6-2010

River Road New Castle Marsh Restoration Recommendations

Rockingham County Conservation District

Rockingham County Conservation District
River Road Marsh and Stuart Farm Restoration Projects
Final Project Report – June 2010

Background:

PREP's 2009 (YR 13) workplan allocated $30,000 of EPA 320 funds for restoration project funding (Workplan ID 09-D-2). $9,500 of this allocation went to the Rockingham County Conservation District (RCCD) to fund planning work on two separate salt marsh restoration projects:

1. Stuart Farm (Stratham, NH)
2. River Road Marsh (New Castle, NH)

Overview of Projects:

1. Stuart Farm (Stratham, NH)

The project scope involved completing engineered plans and federal and state permits necessary to allow the replacement of a failing culvert located at the Stuart Farm in Stratham, NH. The purpose of this project was to obtain the plans and permits so that the landowners can move forward quickly with the construction component. The salt marsh directly affected by this culvert is approximately 12 acres in size, and connects to the Squamscott River. The property is owned by one landowner. The existing oval bituminous coated corrugated pipe (approximately 7 feet tall, 12 feet wide, and 60 feet long was installed in 1993 (with assistance from NOAA & USF&W S funds) to replace a tide gate that was limiting salt water flow. With the new culvert installed, the increased influence of salt water restored approximately 12 acres of salt marsh. Salt water corrosion greatly shortened the expected life of the corrugated culvert, which has nearly completely rusted out through the bottom. Several extreme flood events in 2009 and 2010 severely deformed the culvert and caused it to be a tidal constriction. Due to the failing culvert, the road at this site has been overtopped by floodwaters repeatedly and is a source of fine sedimentation into the adjacent marsh.


Upstream inlet


Downstream (bayside) outlet

The site was reviewed by NRCS staff and is included in the *Evaluation of Restorable Salt Marshes in New Hampshire* in 1994 (restriction # 110 in the above mentioned report). Restoration objectives have been revisited several times by NHCP and NHDES staff with agreement that an embedded HDPE culvert was probably the best solution due to the need to keep the farm road open and is resistant to salt water degradation. A low-cost bridge crossing option was also evaluated by the design engineer, but was not deemed feasible for the site.

The RCCD evaluation of the site included hydrologic analysis, survey data, wetland delineation, an engineered design and specifications, and a permit application to the NHDES Wetlands Bureau for the failed culvert replacement. Results of the project were presented to the Stratham Conservation Commission, landowners, and PREP staff. Funding for the culvert replacement itself is expected to come from the NRCS EQIP program. The final engineering plans and wetlands permit for this project are on file within the PREP office library.

The Stratham Conservation Commission provided $500 cash match towards the project.

2. River Road Marsh (New Castle, NH)

The project scope involved completing an assessment and restoration evaluation of a small degraded salt marsh interfaced with a freshwater marsh. The purpose of the study was to provide a set of restoration alternatives for the site. The marsh is located in the middle of two properties (co-owned) by willing landowners on an extremely well traveled and viewed site on River Road in New Castle, NH. There is an existing sewer line and pump station adjacent to the marsh with an easement that the Town of New Castle holds that was installed in the mid 1970's. An existing 15" RCP culvert that is 44' long (according to an NRCS field survey completed in 1993) connects the marsh to Portsmouth Harbor beneath River Road. The site was reviewed by NRCS staff and is included in the *Evaluation of Restorable Salt Marshes in New Hampshire* in 1994 (restriction # 54 in the above mentioned report). The site and restoration objectives have been revisited several times by NHCP staff. Although noted in the 1994 report, due to the lack of willingness of a former landowner, the restoration effort was stalled in 2003.

The RCCD evaluation of the site included hydrology analysis, survey data, wetland delineation, and alternative restoration options/plans. Results of the study were described in a public presentation and a report to landowners and municipal officials in New Castle.

The data that was collected under the assessment will be available for use in any future design plan. It will also assist in educating the landowners on appropriate methods that may restore natural surface hydrology and create conditions that will naturally and inexpensively manage mosquito populations, as well as to optimize the functionality of the salt marsh. It is anticipated that this ecological analysis/assessment and educational outreach project will result in a salt marsh restoration effort that will be completed efficiently, effectively and in an ecologically sound manner with interested, educated, and

willing landowners. The New Castle Conservation Commission spent $2,000 cash and $263 in-kind on this project.

Attachments

- *River Road New Castle Marsh Restoration Recommendations Report, June 1, 2010*

This project was supported funding from the US Environmental Protection Agency through an agreement with the University of New Hampshire.

River Road, New Castle
Marsh Restoration Recommendations
June 1, 2010

Prepared by the
Rockingham County Conservation District
for the New Castle Conservation Commission

Funding provided in part by the
New Castle Conservation Commission and the

PISCATAQUA REGION Estuaries Partnership

ROCKINGHAM COUNTY CONSERVATION DISTRICT

River Road, New Castle
Marsh Restoration Recommendations
June 1, 2010

Table of Contents

Funding provided in part by the New Castle Conservation Commission, the Piscataqua Region Estuaries Partnership, and the Rockingham County Conservation District. The findings, opinions, and recommendations in this report are not necessarily those of University of New Hampshire or of the Environmental Protection Agency.

River Road, New Castle
Marsh Restoration Recommendations
Based on the Alternatives Analysis
June 1, 2010

Goal: To restore the River Road salt marsh and stream channel

Objective(s)

The Town of New Castle and abutters to the River Road salt marsh agreed to have the River Road salt marsh site analyzed to address the following concerns and opportunities at the site.

> The primary objective was to recommend alternatives to promote a healthy salt marsh system that includes restoring the native habitat. This objective includes reducing invasive species, and determining mechanisms to manage mosquito populations.
>
> A secondary objective was to evaluate alternatives to improve the hydrology of the system, the flow of tidal and freshwater in and out of the salt marsh.

Alternatives to address these concerns and opportunities were evaluated to determine the best and most environmentally sound recommendation.

Salt Marsh Functions – Importance of Restoration

Salt marshes are an important finite natural resource, occupying only 0.1 percent of all the area of New Hampshire (NRCS, 1994). Since the late 1990's significant salt marsh restoration efforts have been completed in New Hampshire to restore the vital functions and values that salt marshes perform. The importance of healthy salt marshes to fisheries has been well documented, along with many other benefits including wildlife habitat, shoreline anchoring, mosquito control, and aesthetic qualities.

Although the salt marsh located at River Road is less than ½ an acre in size, it still has good potential for native community restoration and enhancement and for restoring its habitat benefits. Its greatest potential lies in restoring the tidal flow, while simultaneously promoting faster freshwater flow out of the marsh. The restoration of the hydrology of this system, including portions of the tidal buffer and stream habitat will encourage more native and diverse plant and animal populations. As indicated in the wetland evaluation, tidal wetland resources are biologically important in the food web, and every opportunity should be pursued to restore even the smallest of tidal wetlands (see appendices).

The following restoration recommendation was completed after a detailed review and assessment of the site. Several types of data were collected and evaluated, and hydrologic analysis on both the fresh and salt water flow was completed for this report.

