NHDOT Routes 101/51

File No.: 198802914

City and State: Brentwood, NH

General Impacts: 103 acres forested wetlands

Functions and Values Lost:

Wildlife Habitat
Flood Storage
Water Quality Penoveti

Water Quality Renovation

Year(s) Mitigation Constructed:

Southern pit – started in 1994, completed in 1995 Northern pit – started in 1996, completed in 1997 Eastern pit - started in 1996, completed in 1997

Size and Type of Mitigation as Proposed:

105 acres open water, emergent, and scrub-shrub at Pine Road site Preservation of approximately 500 acres at the Conner Farm

Proposed Functions and Values of Mitigation:

Wildlife Habitat Flood Storage Water Quality Renovation

Mitigation Special Condition(s):

4. Mitigation to be properly constructed, monitored, managed and preserved - The NH DOT (hereafter the Department) shall create not less than 105 acres of wetlands within the Pine Road mitigation site as called for in the January 27, 1992 Wetland Mitigation Technical Report and published as part of the Final EIS. Final engineering plans specifying final elevations for the compensatory mitigation areas shall be provided to and approved by the Corps at least 30 days before the contractor is given a notice to proceed. The purpose of the mitigation work is to compensate for the loss of functions and values provided by those wetlands which will be destroyed by the project. The permittee by agreeing to this special condition commits to undertake the construction, landscaping, monitoring, and remedial actions necessary to create (over a period of 5 to 10 years or longer) a functioning wetland capable of providing flood storage, water quality renovation, and habitat values similar to those of the impacted forested wetlands.

Remedial measures, if necessary, may include, but are not limited to, replanting with different wetland species, relocating plantings to a more suitable location within the mitigation area, removal of invasive, weedy species such as *Lythrum salicaria*, *Phragmites australis*, changing soil composition and depth, changing the elevation of the

wetland surface, changing the hydraulic regime, and undertaking further hydrological and biological analysis as required and approved by the Corps.

Point of Contact:

The Department shall designate a person who will have sufficient responsibility and authority to assure that the mitigation area is constructed in accordance with the mitigation plan, and that monitoring is accomplished in a timely fashion, and any necessary remedial actions are taken expeditiously.

Interdisciplinary Team:

The Department shall employ an interdisciplinary team with the necessary engineering and environmental skills to assess the success of the mitigation, formulate recommendations for the remedial measures, and see that they are executed expeditiously. The Department will provide the Corps with a list of the members of this team, and their qualifications at least 30 days before the contractor is given notice to proceed.

Pre-construction Conference:

A pre-construction conference shall be held at the site prior to the start of construction to insure that the contractor and DOT construction supervisor are aware of the desired result and the actions necessary to achieve it. A Corps of Engineers representative will be included in this pre-construction conference.

Monitoring, Construction Conferences, Surveys:

The Department shall monitor the initial construction regularly to assure that the work is accomplished in accordance with the plan, and that the necessary soil, water and vegetation are present at the mitigation site upon completion of the work.

The condition of the site will be photo documented (panoramic photographs taken which shall depict the lay of the land and the vegetative cover type or lack thereof etc.) prior to, during, and after construction.

Several as-built surveys of the mitigation areas will need to be prepared, at various stages of completion (in sufficient detail to accomplish their intended purpose). One as-built survey will be prepared at the completion of initial excavation (before topsoil is placed and before the initial inspection conference), another final grade as-built survey will be prepared, after final grading (after topsoil is placed), and yet another, post remediation survey will be prepared if changes in grade or the amount of topsoil are required.

The initial excavation as-built survey will be presented to the Corps before the initial construction conference. The final grading as-built survey will be presented to the

Corps before the initial follow-up construction conference. Any post remediation as-built survey will be presented to the Corps before that follow-up inspection is conducted.

