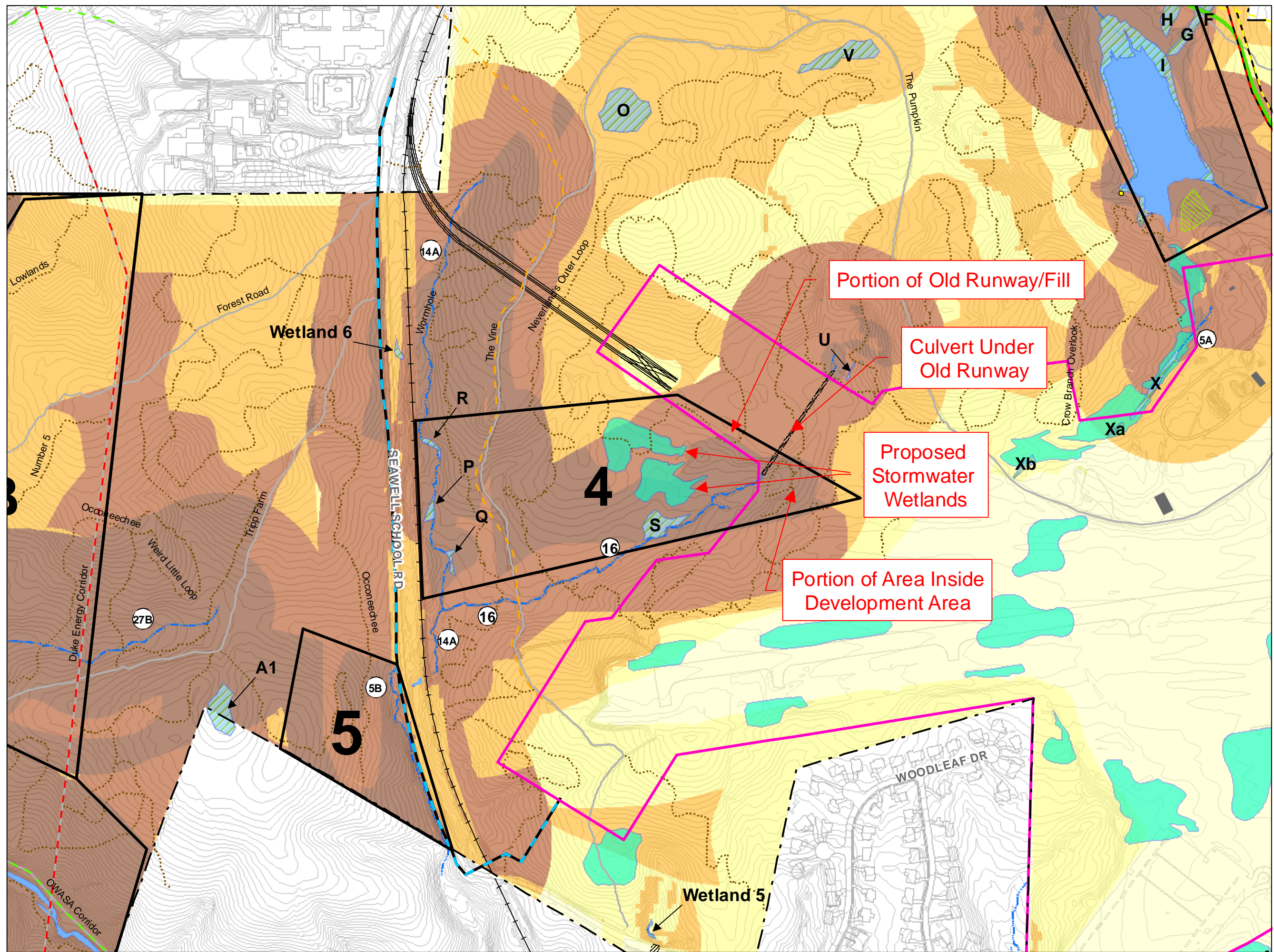
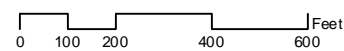
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Date: 6/2/2011



Photos of Proposed Conservation Area 4



Looking north on Vine Loop, near southern border



Trail with bike ramp near eastern border of Conservation Area



Old Horace Williams Airport runway fill, included in the Conservation Area



Looking upstream on Stream 14A near Wetland Q

Proposed Conservation Area 5

Size: Approximately 9 acres

General Character: This Conservation Area is in the southeastern corner of the property that is west of Seawell School Road. Stream 14A flows along the eastern border, adjacent to Seawell School Road. Trees are periodically felled in this Conservation Area in order to meet Federal Aviation Administration (FAA) safety requirements for the Horace Williams Airport.