A wetland evaluation and delineation was prepared for this report by Mike Cuomo, CWS on December 19, 2009 (see appendices). A generalized vegetative cover type map was prepared in February 2010 (see appendices). The plant species listed on that plan are native salt marsh plants that include spike grass and salt marsh hay, yet there are also freshwater species located to the western end of the parcel, and invasive plants located along the edges of the salt marsh and a large area of *Phragmites* (see appendices). The functioning of this very small salt marsh has been severely compromised due to urbanization and development within the watershed and the installation of the sewer line and pump station. In 1993, the Natural Resources Conservation Service (NRCS) completed an inventory of this site, prior to the development of the 1994 plan *Evaluation of Restorable Salt Marshes in New Hampshire*(NRCS, 1994) (see appendices).

The *Evaluation of Restorable Salt Marshes in New Hampshire* (NRCS, 1994) plan identified close to one hundred locations throughout the seacoast where salt marshes were degraded due to tidal restrictions, and included the documentation of this site (see appendices). Additional factors that can add to degradation of salt marshes include inadequate maintenance of culverts. If not regularly maintained, blocked culverts can act as an obstruction and adequate tidal flow will not regularly reach the salt marsh, resulting in further degradation. From the beginning of this project in November 2009, visiting the site on several occasions, the ocean side of the culvert was partially blocked. Yet at the same time, a site visit in May of 2010 indicated that small fish were able to get through the culvert and utilize the salt marsh.

Evaluations of data collected at this site conducted to date include a wetland delineation, and functions and values assessment; a NH Natural Heritage Bureau database check for rare species and exemplary communities in New Hampshire; an existing conditions plan including spot elevations; review and analysis of tidal and freshwater flow, and soil auger borings were completed to determine appropriateness of recommended restoration proposal.

Some of the key items found during review of the site and analysis of data collected include:

- A sewer line and berm were installed along the north and west margins of the marsh somewhere around 1977.
- The sewer line was probably placed just beyond the existing salt marsh based on soil observations.
- Ponding behind the berm is likely to have been caused by the berm construction, but this area is unlikely to have once been salt marsh based on soil observations.
- Sewer plans show a distinct stream channel through the marsh, which also appears to have once served as a property line.
- Currently there is no clear stream channel through the marsh.

- Approximately 3,025 square feet of *Phragmites* has established at the rear (western end) of the marsh.
- A 1993 evaluation of the marsh completed by NRCS did not include mention of *Phragmites*, but did include cattails in the same area.
- Elevations in the marsh occupied by *Phragmites* are 5.3-6.5 feet.
- Existing high marsh elevation is predominantly 5.5 feet.
- The highest observable tide line (HOTL) within the marsh is approximately 5.7 feet.
- The HOTL on the Piscataqua River is approximately 6.8 feet, which is approximately 1.1 feet higher than the estimate within the marsh.

Recommended Restoration Tasks

Figure 1 shows the project area and general vegetative cover in the area. It is likely that *Phragmites* will continue to expand into the marsh if no alternative is chosen. It is also likely that mosquito breeding areas will continue to flourish, and will need constant mosquito treatments.

With landowner(s) approval, the recommended restoration alternatives can be completed as a phased approach over a few years, or can be completed as one restoration project (likely over a 2 year period). The plans presented are preliminary plans, therefore, prior to initiating a wetland permit final design plans must be completed. Any final design plan completed and construction quantities may result in a change to the estimated costs based on more detail survey data and wetland permit criteria.

Task I

Invasive species control.

Initiate restoration with invasive species control around pump station and fringes of marsh that include *Phragmites,* multiflora rose, honeysuckle, etc. Figure 2 shows the general location of invasive plants needing treatment. The estimated area for the *Phragmites* treatment is 3,025 square feet. The square footage of the other invasive plants is approximately 2000 +/- square feet. With landowner approval, the proposed treatment includes cutting within the wetland, and cutting followed by herbicide treatment in uplands. If herbicide application is used it will require a special permit.

Task II

Complete native plantings.

Educate landowners on invasive plants in and around their properties. After possible second year of herbicide treatment of invasives found along property bounds, assist with completing native plantings along both edges of Map 16, Lot 48, particularly the southern edge and western edge of property boundary. Simultaneously educate landowners on nitrogen reduction. The Town of New Castle has information on their Nitrogen Reduction Program on the Town's website at www.newcastlenh.org.

Additional information on invasive plants and native plants will be provided to the landowners. A list of native wetland and buffer plants with estimated costs will also be provided to the landowners. After invasive control, the Town will plant native plants around pump station (permits may be required). Landowners and/or the New Castle Conservation Commission may assist in plant selection and volunteer planting opportunities. The volunteer effort may be counted as a matching component for future restoration funding.

Task III

Restore seasonal stream.

The existing stream appears to have been interrupted and/or blocked by a berm at the rear of the marsh during the installation of sewer line and pump station (1977). Since the sewer line and berm were placed, the stream channel within the marsh has silted in, allowing freshwater to disperse over the surface of the marsh, providing conditions favorable to the establishment of *Phragmites*. In addition, the area dominated by *Phragmites* may have become slightly elevated over time due to the sedimentation.

Figure 3 shows proposed location of the channel/swale with a width of 2 feet and depth ranging from 1.0 to 1.5 feet. Although depicted as straight in Figure 3, the restore stream would include meanders as shown on the Existing Conditions Plan Mark-Up in the appendix. Excavated material to be removed and transported to an offsite location for composting or disposal. Soil observations were performed with hand tools along the berm for the purpose of determining a minimum depth that could be excavated at the existing stream channel without damaging the underlying sewer line. This observation could only be achieved to a depth of one foot (elev. 5.8+/-) due to the extremely stony backfill that was utilized for the sewer. Based upon this information, it appears possible to extend the restored stream into the freshwater ponded area. This restored stream would continue through the existing patch of *Phragmites* to the swale, and to the culvert under River Road shown on Figure 3 and the Existing Conditions Plan Mark-Up.

Task III (A)

Extend existing culvert.

Extend existing culvert on the outlet side by approximately 10 to 15 feet. This would involve additional review with the NH Department of Environmental Services, Wetlands Bureau staff. No figure has been included in this report for Task III (A).

If the existing 12 inch culvert was extended on the ocean side, it would be less likely to get plugged up with debris, and require less maintenance. This practice would require a plastic pipe to be attached to the existing culvert and rip rap, and could be included as a component of the NH DES Wetlands Bureau permit application.

Continual maintenance of culverts is a problematic issue, and is not be the responsibility of the homeowner(s). Maintaining culverts should be addressed and budgeted for by the Town of New Castle.

Task IV
Excavate *Phragmites* rhizomes.

The estimated area for the *Phragmites* treatment is 3,025 square feet as shown on Figure 2 and 3. During stream restoration activities the excavation will include removal of an average of approximately one foot of sediment within and adjacent to the *Phragmites* stand. The excavation would be graded so as to discourage ponding. This task would be completed at the same time as the stream restoration and included as a component of the NHDES Dredge & Fill permit for the stream restoration.

Task V (optional)
Installation of 24 inch culvert.