Initial, Follow-up, Inspection Reports and Remediation:

An initial progress inspection and conference will be undertaken immediately upon the completion of the initial grading of the subsoil at the mitigation site, before the organic or topsoil is placed and graded. An as-built survey will be prepared and available for review prior to this initial excavation progress conference. After this conference NH DOT may place the topsoil, finish grading the site and plant the vegetation. Upon completion of this phase, NH DOT will hold another field review and conference to look at the initial finished product. Following this, the Department will prepare a report outlining what follow-up actions will be necessary to assure a successful mitigation area. The report will contain a schedule for accomplishing any needed remedial actions and be submitted to the Corps within 30 days of the initial follow-up inspection. Remedial actions will be taken at the earliest possible time consistent with achieving success.

First Spring Follow-up Inspection, Reports and Remediation:

In June of the first year following initial construction, a follow-up inspection will be performed to assess the success of the mitigation effort and to plan and schedule remedial actions, indicated. A Corps of Engineers representative will be included on the inspection team. New Hampshire Department of Transportation will prepare a report outlining necessary follow-up action, and provide a schedule for completing the remedial work. This report will be submitted to the Corps within 30 days of the follow-up inspection.

In conducting the follow-up inspection the health and vigor of planted and seeded vegetation will be visually assessed. If less than 70% of planted stock survive in the first year (or 60% in subsequent years) the area will be replanted to the original density. Vegetation shall be sampled in plots along transects across each mitigation area during each growing season for which inspections are required.

An appropriate number of sample plots shall be located within each proposed wetland cover type in each area. Vegetation shall be identified to species when possible. Percent aerial cover for each species shall be estimated. Permanent photographic stations shall be established and a panoramic photograph depicting each mitigation area shall be taken for inclusion in each report.

Surface and/or ground water elevation observation stations will be established to characterize the level of surface or groundwater in each mitigation area. These shall be monitored monthly during the growing season, and at least once in the fall, winter, and spring. The results will be recorded and included in required reports.

Wildlife using the site shall be recorded if directly observed or evidence of their presence is found in the mitigation area.

Subsequent Follow-up Inspections, Reports and Remediation:

Similar inspections, reports and remedial actions will be undertaken in at least the second, third, fifth and tenth year following the initial completion of the mitigation area. A Corps representative will be included in the interdisciplinary inspection team. The inspections will be made in a timely manner, the report prepared and remedial actions taken expeditiously. Each report will be sent to the Corps Regulatory Division no later than September 1st of each year a follow-up inspection is required.

Conservation Public Access and Scientific Observations:

To assure that the functions and values provided by the mitigation areas continue into the future, each mitigation area will be purchased in fee by the state or a conservation easement obtained, and a covenant placed on the property to prevent its future development. The mitigation areas will be accessible and available to the Federal resource agencies personnel for observation and scientific study. Evidence of fee ownership or easements and the recording of restrictive covenants shall be provided to the Corps of Engineers prior to construction beginning.

Water Withdrawals:

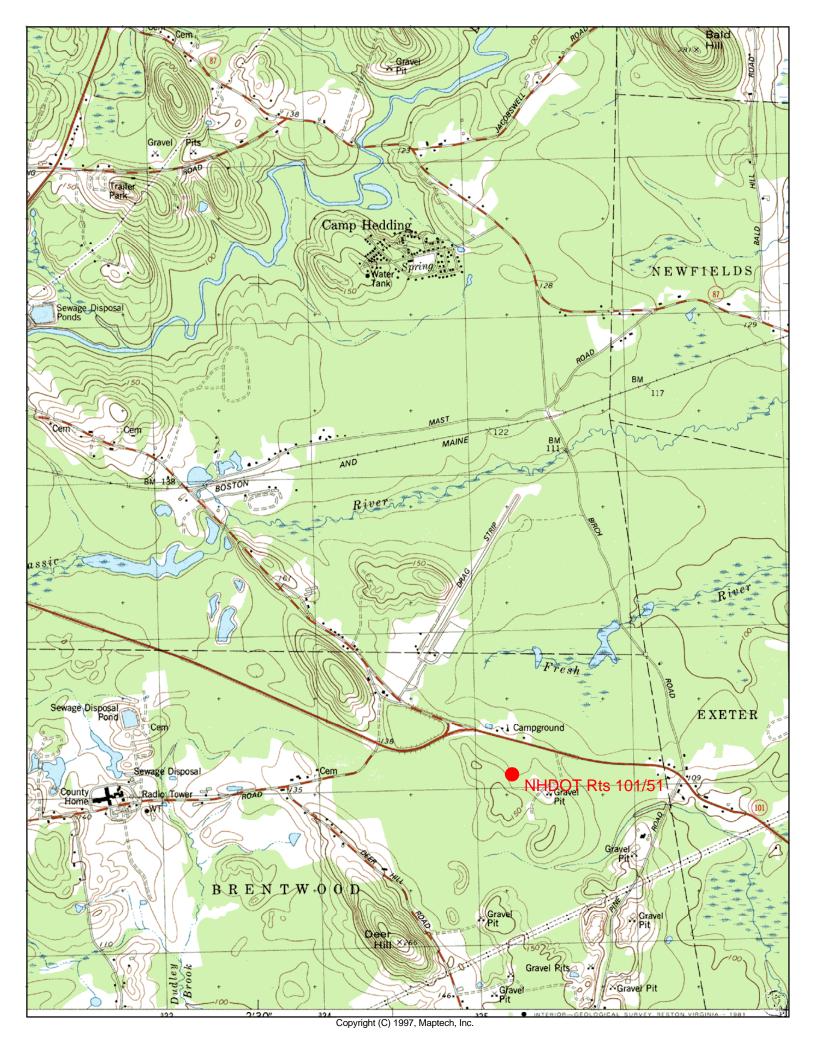
NH DOT will not construct nor permit to be constructed on property they own or control wells for municipal or commercial water supply. They will take action reasonably within their power to prevent the installation of wells outside their property which would adversely effect by desiccation or otherwise wetlands created or preserved on their property to compensate for the loss of wetlands as a result of the 101/51 project. The Corps would entertain a request for modification of this permit to allow water withdrawal for municipal or industrial uses, if it can be demonstrated to the Crops satisfaction that such additional use can be made of water resources at the site without impairing the primary use which shall be mitigation of wetland losses.

Remarks:

None

Directions:

Take I-95 north into New Hampshire. Take exit 2, Route 101 west. Take exit 9, Route 27 (Epping Road) towards Exeter. Then turn left onto Pine Road. The site lies adjacent to Pine Road after crossing Rt. 101. The bulk of the site is west of Pine Road but some is to the east. It is accessed through locked gates (NHDOT has key).



Created Wetlands Total Flora List

From

A Comparison of Floristic Biodiversity in Varying-aged Created Wetlands in Southeastern New Hampshire

Kassandra J. Jahr

2003

Master's Thesis

University of New Hampshire

Durham, New Hampshire

Contact information: kassiejahr@yahoo.com

Table 2. Created Wetlands Total Flora List

SITES

	S11ES								
	PORTS	NORTH	SOUTH	EAST					
PTERIDOPHYTES									
Dryopteridaceae									
Onoclea sensibilis	X		X	Х					
Equisetaceae									
Equisetum arvense	X	X							
Isoetaceae									
Isoetes engelmannii		X	X	X					
Osmundaceae									
Osmunda cinnamomea	X								
Osmunda regalis	X	X							
Thelypteridaceae									
Thelypteris palustris	X	X	X						
ANGIOSPERMS									
DICOTYLEDONS									
Aceraceae									
Acer rubrum	X								
Acer saccharinum		X							
Anacardiaceae									
Toxicodendron vernix	X			X					
Apiaceae									
Cicuta bulbifera	X		X						
Sium suave	X								
Aquifoliaceae									
Ilex verticillata	X	X		X					
Asclepiadaceae									
Asclepias incarnata subsp. incarnata		X	X						
Asclepias incarnata subsp. pulchra	X								
Asteraceae									
Bidens cernuua		X	X						
Bidens cf. comosa	X								
Bidens cf. connatus				X					
Bidens frondosus	X			X					
Eupatorium dubium	X								

