

STATE OF NEW HAMPSHIRE

INTER-DEPARTMENT COMMUNICATION

DATE: April 15, 2024

FROM: Andrew O'Sullivan
Wetlands Program Manager

AT (OFFICE): Department of
Transportation

SUBJECT: Request for More Information
Follow-up Information
Plaistow-Kingston 10044E
NHDES File Number: 2023-00958

Bureau of
Environment

TO: Karl Benedict, Public Works Permitting Officer
New Hampshire Wetlands Bureau
29 Hazen Drive, P.O. Box 95
Concord, NH 03302-0095

On July 19, 2023, NHDOT submitted a response to a Request for More Information (RFMI) received from the New Hampshire Department of Environmental Services (NHDES) Wetlands Bureau for the above-referenced Standard Dredge and Fill Wetlands Permit Application (Application). An email received from NHDES on August 15, 2023, indicated that the following two outstanding issues need to be resolved before the permit can be issued.

1. The NHDES RFMI question #2 had requested that follow-up coordination be performed with the mitigation program, ACOE, and EPA to ensure that the mitigation performed under the 2004 project, meets the current mitigation requirements for permitting this project. The RFMI response referenced a 2020 Natural Resource Agency discussion relative to the 2004 mitigation that was performed, however the additional requested coordination with the mitigation program, ACOE, and EPA was not completed. The coordination for project mitigation will need to be completed prior to NHDES decision for the project.

Response: Additional coordination with the NHDES mitigation program, ACOE, and EPA occurred to confirm that the mitigation from the 2004 project meets the current mitigation requirements for this project. Please find attachments that detail the coordination that has taken place since August 15, 2023 and detailing prior mitigation performed under the 2004 project, which NHDOT concludes meet the current mitigation requirements for permitting this project. Should NHDES feel the attached supporting submissions that were previously submitted to NHDES, ACOE and EPA over the last 8 months are not sufficient for documenting that the 2004 project mitigation meets the current mitigation requirements for this project, NHDOT request a formal determination from NHDES with an explanation as to why the mitigation is not being accepted and provide NHDOT with the associated proposed ARM fund payment for the specific locations and impacts not being considered eligible by NHDES.

2. Additionally, there are wetland impacts proposed (to wetland areas (F, G, H, I, E) that are associated with stormwater management. For equivalency with AOT permitting requirements Env-Wq 1503.19 Criteria for Issuance of AOT Permits requires the department shall not issue an AOT permit unless the applicant demonstrates that all of the following criteria are met: (e) The project does not use naturally-occurring wetlands to treat or detain stormwater runoff from the proposed development, unless a permit that specifically allows the impacts has been issued pursuant to RSA 482-A.

The proposed use of the wetland area adjacent to Granite Road/RT 125 does appear to use naturally occurring wetlands as a Stormwater wetland. Please identify methods to avoid and minimize impacts associated with stormwater treatment within this naturally occurring wetland. After avoidance and minimization please quantify total impacts (ie. If the wetland is proposed for use for stormwater management, then wetland functions will be reduced or eliminated). Please quantify all wetland impacts, and any associated mitigation, for remaining impacts to the area after avoidance and minimization have been performed.

Response: Impacts to Wetland 5 (original impact areas E, F, G, H, and I) were reviewed relative to stormwater impacts. Although the project would result in three new culverts that would discharge to Wetland 5, a negative effect on water quality in the wetland would not be anticipated. Existing stormwater runoff that enters Wetland 5 is untreated, while the proposed runoff would be treated.

The overall goal of the proposed culvert layout under Kingston/Granite Road is to maintain the existing flow patterns. The culvert on the south side of Wetland 5 is the outlet for a proposed stormwater treatment BMP. This will discharge treated runoff to Wetland 5. The proposed culvert on the north side of Wetland 5 (Sta. 929+50) will drain the small infield between Granite Road and the relocated section of Kingston Road and is needed to prevent water from ponding in this area. The proposed culvert at Sta. 928 is at a low point in the roadway and will convey water that drains along the east side of Kingston Road under the road into Wetland 5. The other two culverts (Sta. 926+75 and Sta. 2356) are existing culverts that will be replaced. The culvert at Sta. 926+75 is being replaced in its current location in order to convey the off-site runoff from the upstream wetland. The outlet control structure is proposed to meet AoT pre vs post requirements.

Since Wetland 5 will be substantially reduced by the project and the remaining wetland area will receive additional direct stormwater discharges compared to existing conditions, the Wetland Plans have been revised to include the entire wetland area as permanently impacted. This increases the total amount of permanent wetland and stream impact by approximately 6,953 square feet (from 15,413 square feet to 22,366 square feet). The total amount of temporary wetland and stream impact is decreased by approximately 517 square feet (from 1,835 square feet to 1,318 square feet) since the temporary impact within Wetland 5 is now included as permanent impact. Revised Wetland Plans, Impact Summary Table, and page 5 of the application form are enclosed.