Replace the existing 12 inch diameter reinforced concrete pipe (RCP) culvert with a 24 inch diameter High Density Polyethylene (HDPE) culvert, approximately 46 feet long.

Figure 4 shows the proposed location of the restored stream and culvert replacement location. The stream restoration is the same as noted in Figure 3 and the Existing Conditions Plan Mark-Up. The culvert replacement plan is to excavate the old 12 inch diameter RCP culvert and replace with a 24 inch diameter HDPE culvert embedded 1.0 foot lower than current culvert but refilled with sediment to match the existing channel elevation. This new culvert will allow salt water inflow to occur over a longer time period and allow a greater volume of salt water to enter the marsh area and help control invasive plant growth by increasing the salinity of the marsh. The larger culvert will also improve the discharge capacity for severe stormwater runoff events.

Currently, a 100-yr storm event discharge is modeled to overtop River Road by approximately 0.3 feet during a high tide at the same time as the peak runoff time. The 50-year event would overtop the road by approximately 0.1 feet.

The proposed installation of the 24 inch diameter HDPE culvert would eliminate any overtopping of the road during the 50- and 100-year storm events. This would also lower the height of flood water on the surrounding areas and properties which may have important significance to the property owners (see the Existing Conditions Plan Mark-Up in the Appendix).

The main advantage of the 24 inch diameter HDPE culvert shown on Figure 4 is that the water would get into the marsh slightly faster (than the existing 12 inch diameter culvert) but it would also drain off the water quicker. This would get stormwater off of the marsh faster, even during high tides to eliminate possible road overtopping. It would also have less inundation of the neighbor's property around the apple trees. The 24 inch culvert would also be less likely to get plugged up with debris, and require less maintenance. It is highly unlikely to get a NH DES Wetlands Bureau permit to install a trash rack on the ocean side of the culvert.

Each of the tasks involving excavation will require a NHDES Dredge & Fill permit. It is recommended that one permit application be prepared with two or three conservation practices and to phase the practices over 2 or 3+ years.

The remaining 12 inch diameter culvert is probably adequate if the culvert is maintained (cleaned out) at least once per month and after major storms throughout the year. Maintenance costs have not been definitively calculated with town employee costs, but a rough estimate is $3,000 per year based upon 2 hours each month.

Based on the costs and benefits to the marsh area, it is recommended that at least Tasks I – IV be completed to support a healthy and functioning salt marsh. Additionally, to establish better hydrology in the long term, with less maintenance costs, Task V could be completed. Tasks I- IV would accomplish adequate drainage of the fresh water off the marsh for small storm events and allow adequate salt water back flow over the marsh to help inhibit the *Phragmites* growth.

Task V would result in less maintenance costs, better tidal flows, with better invasives control due to increased salinity. The larger culvert would reduce freshwater flooding on abutter's properties. Freshwater runoff with the existing culvert is modeled to overtop the road during a 50-year storm to elevation 7.6+/-. However, the larger culvert would also result in the passage of higher tidal waters to equilibrate with the Piscataqua River up to elevation 6.8 +/- (see the Existing Conditions Plan Mark-Up in the Appendix). It may be appropriate to reserve Task V for when the Town of New Castle updates the pump station and/or River Road.

If completed together (without permitting and design costs) implementation of Tasks III – V would likely save over $3,000 to $4,000.

Recommended Tasks/Cost Estimation/Timeframe/Possible Funding

Task	Estimated Area	Estimated Cost	Estimated Timeframe	Possible Funding Sources
Task I Cut/treat invasvies	5,025 sq. ft.	$3,000 +/-	Summer 2010/2011	NCCC may be available for match for other funding opportunities.
Task II Native plantings	2,000 sq. ft.	$2,000	Spring/Fall 2011/2012	NH DES/ARM; Landowners; NCCC; volunteer match for other funding opportunities
Task III Stream restoration Task III(A) Culvert extension	240 -280 ft. 10-15 ft.	$12,000 +/- $3,000 +/-	Fall/winter 2011/2012	NH DES/ARM; NRCS/PREP/ NHCP/Mooseplate Matching funds likely needed
Task IV Excavate *Phragmites*	3500 sq. ft. +/-	$2,500+/- *	Fall/winter 2011/2012	NH DES/ARM NRCS/PREP/NHCP/ Mooseplate/Matching funds likely needed
Task V Installation of 24 inch culvert	50 sq. ft./46 ft long HDPE culvert	$10,000 +/-	Fall/winter 2011/2012/2013	NH DES/ARM; NRCS;PREP; NHCP; Mooseplate Matching funds likely needed
Implementation Costs		$32,500		

* If completed at same time as Task III

** (see estimated maintenance costs of existing culvert)

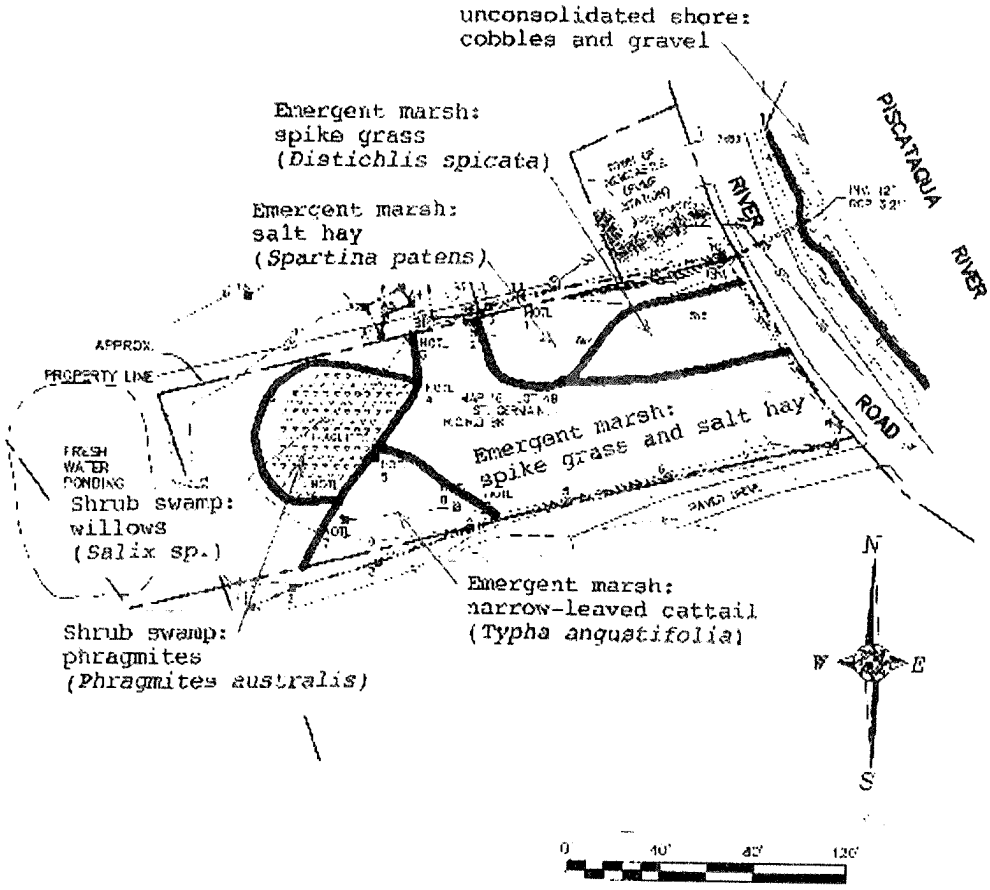
Additional Estimated Costs:

Design and permit costs: $6,000.
Disposal costs are estimated at $5000, but it is highly dependent on location of disposal site and trucking costs.