Eupatorium incarnatum				x
Eupatorium perfoliatum	X	X		X
Euthamia graminifolia	X	X		
Balsaminaceae				
Impatiens capensis	X			
Betulaceae				
Alnus incana subsp. rugosa	X	X	X	
Betula populifolia	X	X		
Brassicaceae				
Cardamine pensylvanica				X
Rorippa palustris subsp. palustris				X
Rorippa palustris subsp. glabra		X	X	
Cabombaceae				
Brasenia schreberi	X	X		
Callitrichaceae				
Callitriche verna	X	X	X	X
Campanulaceae				
Campanula aparinoides	X			
Lobelia cardinalis		X	X	
Caprifoliaceae				
Viburnum dentatum		X	X	
Clusiaceae				
Hypericum boreale	X	X	X	X
Hypericum canadense		X	X	X
Hypericum ellipticum	X	X	X	X
Hypericum majus		X	X	X
Triadenum fraseri	X	X	X	X
Triadenum virginicum			X	
Cornaceae				
Cornus amomum subsp. amomum		X		X
Cornus amomum subsp. obliqua	X	X		
Cornus stolonifera	X			X
Droseraceae				
Drosera intermedia	X			
Ericaceae				
Lyonia ligustrina	X			
Vaccinium corymbosum	X	X		
Vaccinium macrocarpon	X			
Haloragaceae				

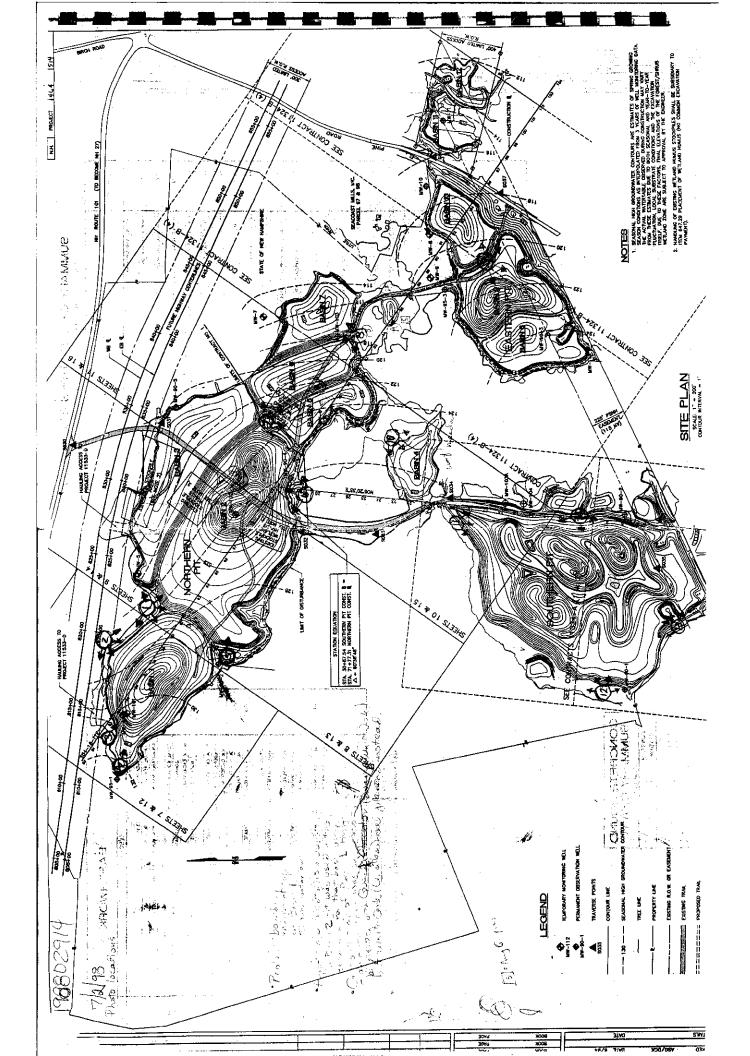
Myriophyllum humile		X		x
Proserpinaca palustris	X	X	X	
Lamiaceae				
Lycopus americanus		X	X	X
Lycopus uniflorus	X	X		X
Scutellaria galericulata	X			
Scutellaria lateriflora		X		
Lentibulariaceae				
Utricularia geminiscapa			X	
Utricularia minor	X	X		
Utricularia vulgaris	X	X	X	X
Lythraceae				
Lythrum salicaria	X	X	X	X
Myricaceae				
Myrica pensylvanica	X			
Nymphaeaceae				
Nuphar variegata	X	X	X	
Nymphaea odorata subsp. odorata		X	X	X
Nymphaea odorata subsp. tuberosa			X	
Onagraceae				
Epilobium ciliatum subsp. ciliatum	X	X		X
Epilobium leptophyllum		X		
Ludwigia palustris	X	X	X	X
Polygonaceae				
Polygonum amphibium var. emersum	X			
Polygonum careyi		X	X	X
Polygonum hydropiper			X	
Polygonum lapathifolium	X	X	X	X
Polygonum pensylvanicum	X	X	X	X
Polygonum persicaria		X	X	X
Polygonum punctatum var. punctatum	X	X		
Polygonum punctatum var. confertiflorum			X	X
Polygonum sagittatum	X		X	X
Rumex crispus		X		X
Rumex cf. pallidus	X			
Rumex cf. verticillatus	X			
Primulaceae				
Lysimachia ciliata		X	X	
Lysimachia ×producta		X		X