Since the revised permanent impact amount is still under the 1.95 acres allowed under the previous permit and mitigation package, it is assumed that no additional mitigation is necessary.

If and when this application meets with the approval of the Bureau, please send the permit directly to Andrew O'Sullivan, Wetlands Program Manager, Bureau of Environment.

AMO:mgl

cc:

BOE Original

ec:

Kevin Nyhan, NHDOT (kevin.t.nyhan@dot.nh.gov)
Matt Lampron, NHDOT (Matthew.D.Lampron@dot.nh.gov)
Marc Laurin, NHDOT (marc.g.laurin@dot.nh.gov)
Mike Hicks, ACOE
Rebecca Martin, NHDOT (Rebecca.A.Martin@dot.nh.gov)
Darren Blood, GM2 (dblood@gm2inc.com)
Jennifer Riordan, GM2 (jriordan@gm2inc.com)

OSullivan, Andrew

From: Laurin, Marc
Sent: Tuesday, August 15, 2023 1:39 PM
To: Nichols, Emily; Benedict, Karl; OSullivan, Andrew
Cc: Brown, Joshúa; Dolcino, Isabelle
Subject: RE: Plaistow-Kingston, 10044E Wetlands Permit-RFMI Response

Emily,

I have added the files I provided to DES in August 2020 to our FTP site.

FTP Site: <https://nhftp.nh.gov/>

Username: dot.environment

Password: NHenviro23

Plaistow-Kingston 10044E Mitigation Files.zip

Let me know if you have any questions.

Marc

From: Nichols, Emily <Emily.P.Nichols@des.nh.gov>
Sent: Tuesday, August 15, 2023 11:45 AM
To: Benedict, Karl <Karl.D.Benedict@des.nh.gov>; OSullivan, Andrew <Andrew.M.OSullivan@dot.nh.gov>
Cc: Brown, Joshua <Joshua.R.Brown@dot.nh.gov>; Laurin, Marc <marc.g.laurin@dot.nh.gov>; Dolcino, Isabelle <Isabelle.R.Dolcino@des.nh.gov>
Subject: RE: Plaistow-Kingston, 10044E Wetlands Permit-RFMI Response

Hello,

Please allow me to piggy-back on Karl's email.

ARM is trying to confirm the mitigation package referenced in the amendment request and previous discussions. We located an email with to an ftp site where the documents were electronic files were stored but it appears to no longer be accessible reference (see clip pasted below). Could you please provide an updated link to these documents so we can review of the mitigation documentation and determine if the compensatory mitigation provided for previous permit and amendments is sufficient?

Thank you in advance,

Emily

From: Laurin, Marc
Sent: Thursday, August 27, 2020 9:31 AM
To: Sommer, Lori <LORI.L.SOMMER@des.nh.gov>; Benedict, Karl <Karl.D.Benedict@des.nh.gov>
Cc: Jennifer Zorn <JZorn@mjinc.com>; Jennifer Riordan <JRiordan@GM2INC.COM>; Baldwin, Margaret <Margarete.Baldwin@dot.nh.gov>; Lampron, Matthew <Matthew.Lampron@dot.nh.gov>; Corliss, Kathleen <Kathleen.Corliss@dot.nh.gov>
Subject: Plaistow-Kingston, 10044E - Existing Mitigation Documentation

Lori,

As requested during the August 19th Natural Resource Agency meeting, I have compiled the documents describing the wetland mitigation sites associated with the Plaistow-Kingston NH 125 corridor widening.

I am providing you with a link to our FTP site as a few of the electronic files are large and I recall that DES's server is limited in the size you can receive.

FTP Site: <https://nhftp.nh.gov/>

Environment
Username: dot.environment
Password: NHenviron20

I have downloaded 8 files: Plaistow-Kingston Mitigation Sites Location Map; Pow-wow conservation easement Quitclaim Deed; Pow-wow conservation easement baseline study; Sullivan Mitigation Tech Report 2006; Kelly Brook (Frog Pond Woods) Recorded Quitclaim Deed; Kelly Brook Combined Baseline/Final Report_02_02_12; Wetland Mitigation Technical Report - 2009, and; Addendum to FEA (Sections 4.3.4, 4.8.2.3, 6.

The mitigation package consists of the

- creation of wetlands and preservation of the Sullivan site adjacent to Bayberry Pond in Kingston
- preservation of the Nichols site along the Pow-wow River in Kingston, and
- preservation of the Frog Pond Woods site along Kelly Brook in Plaistow.

2

Let me know if you need more information.

Thanks,

Emily Nichols

[Aquatic Resource Mitigation Program](#)

Wetlands Bureau, Land Resources Management

Water Division, NH Department of Environmental Services

P.O. Box 95

Concord, NH 03302-0095

Email: Emily.P.Nichols@des.nh.gov

Phone: (603) 271-4059

We value your feedback. Please consider completing a 3-minute [customer satisfaction survey](#).