NOTE: Changes in final design and construction quantities may result in changes in final costs

Generalized Vegetative Cover Type Map

River Road Wetland, New Castle NH



Michael Cuomo
NH Cert. Wetland Scientist #4
February 2010

Rockingham County Conservation District

Figure 1

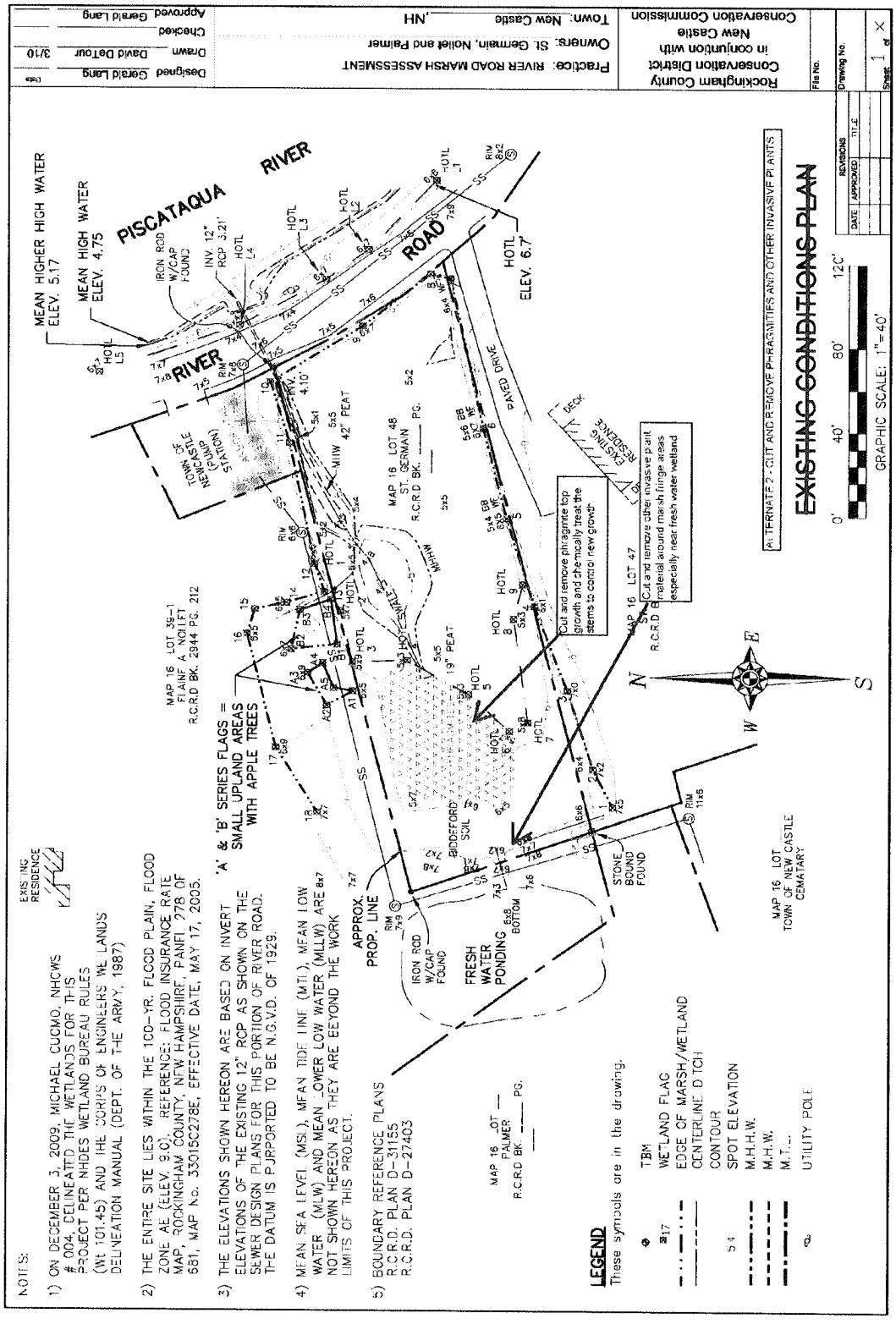

EXISTING CONDITIONS PLAN
GRAPHIC SCALE: 1"=40'
Rockingham County Conservation District in conjunction with New Castle Conservation Commission
Practice: RIVER ROAD MARSH ASSESSMENT
Owners: St. Germain, Nollet and Palmer
Town: New Castle, NH
Designed Gerald Lang
Drawn David DeTour 3/10
Checked
Approved Gerald Lang
MEAN HIGHER HIGH WATER ELEV. 5.17
MEAN HIGH WATER ELEV. 4.75
PISCATAQUA RIVER
RIVER ROAD
TOWN OF NEWCASTLE (PUMP STATION)
MAP 16 LOT 35-1 PLAINE A NOLIET R.C.R.D BK. 2944 PG. 212
MAP 16 LOT 48 ST. GERMAIN R.C.R.D BK. ____ PG. ____
MAP 16 LOT 47
PAVED DRIVE
EXISTING RESIDENCE
DECK
APPROX. PROP. LINE
'A' & 'B' SERIES FLAGS = SMALL UPLAND AREAS WITH APPLE TREES
Cut and remove phragmite top growth and chemically treat the stems to control new growth
Cut and remove other invasive plant material around marsh fringe areas especially near fresh water wetland
ALTERNATE 2 - CUT AND REMOVE PHRAGMITES AND OTHER INVASIVE PLANTS
FRESH WATER PONDING
BIDDEFORD SOIL
IRON ROD W/CAP FOUND
STONE BOUND FOUND
MAP 16 LOT TOWN OF NEW CASTLE CEMETARY
MAP 16 LOT PALMER R.C.R.D BK. ____ PG. ____
EXISTING RESIDENCE
NOTES:
1) ON DECEMBER 3, 2009, MICHAEL CUOMO, NHCWS #004, DELINEATED THE WETLANDS FOR THIS PROJECT PER NHDES WETLAND BUREAU RULES (Wt 101.45) AND THE CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL (DEPT. OF THE ARMY, 1987)
2) THE ENTIRE SITE LIES WITHIN THE 100-YR. FLOOD PLAIN, FLOOD ZONE AE (ELEV. 9.0). REFERENCE: FLOOD INSURANCE RATE MAP, ROCKINGHAM COUNTY, NEW HAMPSHIRE, PANEL 278 OF 681, MAP No. 33015C278E, EFFECTIVE DATE, MAY 17, 2005.
3) THE ELEVATIONS SHOWN HEREON ARE BASED ON INVERT ELEVATIONS OF THE EXISTING 12" RCP AS SHOWN ON THE SEWER DESIGN PLANS FOR THIS PORTION OF RIVER ROAD. THE DATUM IS PURPORTED TO BE N.G.V.D. OF 1929.
4) MEAN SEA LEVEL (MSL), MEAN TIDE LINE (MTL), MEAN LOW WATER (MLW) AND MEAN LOWER LOW WATER (MLLW) ARE NOT SHOWN HEREON AS THEY ARE BEYOND THE WORK LIMITS OF THIS PROJECT.
5) BOUNDARY REFERENCE PLANS R.C.R.D. PLAN D-31155 R.C.R.D. PLAN D-27403
LEGEND
These symbols are in the drawing.
TBM
WETLAND FLAG
EDGE OF MARSH/WETLAND
CENTERLINE DITCH
CONTOUR
SPOT ELEVATION
M.H.H.W.
M.H.W.
M.T.L.
UTILITY POLE
N
S
E
W
0'
40'
80'
120'
GRAPHIC SCALE: 1"=40'
REVISIONS
DATE
APPROVED
File No.
Drawing No.
Sheet 1 of 1