Streams: Stream 14A, which is perennial at this point, flows parallel to both Seawell School Road and the eastern border of the Conservation Area. It is very stable, due to bedrock in its channel, but it does receive direct stormwater runoff from Seawell School Road. The total length of stream in the Conservation Area is approximately 861 feet. Based on an assumed 70-foot total width of the NC DOT right-of-way, approximately 525 feet of the total 861 feet are within the right-of-way (61%). The stream has been noted for the presence of macroinvertebrates not found in other Chapel Hill streams.

Wetlands: There are no wetlands in this Conservation Area.

Vegetation: The estimated forest cover in this Conservation Area is 99%. Approximately 40% of this Conservation Area, along the south and east borders, is a mixed pine/hardwood stand between 50 and 75 years old. The remainder of the Conservation Area is a mixed pine/hardwood stand that is less than 50 years old. This Conservation Area is relatively undisturbed and natural.

Utilities: There are no utilities in this Conservation Area.

Adjacent Areas: Seawell School Road is immediately to the east. The east border, as drawn, does not take into consideration the N.C. Dept. of Transportation right-of-way for Seawell School Road. To the north and west is Carolina North property. The southern border of the Conservation Area is adjacent to property owned by P.H. Craig, which is located in the Town of Carrboro and is zoned R-10.

Cultural/Historic Sites: There are none present.

Trails/Service Roads: This Conservation Area contains approximately 1,400 linear feet of multi-use single-track trail known as the 'Occoneechee' trail and 200 linear feet of miscellaneous/connector multi-use single-track trail.