From: Benedict, Karl <Karl.D.Benedict@des.nh.gov>

Sent: Tuesday, August 15, 2023 11:22 AM

To: OSullivan, Andrew <Andrew.M.OSullivan@dot.nh.gov>

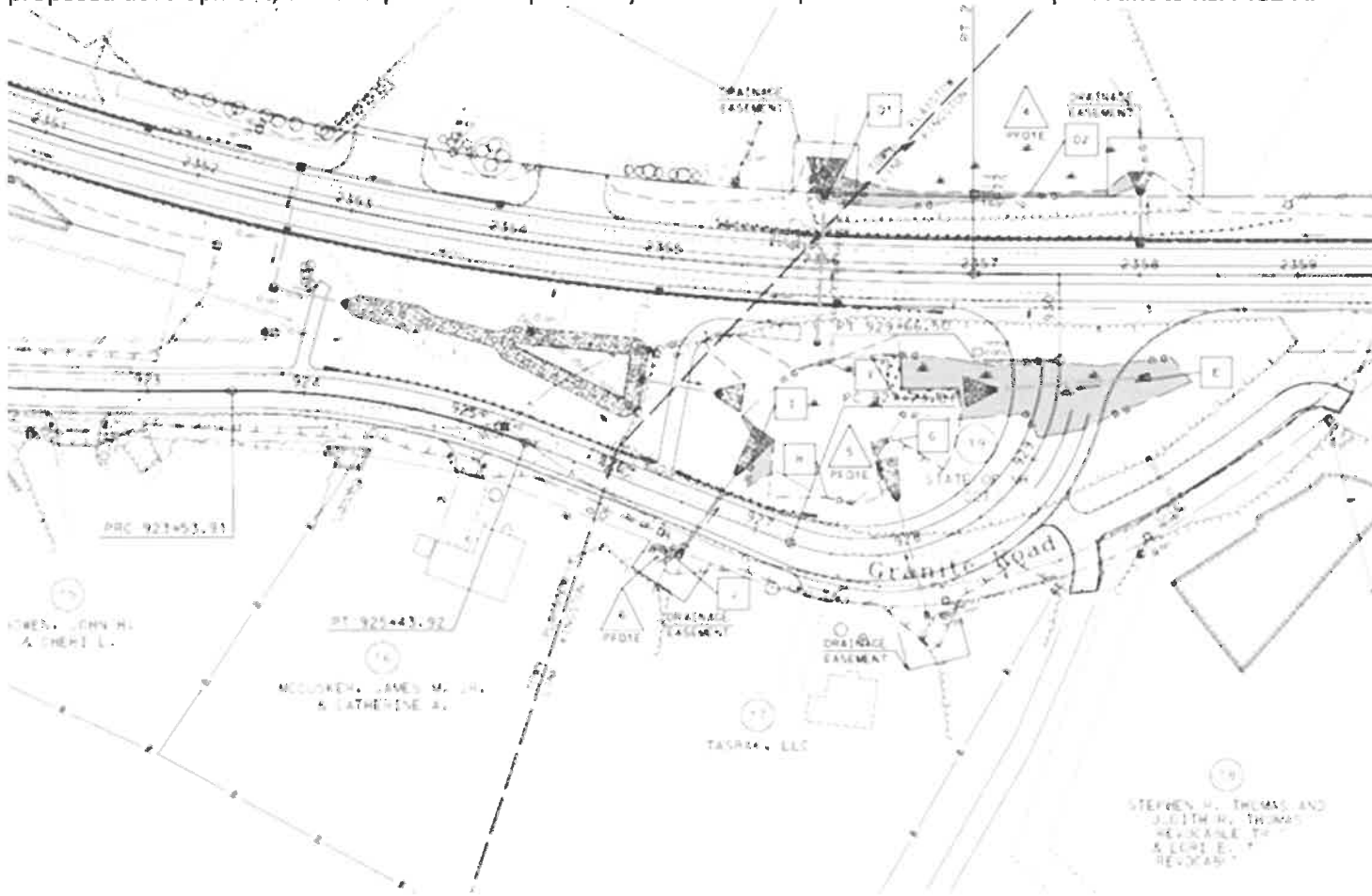
Cc: Brown, Joshua <Joshua.R.Brown@dot.nh.gov>; Laurin, Marc <marc.g.laurin@dot.nh.gov>; Nichols, Emily <Emily.P.Nichols@des.nh.gov>

Subject: RE: Plaistow-Kingston, 10044E Wetlands Permit-RFMI Response

Hello,

Following up on this project RFMI response and the associated application decision. The NHDES RFMI question #2 had requested that follow-up coordination be performed with the mitigation program, ACOE, and EPA to ensure that the mitigation performed under the 2004 project, meets the current mitigation requirements for permitting this project. The RFMI response referenced a 2020 Natural Resource Agency discussion relative to the 2004 mitigation that was performed, however the additional requested coordination with the mitigation program, ACOE, and EPA was not completed. The coordination for project mitigation will need to be completed prior to NHDES decision for the project.