Figure 2

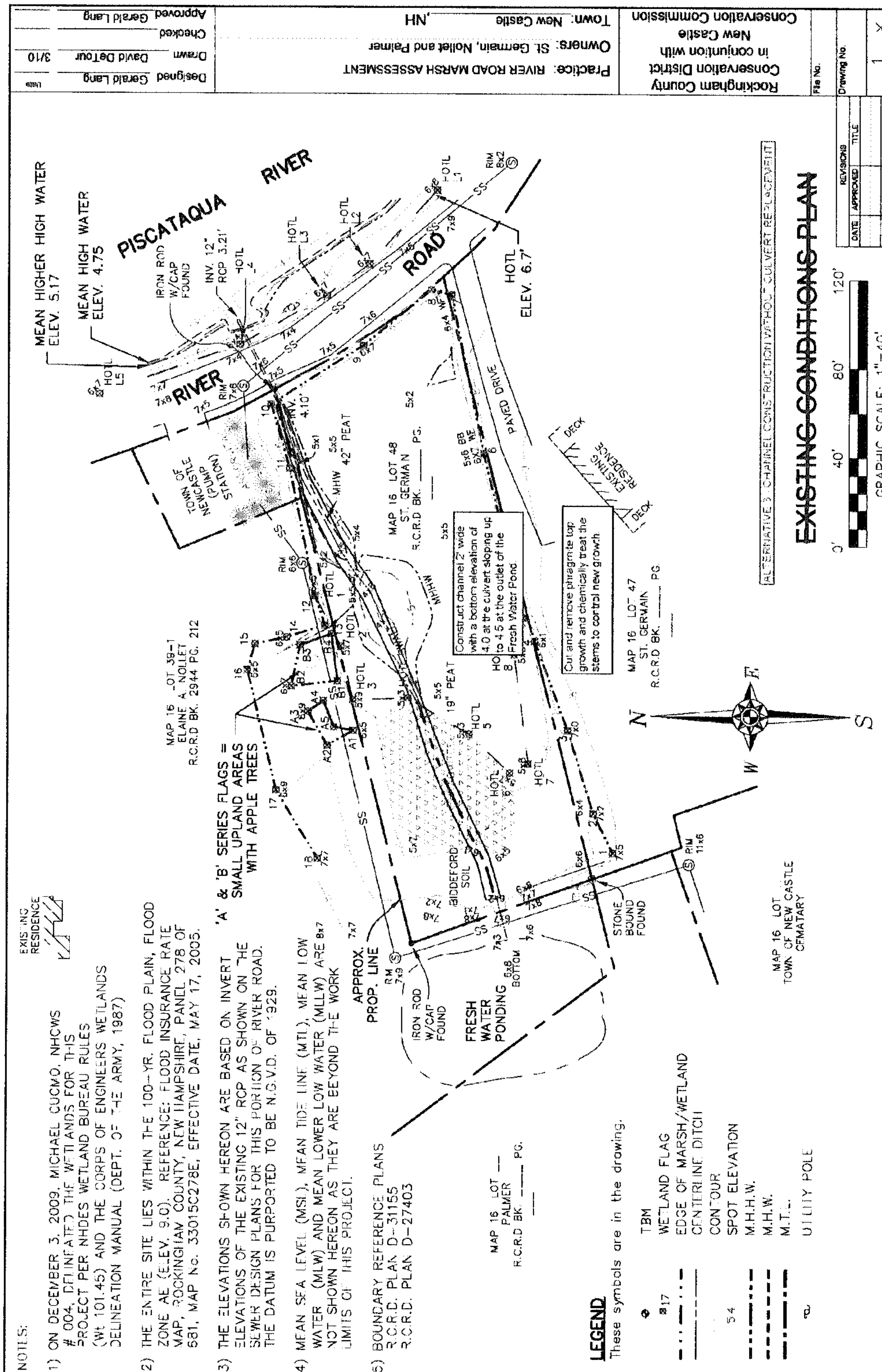
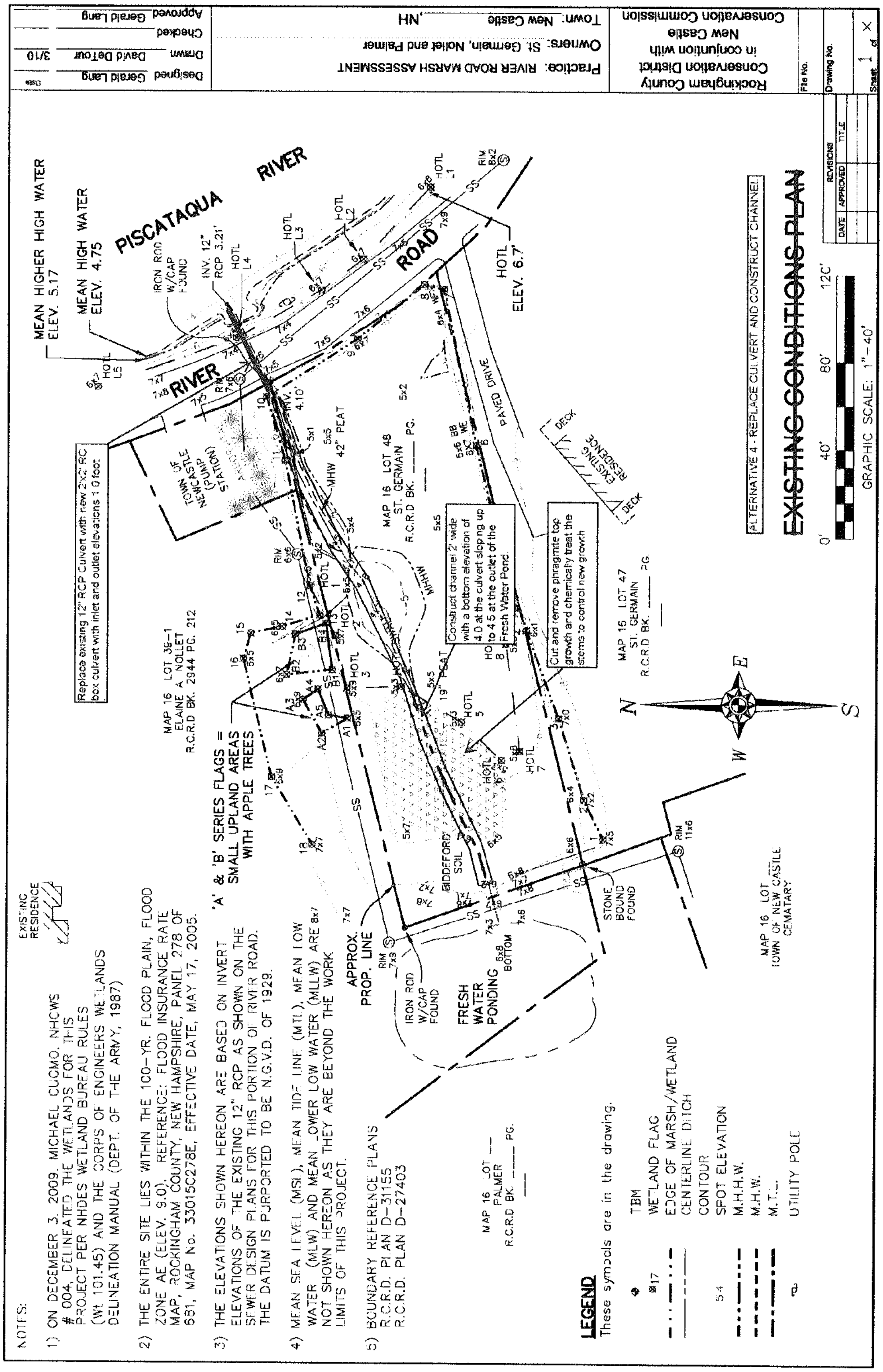