Other: Not Applicable

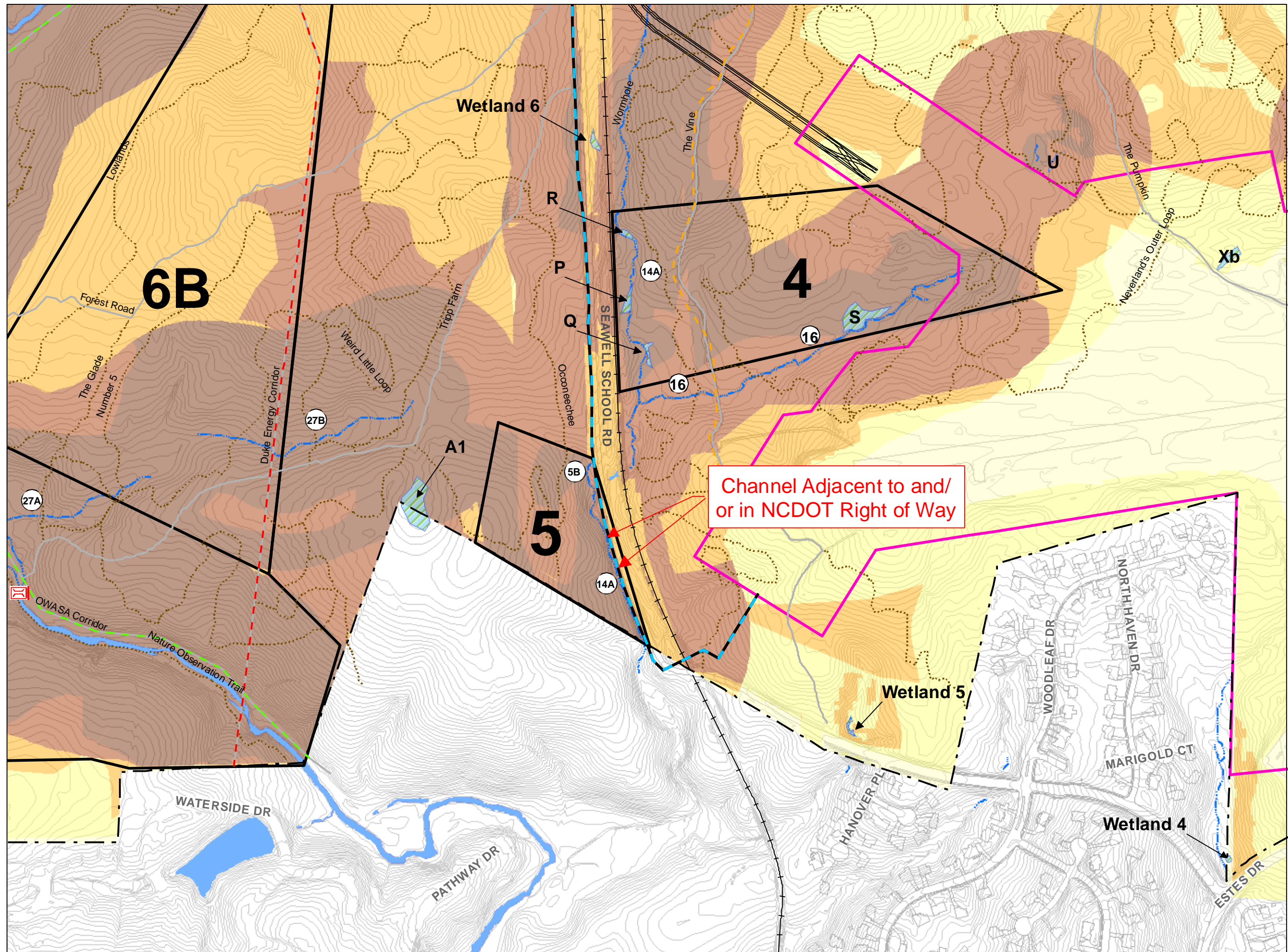


Ecological Analysis Proposed Conservation Area 5

Legend

- Carolina North Boundary
 - Conservation Area
 - Development Area
 - Existing UNC Buildings
 - Federal/State delineated streams
 - Open Water
 - Wetlands Delineated on CN Property
 - Railroad
 - Proposed Rail Spur
 - Landfill
 - Waste Reduction Recycling Storage
 - Bridge
 - Castlebury Mill Site
 - Monitoring Wells
 - Proposed Greenway
 - Existing Trails
 - Existing Gravel and Service Roads
 - Existing Duke Energy Corridor (Approx)
 - Existing OWASA Sanitary Sewer
 - Existing Telecom- Direct Burried
 - Existing UNC Lines for Groundwater Treatment
 - Existing PSNC Natural Gas - Mowed Corridor
 - Proposed Electric/Telecom Ductbank
 - Proposed Natural Gas
 - Proposed Water Mains
- Weighted Index Categories**
- A - Suitable for Disturbance
 - B - Suitable for Disturbance with Limited BMP's
 - C - Suitable for Disturbance with BMP's
 - D - Suitable for Conservation
 - E - Most Suitable for Conservation

Date: 7/29/2011



Photos of Proposed Conservation Area 5



Typical forest: great than 50 years old in foreground, older in back



Trees felled for FAA safety compliance at the Horace Williams Airport, Fall 2009



Pine/hardwood stand with trail, looking north on western border of Conservation Area



Stream 14A, looking south along Seawell School Road

Proposed Conservation Area 6A

Size: Approximately 205 acres

General Character: This is the largest Conservation Area, which includes approximately 6,125 feet of Bolin Creek, numerous smaller tributaries and a mix of bottomland hardwood, hardwood and upland pine forest. An OWASA sewer easement doubles as a community trail. There are numerous, well-used trails in this Conservation Area. It contains the best examples of undisturbed mature forest on the Carolina North property.

Streams: Bolin Creek, a perennial stream, is the largest stream in the Conservation Area, with approximately 6,125 feet of channel within the borders. There are six smaller tributary channels to Bolin Creek in the Conservation Area, Streams 22, 23, 24, 25, 26, 27A. All these streams are intermittent except Stream 26, which is perennial. Bolin Creek is highly incised in the upper reaches of the Conservation Area and somewhat less incised farther downstream. Its channel will not likely become more incised, due to bedrock grade control throughout the entire reach. Stream 26 is also quite incised, and has areas where the banks are unstable, contributing sediment to the stream. The intermittent tributaries have lower levels of incision and their channels are generally stable.