Lysimachia terrestris	x	x	x	x
Ranunculaceae				
Ranunculus sceleratus subsp. sceleratus	X			
Rosaceae				
Rosa palustris	X			
Rosa virginiana	X			
Spiraea latifolia	X	X	X	
Spiraea tomentosa	X	X	X	X
Rubiaceae				
Cephalanthus occidentalis		X	X	X
Galium palustre	X			
Galium tinctorium		X	X	X
Salicaceae				
Populus deltoides		X		
Salix bebbiana		X		
Salix eriocephala	X	X		X
Salix lucida	X			
Salix nigra	X	X	X	X
Salix purpurea				X
Saxifragaceae				
Penthorum sedoides	X	X	X	X
Solanaceae				
Solanum dulcamara	X			X
Scrophulariaceae				
Agalinis purpurea	X	X	X	X
Chelone glabra	X			
Gratiola aurea			X	
Gratiola neglecta		X		
Lindernia anagallidea		X	X	X
Lindernia dubia			X	X
Mimulus ringens	X	X	X	X
Veronica scutellata			X	
Urticaceae				
Boehmeria cylindrica	X		X	
Verbenaceae				
Verbena hastata	X	X	X	X
Violaceae				
Viola lanceolata		X	X	X
MONOCOTYLEDONS				

Alismataceae				
Alisma subcordatum	X	X	X	X
Sagittaria graminea			X	
Sagittaria latifolia	X	X	X	Х
Araceae				
Symplocarpus foetidus	X			
Cyperaceae				
Carex atherodes	X			
Carex canescens	X			
Carex comosa	X		X	
Carex crinita var. crinita		X		
Carex lenticularis	X			
Carex lupulina	X	X	X	X
Carex lurida	X	X	X	X
Carex pseudocyperus	X			
Carex scoparia	X	X		X
Carex stipata	X			
Carex stricta var. stricta	X		X	
Carex utriculata	X	X		
Carex vesicaria		X	X	
Carex vulpinoidea	X	X		
Cyperus strigosus	X	X	X	X
Dulichium arundinaceum		X	X	X
Eleocharis acicularis	X	X		
Eleocharis elliptica	X			
Eleocharis obtusa		X	X	X
Eleocharis robbinsii		X		
Eleocharis smallii	X	X	X	X
Eleocharis tenuis var. tenuis		X	X	X
Scirpus atrocinctus	X			
Scirpus atrovirens		X		
Scirpus cyperinus	X	X		X
Scirpus microcarpus			X	
Scirpus pedicellatus		X	X	
Scirpus pungens	X		X	
Scirpus tabernaemontani	X	X	X	X
Hydrocharitaceae				
Elodea nuttallii			X	
Vallisneria americana	X	X	X	