Additionally, there are wetland impacts proposed (to wetland areas (F, G, H, I, E) that are associated with stormwater management. For equivalency with AoT permitting requirements Env-Wq 1503.19 Criteria for Issuance of AOT Permits requires The department shall not issue an AOT permit unless the applicant demonstrates that all of the following criteria are met: (e) The project does not use naturally-occurring wetlands to treat or detain stormwater runoff from the proposed development, unless a permit that specifically allows the impacts has been issued pursuant to RSA 482-A.



The proposed use of the wetland area adjacent to Granite Road/RT 125 does appear to use naturally occurring wetlands as a Stormwater wetland. Please identify methods to avoid and minimize impacts associated with stormwater treatment within this naturally occurring wetland. After avoidance and minimization please quantify total impacts (ie. If the wetland is proposed for use for stormwater management, then wetland functions will be reduced or eliminated). Please quantify all wetland impacts, and any associated mitigation, for remaining impacts to the area after avoidance and minimization have been performed.

The NHDES decision for the application based on information received from the request for more information is pending due by 8/18. Please advise to whether the NHDOT would prefer to continue decision based on current information provided, or whether a Time extension would be beneficial for ability to resolve these outstanding issues for permitting. I have continued initiating coordination with the mitigation program/ACOE however I cannot confirm this will be completed prior to the NHDOT permit response deadline.
Thank you,

Karl Benedict, Public Works Subsection Supervisor
Land Resources Management
Water Division, NH Department of Environmental Services
29 Hazen Drive, PO Box 95
Concord, NH 03302

Phone: (603) 271-4194

Fax: (603) 271-6588

Email: Karl.Benedict@des.nh.gov

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We greatly appreciate your feedback. Please take a moment to fill out our 3-minute [NHDES-LRM customer satisfaction survey](#).

From: OSullivan, Andrew <Andrew.M.OSullivan@dot.nh.gov>

Sent: Wednesday, July 19, 2023 9:10 AM

To: Benedict, Karl <Karl.D.Benedict@des.nh.gov>; Brown, Joshua <Joshua.R.Brown@dot.nh.gov>; 'Maria Tur' <Maria_Tur@fws.gov>; Jean Brochi <Brochi.Jean@epa.gov>; Hicks, Michael C CIV USARMY CENAE (USA) <Michael.C.Hicks@usace.army.mil>; Kristoff, Richard <Richard.C.Kristoff@usace.army.mil>; Dionne, Michael <Michael.A.Dionne@wildlife.nh.gov>; Newton, Kevin <Kevin.M.Newton@wildlife.nh.gov>

Cc: Nyhan, Kevin <Kevin.T.Nyhan@dot.nh.gov>; Rook, Amy <Amy.W.Rook@dot.nh.gov>; Lampron, Matthew <Matthew.D.Lampron@dot.nh.gov>; Laurin, Marc <marc.g.laurin@dot.nh.gov>; mpearson@plaiستow.com; admin@kingstonnh.org; Jennifer Riordan <jriordan@gm2inc.com>

Subject: RE: Plaistow-Kingston, 10044E Wetlands Permit-RFMI Response

Good morning Karl,

Please find attached response to your request for more information (for the Plaistow-Kingston, 10044E project) to coordinate final NHFG recommendations and confirm project mitigation requirements. Please contact me for any additional coordination or if you need anything further.

Thank you,

Andrew O'Sullivan
Wetlands Program Manager
New Hampshire Department of Transportation
Bureau of Environment
7 Hazen Drive, PO Box 483
Concord NH, 03301-0483
603-271-0556

From: Benedict, Karl <Karl.D.Benedict@des.nh.gov>

Sent: Friday, June 2, 2023 12:47 PM

To: Brown, Joshua <Joshua.R.Brown@dot.nh.gov>; 'Maria Tur' <Maria_Tur@fws.gov>; Brochi, Jean <Brochi.Jean@epa.gov>; Hicks, Michael C CIV USARMY CENAE (USA) <Michael.C.Hicks@usace.army.mil>; Kristoff, Richard <Richard.C.Kristoff@usace.army.mil>; Dionne, Michael <Michael.A.Dionne@wildlife.nh.gov>; Newton, Kevin <Kevin.M.Newton@wildlife.nh.gov>

Cc: Nyhan, Kevin <Kevin.T.Nyhan@dot.nh.gov>; Rook, Amy <Amy.W.Rook@dot.nh.gov>; OSullivan, Andrew <Andrew.M.OSullivan@dot.nh.gov>; Lampron, Matthew <Matthew.D.Lampron@dot.nh.gov>; Laurin, Marc <marc.g.laurin@dot.nh.gov>

Subject: RE: Plaistow-Kingston, 10044E Wetlands Permit Application Submitted

Hello,

Please find the attached request for more information (for the Plaistow-Kingston, 10044E project) to coordinate final NHFG recommendations and confirm project mitigation requirements. Please contact for any additional coordination for the project permitting.