EXISTING CONDITIONS PLAN
GRAPHIC SCALE: 1"=40'
PISCATAQUA RIVER
RIVER ROAD
Rockingham County
Conservation District
in conjunction with
New Castle
Conservation Commission
Practice: RIVER ROAD MARSH ASSESSMENT
Owners: St. Germain, Nollet and Palmer
Town: New Castle, NH
Construct channel 2' wide with a bottom elevation of 4.0 at the culvert sloping up to 4.5 at the outlet of the Fresh Water Pond.
Cut and remove phragmite top growth and chemically treat the stems to control new growth.
FRESH WATER PONDING
LEGEND
These symbols are in the drawing:
TBM
WETLAND FLAG
EDGE OF MARSH/WETLAND
CENTERLINE DITCH
CONTOUR
SPOT ELEVATION
M.H.H.W.
M.H.W.
M.T.L.
UTILITY POLE

Figure 3


EXISTING CONDITIONS PLAN
ALTERNATIVE 4 - REPLACE CULVERT AND CONSTRUCT CHANNEL
GRAPHIC SCALE: 1"=40'
PISCATAQUA RIVER
RIVER ROAD
Rockingham County Conservation District in conjunction with New Castle Conservation Commission
Practice: RIVER ROAD MARSH ASSESSMENT
Owners: St. Germain, Nollet and Palmer
Town: New Castle, NH
Designed Gerald Lang
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MAP 16 LOT 39-1 ELAINE A. NOLLET R.C.R.D BK. 2944 PG. 212
MAP 16 LOT 48 ST. GERMAIN
MAP 16 LOT 47 ST. GERMAIN
MAP 16 LOT TOWN OF NEW CASTLE CEMATARY
MAP 16 LOT PALMER
Replace existing 12" RCP Culvert with new 2'x2' RC box culvert with inlet and outlet elevations 1.0 foot.
Construct channel 2' wide with a bottom elevation of 4.0 at the culvert sloping up to 4.5 at the outlet of the Fresh Water Pond.
Cut and remove phragmite top growth and chemically treat the stems to control new growth
NOTES:
1) ON DECEMBER 3, 2009, MICHAEL CUOMO, NHCWS # 004, DELINEATED THE WETLANDS FOR THIS PROJECT PER NHDES WETLAND BUREAU RULES (Wt 101.45) AND THE CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL (DEPT. OF THE ARMY, 1987)
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LEGEND
These symbols are in the drawing.
TBM
WETLAND FLAG
EDGE OF MARSH/WETLAND
CENTERLINE DITCH
CONTOUR
SPOT ELEVATION
M.H.H.W.
M.H.W.
M.T.L.
UTILITY POLE

Figure 4

9 December 2009

Rockingham County Conservation District
110 North Road
Brentwood, NH 03833-6614

Wetland Delineation Report
New Castle, NH
Tax Map/Lot: 16/47 and 16/48
River Road
RCCD # NC16-48-R09

On 3 December 2009 I flagged a portion of the wetland/upland boundary and the upper limit of the highest observable tide line at this site. The purpose of this study is to provide information for permitting the replacement of the culvert which runs under River Road and connects the tidal wetland described below with the Piscataqua River.

Wetlands were identified as defined in the 1987 *Corps of Engineers Wetlands Delineation Manual*, as required by the State of New Hampshire and the federal agencies. Highest observable tide line (HOTL) is defined as described in New Hampshire Wetlands Bureau rule Wt 101.36.

The wetland and HOTL boundaries are marked with sequentially numbered blue flags. Flag sequence EW-1 to EW-18 are along the wetland/upland boundary. The freshwater wetland extends inland beyond the beginning and end of this line, outside of the area of interest of this study.

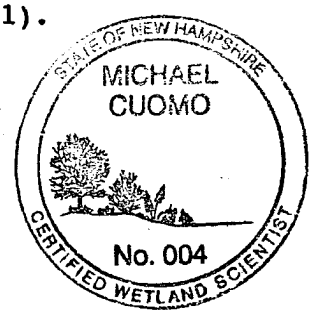
Flags A-1 to A-4 and B-1 to B-5 encircle two small uplands within the larger freshwater wetland. These uplands are probably the result of historic manipulation of the landscape by humans for agriculture.

Flags HOTL-1 to HOTL-9 mark the landward limit of the highest observable tide line.

The wetlands in the immediate vicinity of the flags were further

classified using the system developed by Cowardin et. al. for the US Fish and Wildlife Service. The freshwater wetland landward of the HOTL flag line is a palustrine shrub swamp dominated by *Phragmites australis* (PSS1). The wetland between the HOTL flags and River Road is an estuarine intertidal emergent marsh dominated by *Spartina patens* (E2EM1). The wetland on the Piscataqua River side of River Road is an estuarine intertidal unconsolidated shore comprised of cobbles and gravel (E2US1).

Sincerely,



Michael Cuomo
NH Certified Wetland Scientist #4

10 February 2010

Wetland Evaluation Report
New Castle, NH
Tax Map/Lot: 16/47 and 16/48
River Road
RCCD # NC16-48-R09

On 19 December 2009 I conducted a brief evaluation the tidal wetland behind River Road in New Castle, New Hampshire. The purpose of this evaluation is to provide basic information about wetland functions and values to assist in developing alternatives for restoring the ecological functions of this relatively small tidal wetland connected to the Piscataqua River.