Iridaceae				
Iris versicolor	X	X	X	
Sisyrinchium atlanticum	X	X		
Juncaceae				
Juncus acuminatus	X	X	X	X
Juncus brevicaudatus			X	
Juncus canadensis		X	X	X
Juncus effusus	X	X	X	X
Juncus marginatus var. marginatus		X	X	
Juncus pelocarpus			X	
Juncus tenuis			X	X
Lemnaceae				
Lemna minor	X			
Najadaceae				
Najas flexilis		X		
Najas gracillima	X			X
Poaceae				
Agrostis gigantea		X		
Agrostis stolonifera			X	
Alopecurus aequalis		X	X	X
Calamagrostis canadensis	X			
Echinochloa muricata		X		
Glyceria acutiflora			X	
Glyceria borealis	X	X	X	X
Glyceria canadensis	X	X	X	X
Glyceria grandis			X	X
Leersia oryzoides		X	X	
Muhlenbergia uniflora		X	X	
Phalaris arundinacea	X	X	X	
Poa palustris	X			
Puccinellia fernaldii			X	
Pontederiaceae				
Pontederia cordata	X	X	X	X
Potamogetonaceae				
Potamogeton amplifolius	X	X		X
Potamogeton bicupulatus	X	X	X	X
Potamogeton epihydrus			X	X
Potamogeton foliosus			X	X
Potamogeton natans	X	X	X	X

Potamogeton nodosus			X	
Potamogeton perfoliatus			X	
Potamogeton pusillus subsp. tenuissimus	X	X	X	X
Sparganiaceae				
Sparganium americanum	X	X	X	X
Sparganium eurycarpum	X			
Typhaceae				
Typha angustifolia	X	X	X	X
Typha ×glauca	X		X	
Typha latifolia	X	X	X	X
Total species	110	106	99	80