Thank you,

Karl Benedict, Public Works Subsection Supervisor
Land Resources Management
Water Division, NH Department of Environmental Services
29 Hazen Drive, PO Box 95
Concord, NH 03302
Phone: (603) 271-4194
Fax: (603) 271-6588
Email: Karl.Benedict@des.nh.gov

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We greatly appreciate your feedback. Please take a moment to fill out our 3-minute [NHDES-LRM customer satisfaction survey](#).

From: Brown, Joshua <Joshua.R.Brown@dot.nh.gov>
Sent: Monday, April 17, 2023 8:10 AM
To: Benedict, Karl <Karl.D.Benedict@des.nh.gov>; 'Maria Tur' <Maria_Tur@fws.gov>; Brochi, Jean <Brochi.Jean@epa.gov>; Hicks, Michael C CIV USARMY CENAE (USA) <Michael.C.Hicks@usace.army.mil>; Kristoff, Richard <Richard.C.Kristoff@usace.army.mil>; Dionne, Michael <Michael.A.Dionne@wildlife.nh.gov>; Newton, Kevin <Kevin.M.Newton@wildlife.nh.gov>
Cc: Nyhan, Kevin <Kevin.T.Nyhan@dot.nh.gov>; Rook, Amy <Amy.W.Rook@dot.nh.gov>; OSullivan, Andrew <Andrew.M.OSullivan@dot.nh.gov>; Lampron, Matthew <Matthew.D.Lampron@dot.nh.gov>; Laurin, Marc <marc.g.laurin@dot.nh.gov>
Subject: Plaistow-Kingston, 10044E Wetlands Permit Application Submitted

Good morning,

NHDOT Bureau of Highway Design and NHDOT Bureau of Environment submitted a Wetlands Permit Application for the **Plaistow-Kingston, 10044E** project to NHDES Wetlands Bureau. This email serves as your notification of our submission.

A copy of the permit application can be found online on BOE's Wetlands Program permitting webpage at: <https://www.nh.gov/dot/org/projectdevelopment/environment/units/program-management/wetland-applications.htm#G> under the project town and project number.

Karl, a hard copy is being delivered to NHDES today and 4 copies were sent certified mail to **Towns of Plaistow & Kingston**. If you have any questions, feel free to contact me.

Thank you,

Joshua R. Brown
Wetlands Program Analyst
NH Department of Transportation
Bureau of Environment

OSullivan, Andrew

From: Laurin, Marc
Sent: Monday, December 11, 2023 8:04 AM
To: Nichols, Emily; Lindsey Lefebvre
Cc: OSullivan, Andrew; Benedict, Karl; Michael Hicks; Brown, Joshua; Detzel, Seta
Subject: RE: Plaistow-Kingston, 10044E - Mitigation (email 1 of 2)
Attachments: Plaistow-Kingston 10044E Mitigation Summary Update.pdf; Sullivan Decl of Restrictive Covenants.pdf; Sullivan Mitigation Tax Map Aerial.pdf

Emily and Lindsey,

Attached is a memorandum *Plaistow-Kingston 10044E Mitigation Summary Update* that addresses justification that appropriate mitigation for the 10044E contract would be covered under the existing Plaistow-Kingston, 10044B corridor mitigation package.

Regarding the Sullivan Properties, attached is the *Declaration of Restrictive Covenant* for the site with the *Sullivan Mitigation Tax Map Aerial*.

I have also included in this email, and due to the size of the files in a second email, the following supporting information as enclosures to this memorandum:

- October 2009 *Wetland Mitigation Technical Report, Reconstruction of NH 125 Wetland Mitigation, Plaistow and Kingston, NH*
- March 2006 *Addendum to: the Final Environmental Assessment & Section 4(f) Evaluation*
- September 2006 *Wetland Mitigation Technical Report, Sullivan Properties (Map R5, Lots 20,19 and 1B), Kingston, NH*
- Plaistow-Kingston, 10044F *Wetland Mitigation Grading Plan*, and 2011 transmittal letters to DES and ACOE of the full plans
- 08/18/2015, *Plaistow-Kingston 10044-G, DES Permit #2004-00736 Wetlands Mitigation Summary/Proposal* memorandum
- *Plaistow-Kingston (Project #10044)Wetland Impacts Summary* matrix

Let me know if you require more information or need clarification on this submittal.

Marc

From: Nichols, Emily <Emily.P.Nichols@des.nh.gov>
Sent: Tuesday, November 28, 2023 11:08 AM
To: Laurin, Marc <marc.g.laurin@dot.nh.gov>
Cc: OSullivan, Andrew <Andrew.M.OSullivan@dot.nh.gov>; Benedict, Karl <Karl.D.Benedict@des.nh.gov>; Lindsey Lefebvre <lindsey.e.lefebvre@usace.army.mil>; Michael Hicks <Michael.C.Hicks@usace.army.mil>; Brown, Joshua <Joshua.R.Brown@dot.nh.gov>; Detzel, Seta <Seta.A.Detzel@des.nh.gov>
Subject: RE: Plaistow-Kingston, 10044E - Mitigation

Good morning Marc.