The tidal wetland was evaluated using the *Method for the Evaluation and Inventory of Vegetated Tidal Marshes in New Hampshire*, by R.A. Cook, A.J. Lindley Stone, and A.P. Ammann, 1993, commonly referred to as the 'Coastal Method.'
The Coastal Method generates scores (the average functional index, or AFI) for nine functions and values, which range from 0.1 (the wetland has characteristics which indicate it performs this function poorly or not at all) to 1.0 (the wetland has characteristics which indicate it performs this function very well). The abbreviated results listed below reflect conditions of the marsh in its current degraded state.

Function	AFI
Ecological Integrity of Wetland	0.3
Ecological Integrity of Buffer	0.1
Shoreline Anchoring	0.5
Storm Surge Protection	0.3
Wildlife, Finfish, and Shellfish Habitat	0.26
Water Quality Maintenance	0.23
Recreational Potential	0.12
Aesthetic Quality	0.36
Educational Potential	0.28
Noteworthiness	1.0

The scores are generally low compared to the potential high score of 1.0. The exception is noteworthiness, which received the highest score due because it is the remnant of a tidal marsh in a high density residential area. It is expected that a similar evaluation following restoration would yield significantly higher

scores.

The Coastal Method also examines the restoration potential of coastal marshes. This wetland is a good candidate for restoration for two reasons. First, there is a single constriction of tidal flow, making the restoration of tidal flow more straight forward. Secondly, the invasive species present, phragmites or common reed (Phragmites australis), can be controlled by the restoration of tidal flow. One alternative to be considered is installing a larger culvert under River Road at an elevation which would substantially restore tidal flow and the ecological functions of this small tidal marsh.

Tidal wetland resources are so greatly reduced by historical development and so important biologically in the food web that every opportunity must be pursued to restore even small tidal wetlands.

As stated above, phragmites can be controlled by the restoration of tidal flow, though it may be difficult to completely eradicate. It is possible that because of the seed bank in the soil and the spreading through plant and root fragments, phragmites will shift 'inland' of it's current ecological niche when tidal flow is restored. Even this would be an ecological benefit to the tidal marsh and river system. Additional analysis of the freshwater inputs may indicate other contributing factors to increased invasive plant populations and mosquito breeding areas. This additional analysis will recommend restoration alternatives focused on the salt marsh portion of this system, in an attempt to improve it's ecological function.

Based on my investigation and evaluation using the Coastal Method, I conclude this tidal marsh is ecologically well suited to restoration.

Sincerely,

Michael Cuomo
NH Certified Wetland Scientist #4

New Hampshire Natural Heritage Bureau

To: Joanne Ward
Rockingham county Conservation District
110 North Road
Brentwood, NH 03833

Date: 11/30/2009

From: NH Natural Heritage Bureau

Re: Review by NH Natural Heritage Bureau of request dated 11/30/2009

VALID ONLY FOR NOTIFICATION OR MINIMUM EXPEDITED APPLICATIONS SUBMITTED TO THE NHDES WETLANDS BUREAU

NHB File ID: NHB09-2555

Applicant: Joanne Ward

Tax Map(s)/Lot(s): 16-48, 16-47, 16-40
New Castle

Project Categories:
Roads, Driveways, Bridges: Culvert(s)
Water/Wastewater: Wetland restoration

The NH Natural Heritage database has been checked for records of rare species and exemplary natural communities near the area mapped below. The species considered include those listed as Threatened or Endangered by either the state of New Hampshire or the federal government. We currently have no recorded occurrences for sensitive species near this project area.

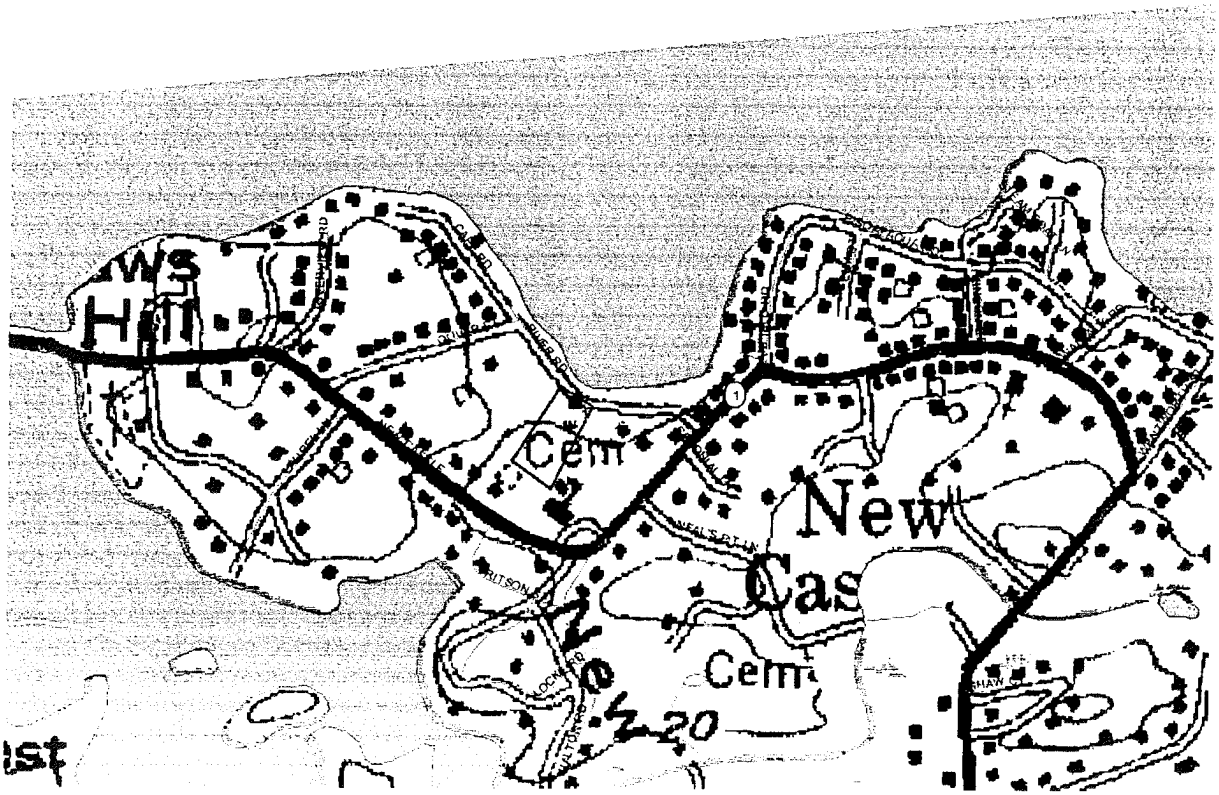
A negative result (no record in our database) does not mean that a sensitive species is not present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present

This review is valid through 11/30/2010.