Wetlands: There are three small palustrine forested wetlands in the Conservation Area (B1, C1 and D1) associated with the Bolin Creek floodplain.

Topography and Watershed: Conservation Area 6A is centered around the Bolin Creek stream corridor and includes the floodplain and forested stream valley slopes.

Vegetation: The estimated forest cover in this Conservation Area is 97%. This Conservation Area supports a diverse forest. A hardwood forest that contains trees over 100 years old is in the northwest corner. A mature hardwood bottomland forest borders Bolin Creek. Mixed pine/hardwoods over 75 years old occupy the hillsides on both sides of the floodplain in the southeast corner of the site and a 30-40 year-old loblolly pine forest occupies a large portion of the Conservation Area along the eastern border. There are some infestations of Russian/autumn olive (*Eleagnus* spp.) on the west side of Bolin Creek, in the western parts of the Conservation Area. Chinese privet is also common in the Bolin Creek floodplain.

Utilities:

- Sanitary Sewer - This Conservation Area contains approximately 5,300 continuous linear feet of OWASA Sewer Corridor (30 foot width) that is parallel to Bolin Creek. An additional 2,200 linear feet of OWASA sewer corridors leads from existing neighborhoods to the sewer interceptor along Bolin Creek.
- Electric- Approximately 900 continuous linear feet of the Duke Energy utility corridor (50 foot width) are within Conservation Area 6A.

Adjacent Areas: Most of the eastern border of the Conservation Area is adjacent to Carolina North property. In the southeast corner, Conservation Area 6A is very close to the private property that is zoned R-10 and owned by P.H. Craig. There are existing single-family residence subdivisions to the south (Spring Valley, Waverly Forrest and Sudbury/Fairoaks) and west (Cobblestone) of the Conservation Area. Claremont II, a proposed single-family residence subdivision within the Town of Carrboro, is located to the west and north of Conservation Area 6A. A University-owned property that is not considered part of Carolina North is adjacent to

the northern border and includes athletic fields on land leased to Orange County by UNC-CH, for Chapel Hill-Carrboro City Schools.

Cultural/Historic Sites: The Castleberry Mill site, dating from the 18th century, is located on the south side of Bolin Creek, approximately 1,500 feet upstream of the Conservation Area border.

Trails/Service Roads: This Conservation Area contains 3,479 linear feet of service roads known as 'Maytag' and 'Tripp Farm.' Service roads are also located along the OWASA Sanitary Sewer and Duke Power corridors, for an additional 6,038 linear feet of service road. The Conservation Area contains approximately:

- 8,162 linear feet of pedestrian-only single-track trail known as the 'Nature Observation' trail
- 2,587 linear feet of multi-use single track trail known as the 'Occonechee' trail,
- 4,960 linear feet of multi-use single-track trail known as the 'Lowlands' trail,
- 1,846 linear feet of multi-use miscellaneous/connector single-track trail, and
- Many frequently used informal pathways from adjoining residential areas.

There is a newly constructed bridge over Bolin Creek in this Conservation Area.

Other: Proposed Conservation Area 6A contains a part of the Bolin Creek Natural Area, designated as a Significant Natural Heritage Area (Significance D) by the North Carolina Natural Heritage Program. The shape of proposed Conservation Area 6A roughly corresponds to the portion of the Bolin Creek Natural Area within Carolina North.