I understand that NHDOT and the Corps met yesterday to discuss NHDOT Project 10044E and mitigation requirements. NHDES reviewed the documentation on file and agrees with the Corps that more information is needed to determine if additional mitigation is required. NHDES requests to be copied on future correspondence that identifies the aquatic resources on the preserved parcels, previous impacts and new proposed impacts.

The original project scope for Wetlands Permit 2004-0763/NHDOT 10044B included Dredge and / or fill approximately 4.49 acres of palustrine and riverine to reconstruct and widen approximately 6 miles of Route 125 to provide through lanes, a center left turn lane, intersection improvements and the construction of a service road. Compensatory mitigation for NHDOT Project 10044B included a total of **80.8 acres** of conservation land including restoration of **2 acres** of wetlands.

Review of our files indicates that the following compensatory mitigation was completed:

- Pow-Wow Conservation Easement (Nichols Property) Kingston protecting **22.3 acres** of land depicted on Plan D-7324, recorded at Rockingham County Registry of Deeds (BK4848 PG0226)
- Frog Pond (Kelly Brook Area, Plaistow) Declaration of Restrictive Covenants for Conservation Purposes, protecting **43.82 acres** of land depicted on Plan D-4490, recorded at Rockingham County Registry of Deeds (BK4875 PG0738)
- Sullivan property mitigation project included wetland creation resulting in **3.4 acres** of wetlands

The final mitigation package documentation in our files documents the conservation of **66.12 acres** and restoration/creation of **3.4 acres** wetland. Is there correspondence in your files that documents NHDES or USACE approval of the reduction in conservation lands/additional restoration areas? Was a conservation easement or other long-term protection mechanism established for the restoration areas on the Sullivan Property?

Please provide clarification on the completed mitigation components in addition to information requested by the Corps.

Reach out if you have questions or wish to discuss.

Thanks,

Emily

Emily Nichols

[Aquatic Resource Mitigation Program](#)

Wetlands Bureau, Land Resources Management
Water Division, NH Department of Environmental Services
P.O. Box 95
Concord, NH 03302-0095
Email: Emily.P.Nichols@des.nh.gov
Phone: (603) 271-4059

We value your feedback. Please consider completing a 3-minute [customer satisfaction survey](#).

From: Laurin, Marc <marc.g.laurin@dot.nh.gov>
Sent: Thursday, November 16, 2023 7:41 AM
To: Nichols, Emily <Emily.P.Nichols@des.nh.gov>
Cc: OSullivan, Andrew <Andrew.M.OSullivan@dot.nh.gov>; Benedict, Karl <Karl.D.Benedict@des.nh.gov>
Subject: RE: Plaistow-Kingston, 10044E - Mitigation

Emily,

Thanks for making this a priority. I talked to Mike Hicks on this yesterday, so he should be up to speed on the details.

Let me know if you have any questions or need further clarification.

Marc

From: Nichols, Emily <Emily.P.Nichols@des.nh.gov>
Sent: Thursday, November 16, 2023 6:33 AM
To: Laurin, Marc <marc.g.laurin@dot.nh.gov>
Cc: OSullivan, Andrew <Andrew.M.OSullivan@dot.nh.gov>; Benedict, Karl <Karl.D.Benedict@des.nh.gov>
Subject: RE: Plaistow-Kingston, 10044E - Mitigation

Hi Marc,

My apologies for taking so long to review this. I have scheduled some time to go through everything on Monday. I will try to coordinate a response with the Corps and get back to you before Thanksgiving.

Again, my apologies for the delay. My schedule is extremely packed with meetings lately and I am struggling to keep up with tasks. This is a priority, and I will respond next week if that is a sufficient timeline.

Thanks for your patience.

Emily

Emily Nichols
[Aquatic Resource Mitigation Program](#)
Wetlands Bureau, Land Resources Management
Water Division, NH Department of Environmental Services
P.O. Box 95
Concord, NH 03302-0095
Email: Emily.P.Nichols@des.nh.gov
Phone: (603) 271-4059

We value your feedback. Please consider completing a 3-minute [customer satisfaction survey](#).

From: Laurin, Marc <marc.g.laurin@dot.nh.gov>
Sent: Wednesday, November 15, 2023 11:27 AM
To: Nichols, Emily <Emily.P.Nichols@des.nh.gov>
Cc: OSullivan, Andrew <Andrew.M.OSullivan@dot.nh.gov>
Subject: RE: Plaistow-Kingston, 10044E - Mitigation

Emily,

Can you confirm your concurrence with the mitigation for this latest Plaistow-Kingston construction contract, as has been requested of NHDOT by Karl in order for him to finalize the permit issuance.

Thanks,

Marc

From: Laurin, Marc
Sent: Thursday, October 26, 2023 10:41 AM
To: Nichols, Emily <Emily.P.Nichols@des.nh.gov>
Cc: OSullivan, Andrew <Andrew.M.OSullivan@dot.nh.gov>
Subject: Plaistow-Kingston, 10044E - Mitigation

Emily,

This project entails re-evaluating and updating the design of previously proposed improvements to a 1.7-mile segment of the NH Route 125 corridor located in Plaistow and Kingston. The 1.7-mile segment is the only remaining segment that has not yet been constructed from a 6-mile project corridor that was previously studied and approved (Plaistow-Kingston, 10044B).