Department of Resources and Economic Development
Division of Forests and Lands
(603) 271-2214 fax: 271-6488

DRED/NHB
PO Box 1856
Concord NH 03302-1856

MAP OF PROJECT BOUNDARIES FOR: NHB ID# NHB09-2555



Department of Resources and Economic Development
Division of Forests and Lands
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DRED/NHB
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Concord NH 03302-1856

DATE: 11/18/93
WEATHER: Cloudy Cool

NH Saltmarsh Restoration Inventory
Engineering Field Survey Data Sheet

INST: D. Goodwin
NOTES: "
ROD: L. Nilson

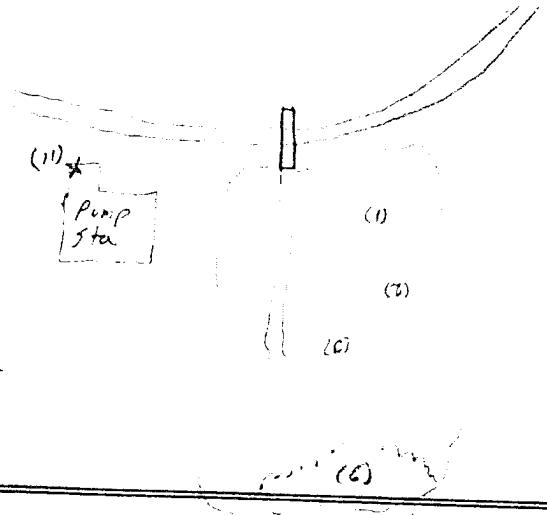
Restriction Site Number : 54

LSME Elevation (Assumed) : 104.7
LSME Shots (Typical) : (1) 7.2 ; (2) 7.2 ; (3) 7.1 ; Ave. = 7.2
Height of Instrument (HI) : 111.9

OSME Shots:	Typical OSME location 1 ... 2 rod shots (ocean)	(4)		
	Typical OSME location 2 ...	(5)		
PHRAG Shots:	~~PHRAG~~ location 1 ... Cat Tails	(6)	6.9	105.0
	PHRAG location 2 ...	(7)		
	PHRAG location 3 ...	(8)		
Conduit Info:	OSI ...	(9)	9.4	102.5
	LSI ...	(10)	8.5	103.4
	Length: 44' Type: RCP			
	TRM: Orange Paint Pump Station Control Box Concrete Box 3' above ground ...	(11)	4.98	109.9
Water Shots:	OSWS: Date 11/18/93, Time 9 : 13 am/pm Ocean.	(12)	16.3	95.6
	LSWS: Date 11/18/93, Time 8 : 57 am/pm ...	(13)	8.2	103.7
Road Info:	Low Road Elevation ...	(14)	5.1	106.8
	C/L Road Elevation at C/L Conduit ...	(15)	5.1	106.8
Additional Info:	...	(16)		
	...	(17)		
	...	(18)		

SKETCH

Plan View of Restriction



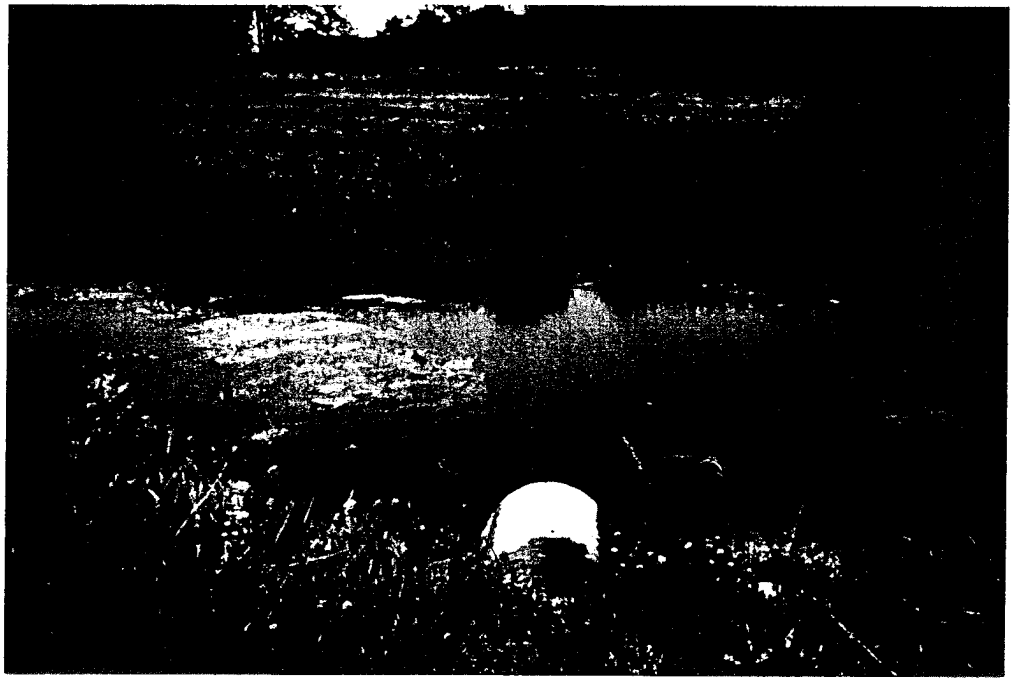
Conduit Opening (incoming tide view)

LSI = Land Side Invert
OSI = Ocean Side Invert
LSME = Land Side Marsh Elevation
OSME = Ocean Side Marsh Elevation

Land Side

LSWS = Land Side Water Surface (+/- 25' from conduit end)
OSWS = Ocean Side Water Surface (+/- 25' from conduit end)
PHRAG = Elevation of Phragmites
TRM = Temporary Reference Mark

Evaluation of Restorable Salt Marshes in New Hampshire



U.S. Department of Agriculture
Soil Conservation Service
Durham, New Hampshire

October 1994

Table 2 - Adequacy of Tidal Inlets to NH Salt Marshes

Evaluation Unit (EU)	Restriction Number	Town	EU U/S of Restriction	Inlet Adequacy	Order to Restore	Restorable Acres	Corrective Action	Restoration Cost	Unit Cost
PH050									
	49	New Castle	PH040	Inadequate	1	4.7	Concrete Box	$17,200	$3,660
	56	New Castle	PH050	Inadequate	2	5.0	Concrete Box/2	$125,100	$25,020
						9.7		**$142,300**	**$14,670**
PH060									
	49	New Castle	PH040	Inadequate	1	4.7	Concrete Box	$17,200	$3,660
	56	New Castle	PH050	Inadequate	2	9.9	Concrete Box/2	$125,100	$12,636
	55	New Castle	PH060	Adequate	3	0.0	None		
						14.6		**$142,300**	**$9,747**
PH070									
	54	New Castle	PH070	Adequate	1	0.0	None		
Rye Harbor									
RH010									
	37	Rye	RH010	Adequate	1	0.0	None		
RH020									
	37	Rye	RH010	Adequate	1	0.0	None		
	38	Rye	RH020	Inadequate	2	1.0	CMP/2	$600	$600
RH030									
	37	Rye	RH010	Adequate	1	0.0	None		
	35	Rye	RH030	Inadequate	2	9.4	Concrete Box	$41,400	$4,404
RH040									
	37	Rye	RH010	Adequate	1	0.0	None		
	35	Rye	RH030	Inadequate	2	9.4	Concrete Box	$41,400	$4,404
	34	Rye	RH040	Inadequate	3	13.1	Concrete Box	$16,600	$1,267
						22.5		**$58,000**	**$2,578**

IMPORTANT - For explanation of terms refer to definitions on page 26.