Wetland Function-Value Evaluation Form

E O		•	<i>^</i>	1	*	1	1.	4	#	€≪	3	•			How 1	Is the	Domii	Adjac	Total:
Endangered Species Habitat	Endones	Wy Visual Quality/Aesthetics	Uniqueness/Heritage	Educational/Scientific Value	Recreation	Wildlife Habitat	Sediment/Shoreline Stabilization	Production Export	Nutrient Removal	Sediment/Toxicant Retention	Fish and Shellfish Habitat	Floodflow Alteration	Groundwater Recharge/Discharge	Į.	How many tributaries contribute to the wetland?	Is the wetland a separate hydraulic system?w/in Little R watershed	Dominant wetland systems present	Adjacent land use	Total area of wetland <u>~100 ac</u>
red Spe	and Can	uality/,	ess/Her	nal/Sci	on	Habitat	t/Shore	on Exp	Remov	t/Toxic	Shellfi	w Alter	vater Re	Function/Value	aries cont	eparate h	d system		land <u>~100</u>
Cles II		Aestheti	itage	entific			line Sta	ort	'al	ant Ret	sh Habi	ation	charge	Value	tribute to	ydraulic	s present_	nd gravel ds; powei	1
וסוומו	hitat	ics		Value			bilizati			ention	tat		/Discha		the wetla	system? <u>w</u> w	POW, P	operation . line; seco	_ Human made?_
		×			3			\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	\\					Su		w/in Little I watershed	POW, PEM, PSS	sand and gravel operation; forested uplands and wetlands; power line; secondary road; Rt. 101	? yes
+	,	^	×	<u>×</u>	X	×	×	×	×	×	×	×	×	Suitability Y N				upland id; Rt.	Is we
+				-									ļ <u>.</u>	ity	_Wild	not, w		s and	tland part
														Rationale (Reference	llife & v	here do	Co	_ Dist	art of a
:								,						Rationale (Reference #)*	/egetatio	es the w	ntiguous	ance to	wildlife
	ļ.													#)*	on divers	etland li	undeve	nearest r	Is wetland part of a wildlife corridor?
				×		×								Principal Function	Wildlife & vegetation diversity/abundance (see attached list)	If not, where does the wetland lie in the drainage basin? <u>headwaters</u>	Contiguous undeveloped buffer zone present 60%	Distance to nearest roadway or other developmen	? yes
I O WIE	none I	numer		site is	hunter	combi	applie	food f	dense	dense	there	proba	sandy	Principal Function(s)/Value(s)	lance (se	rainage	fer zone	or other	or 2
IIAONII		oog suo		being u	s, horse	nation o	s to larg	or wildl	dense herbaceous	vegetat	there is permanent	bly has	soils, fi	/Value	ee attaci	basin?_	presen	develop	or a "habitat island"? no
		od overl		sed for	back ri	of open	ger ponc	ife (and		ion aro	ment w	some in	uctuatii	e(s)	hed list	headw	t 60%)ment_	at islan
		ooks; sı		several	ders, wa	water, e	is and s	human	getation	ınd muc	ater in s	npact or	ng wate		Ŭ	aters		~150'	d"'? no
		numerous good overlooks; snags for birds		researcl	ılkers ar	mergen	teeper s	s—blue	around	th of the	ome of	the Lit	r table s					•	
		birds		site is being used for several research projects	hunters, horseback riders, walkers and birdwatchers use site; good trail system	combination of open water, emergent marsh, wet meadow, and scrub-shrub, & upland	applies to larger ponds and steeper slopes where there is a fetch	food for wildlife (and humans—blueberries)	vegetation around the perimeter of most of the site	dense vegetation around much of the perimeter of the site	water in some of the basins which likely support fish	probably has some impact on the Little River floodflows	sandy soils, fluctuating water table suggests there is both recharge and discharg e	Comments	 6 C	Evalua Office_	Ty	Pre	We Lai
				ß	atchers/	, wet m	here the		meter o	ter of th	ns whic	r floodf	there is	ents	Corps manual wetland delineation completed? Y N Y	Evaluation based on: OfficeFi	Wetland Impact:	Prepared by:	NHDOT Wetland I.D19880029 N43,0094146 Latitude_7L
					use site	eadow,	re is a f		f most o	ne site	h likely	lows	both re		nual we	based o	ppact:	y:RML	NHI D. 1988 43.009
					e; good	and scr	ètch		of the si		suppor		charge		tland d	on: Field_		D D	NHDOT Rt 101/51; 1988002914 0094146 V Longitude_
					trail sy	ub-shru			te		t fish		and dis		elineati N <u>x</u>	×	_Area_	. Date8	101/51 4 1gitude
					stem	ıb, & up							charg e		ion		105 acres	8/7-8/02	T Rt 101/51; 12914 W71.0169286 Longitude
						land											теs		169280

Notes:

*Refer to backup list of numbered considerations.

198802914 NHDOT Route 101/51 Brentwood/Epping, NH 8/6-7/02



Southern pit: Looking south and southwest from the northeast tip of the site. Access road around site is behind the shrubs on the left.



Southern pit: Looking west and north from midway own the east side of the site. In the center left is a low island. The site extends to the shrubs in the distance on the right and beyond the shrubs in the distance on the left.



Southern pit: Looking north from pole near southeast corner of site.



Southern pit: Looking south from inside the PFO/SS zone on the west side of the site (near waypoint AS-14)



Basin 4: Looking northwest and northeast from the southern side of the site.



Basin 4



Eastern pit – Basin 9: Looking westerly from the berm on the northeast side.



Eastern pit – Basin 10: Looking southeast from the entrance road on the east side.



Basin 11: Looking southeast from northwest corner





Northern pit – Basin 1: Looking west and north across the site from the berm on the southeast side.



Northern pit – Basin 1: Looking east from the westernmost corner of the site.



Northern pit – Basin 2: looking north towards two islands from south side near access road from southern pit.





Northern pit – Basin 5: Looking northwest, north, and east from southwest side.



Northern pit – Basin 6



Image courtesy of the U.S. Geological Survey © 2002 Microsoft Corporation. All rights reserved.