Wetland impacts were previously mitigated as part of the overall Plaistow-Kingston 10044B project under NHDES Wetlands Permit #2004-00763 and US Army Corps Permit NAE-2004-01342. This mitigation package included 80.8 acres of land preservation and restoration of two wetlands. The previous permit and mitigation package allowed for up to 1.95 acres of permanent wetland impact under Contract 10044E. With the reduced project footprint (from 5 lanes to 3 lanes), wetland impacts were substantially reduced. The currently proposed 10044E Contract will have 0.354 acres of permanent wetland and bank impacts.

Pursuant to NHDOT's submittal of the NHDES Wetland Permit application for the Plaistow-Kingston, 10044E contract, Karl Benedict has requested that we inform you of the previous decisions that Lori Sommer made on the mitigation performed under the Plaistow-Kingston 10044B project, and that previous mitigation measures meets the current mitigation requirements for permitting Contract E.

Attached is the November 18, 2020 Natural Resource Agency meeting minutes and November 20, 2020 email where Lori concurred that "... stream mitigation has been provided to adequately compensate for the lost functions that may occur through [this] project."

Let me know if you have any questions.

Thanks,

Marc



THE STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION

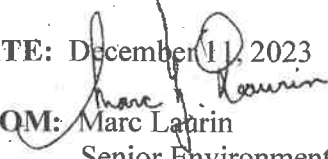


William Cass, P.E.
Commissioner

David Rodrigue, P.E.
Assistant Commissioner

Andre Briere, Colonel, USAF (RET)
Deputy Commissioner

DATE: December 11, 2023

FROM: 
Marc Laurin
Senior Environmental Manager

AT (OFFICE): Department of Transportation
Bureau of Environment

SUBJECT: Plaistow-Kingston, 10044E

TO: Lindsey Lefebvre, ACOE
Emily Nichols, NHDES

Plaistow-Kingston 10044E Mitigation Summary Update

The following discussion addresses justification that the proposed wetland and stream impacts associated with the Plaistow-Kingston, 10044E construction contract are appropriately mitigated under the approved and existing Plaistow-Kingston, 10044B corridor project mitigation package.

- As detailed in the October 2009 *Wetland Mitigation Technical Report, Reconstruction of NH 125 Wetland Mitigation, Plaistow and Kingston, NH* the mitigation package for the Plaistow-Kingston, 10044B corridor project (10044 D, E, F G and I construction contracts) was formulated based on wetland impacts of 4.49 acres for the Plaistow-Kingston 10044B project, and for three previously completed NHDOT projects with impacts of 1.2 acres for the Kingston 10044C project; 1 acre for the Plaistow 10005 project; and 0.65 acres for the Kingston 13012 project. The mitigation package compensated for a total of **7.34 acres** of wetland impacts.
- The completed Plaistow-Kingston corridor contracts (10044D, 10044F and 10044G) have impacted **2.42 acres** of the 4.49 acres of wetlands estimated in the *Wetland Mitigation Technical Report*. Due to changes in the design of the 10044E contract from a 5-lane to a 3-lane roadway, the wetland impacts for this contract have been reduced from 1.95 acres to **0.35 acres**.
- Due to an increase in wetland impacts associated with the Plaistow-Kingston, 10044G contract totaling 0.64 acres, an ARM Fund payment in the amount of \$135,507.71 was previously made by NHDOT in 2016.
- Furthermore, the 10044I contract (with an estimated 0.86 acres of wetland impacts) is no longer proposed to be constructed, as demonstrated by its absence from the most recent *NHDOT Recommendations for the Ten Year Transportation Improvement Plan 2015-2024 – DRAFT, [2015-24 GACIT Cover Projects 12-02-13.docx \(nh.gov\)](#)*.
- The Plaistow-Kingston, 10044B corridor mitigation package consists of a total of 80.8 acres of conservation lands with the creation/restoration of 3.4 acres of wetlands.
 - Pow-Wow Conservation Easement (Nichols Property) in Kingston protecting 22.3 acres of land depicted on Plan D-7324, recorded at Rockingham County Registry of Deeds (BK4848 PG0226).