Ecological Analysis Proposed Conservation Area 6A

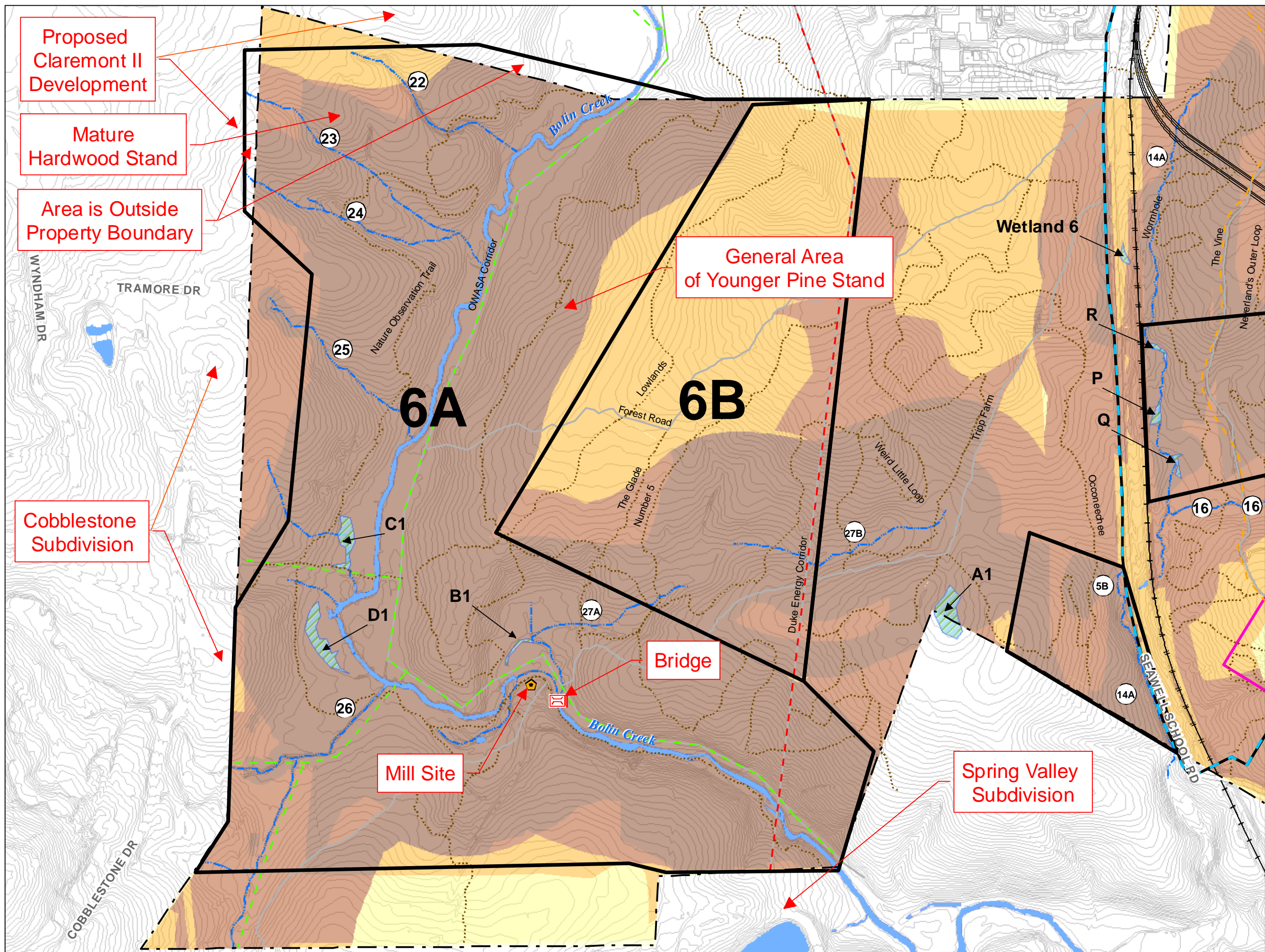
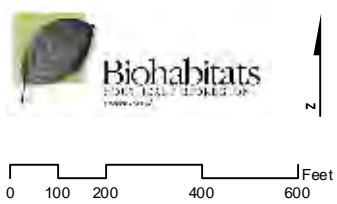
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- E- Most Suitable for Conservation

Date: 6/2/2011



Photos of Proposed Conservation Area 6A



Typical 30-40 year old loblolly pine stand



View from Bolin Creek of pedestrian bridge, downstream of the Castlebury mill site



Mature hardwoods in northwest corner of Conservation Area



Looking north across Wetland C1

Literature Cited

Cowardin, L. M., V. Carter, F. C. Golet, E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U. S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page.

<http://www.npwrc.usgs.gov/resource/1998/classwet/classwet.htm> (Version 04DEC98).

Town of Chapel Hill, Carolina North Development Agreement, July 1, 2009. <http://www.ci.chapel-hill.nc.us/index.aspx?page=1232>

University of North Carolina at Chapel Hill, Ecological Assessment Report, Carolina North, October 2007.

http://townhall.townofchapelhill.org/agendas/2008/11/18/background/6-carolina_north_ecological_assessment_report_full_oct_2007.pdf