- Frog Pond (Kelly Brook Area, Plaistow) Declaration of Restrictive Covenants for Conservation Purposes, protecting 43.82 acres of land depicted on Plan D-4490, recorded at Rockingham County Registry of Deeds (BK4875 PG0738).
- Sullivan Properties (Bayberry Pond Area, Kingston) Declaration of Restrictive Covenants for Conservation Purposes protecting three parcels totaling 14.7 acres, recorded at Rockingham County Registry of Deeds (Bk 4875 PG0732) on January 3, 2008. Providing 12 acres of conservation buffer to Bayberry Pond, including wetland creation/restoration of 3.4 acres of wetlands.
- As noted in the March 2006 Revisions of the *Addendum to: the Final Environmental Assessment & Section 4(f) Evaluation* (Page 11), in the September 2006 *Wetland Mitigation Technical Report, Sullivan Properties (Map R5, Lots 20,19 and 1B), Kingston, NH* (Page 1-2) and in the October 2009 *Wetland Mitigation Technical Report*, (Section 4 and Appendix E) stormwater treatment ponds (BMPs) were identified to be located on the Sullivan Properties. An existing BMP on the site was constructed in 2005 as part of the Kingston, 10044C project. NHDOT will be constructing another BMP on the Sullivan Properties during the Plaistow-Kingston, 10044E project. This BMP area was also identified in the Plaistow-Kingston, 10044F wetland mitigation construction grading plan, although its extent was not defined at that time, these plans were provided to NHDES Wetlands Bureau and the ACOE in 2011.
- Prior to the construction of the Plaistow-Kingston, 10044G contract, NHDOT provided a 08/18/2015, *Plaistow-Kingston 10044-G, DES Permit #2004-00736 Wetlands Mitigation Summary/Proposal* memorandum and *Plaistow-Kingston (Project #10044)Wetland Impacts Summary* matrix. These documents affirmed that future impacts associated with outstanding Plaistow-Kingston construction contracts would not require additional mitigation unless the wetland impacts exceeded those noted.

The total wetland impacts for the overall Plaistow-Kingston, 10044B corridor project will be **2.77 acres, reduced from the estimated 4.49 acres**, as such NHDOT contends that the original mitigation package is still appropriate compensation for the remaining 10044E contract impacts. As noted above, the original mitigation package was approved by DES and ACOE for compensation of impacts to 7.34 acres of wetlands. With the 1.72 acres reduction of impacts of the 10044E contract and the elimination of the 10044I contract impacts of 1.95 acres, 3.67 acres of wetlands impacts are being compensated by the mitigation package, but these wetland acreages have not and will not foreseeably be impacted by NHDOT.

As previously noted NHDOT conferred with DES and the ACOE on the Plaistow-Kingston, 10044E contract during the March 20, 2019, August 19, 2020 and November 18, 2020 Natural Resource Agency meetings. The resource agencies present did not object that the 0.35 acres of impacts would be covered by the original mitigation package. Additionally in the October 20, 2020 email from Lori Sommer, representing DES as the Wetlands Bureau mitigation coordinator, concurred that "... stream mitigation has been provided to adequately compensate for the lost functions that may occur through [this] project."

As such NHDOT maintains that the original mitigation package is still appropriate compensation for the Plaistow-Kingston, 10044E wetland and stream impacts. Please provide your concurrence for NHDOT to complete the outstanding permit application RFMI on mitigation. Let me know if you need further information or clarification.

MGL:mgl
Enclosures

cc Mike Hicks, ACOE
Karl Benedict, NHDES
Andy O'Sullivan, NHDOT
Matt Lampron, NHDOT

s:\environment\projects\plaistow\10044 (b, d, e, f, g)\10044e\wetland\mitigation\plaistow-kingston mitigation summary.docx

JOHN O. MORTON BUILDING • 7 HAZEN DRIVE • P.O. BOX 483 • CONCORD, NEW HAMPSHIRE 03302-0483
TELEPHONE: (603) 271-3734 • FAX: (603) 271-3914 • TDD: RELAY NH 1-800-735-2964 • DOT.NH.GOV

**DECLARATION OF RESTRICTIVE COVENANTS
FOR CONSERVATION PURPOSES**

DECLARATION made this 20th day of December, 2007.

WHEREAS, The State of New Hampshire Department of Transportation, with a principal place of business at PO Box 483, 7 Hazen Drive, Concord, New Hampshire 03302-0483 (the "Declarant", which shall include the Declarant's successors and assigns), has acquired certain real property by Notice of Condemnation as described in documents recorded October 23, 2003, at Book 4178, Page 684 and Book 4178, Page 685 in the Rockingham County Registry of Deeds acquired from Frederick C. Sullivan, being New Hampshire Department of Transportation Parcels 8, 9 and 9A and also being Town of Kingston Tax Map 5, Lots 1B, 19 and 20 being unimproved land situated on NH Route 125 in the Town of Kingston, County of Rockingham, State of New Hampshire (the "Property");

WHEREAS, the Declarant acquired the Property in mitigation of environmental impacts, including wetland impacts, from the NH Route 125 widening project known as Plaistow-Kingston, MGS-STP-T-X5375(010), 10044B.

WHEREAS, the Declarant desires and intends to preserve and protect the Property in perpetuity for its wildlife habitat qualities, natural vegetation, soils, hydrology, wetlands, natural habitat and its scenic and aesthetic character so that it retains its natural qualities and functions; and

WHEREAS, the Declarant desires and intends to prevent any future development, construction, or use that will significantly and negatively impact the conservation values of the Property, while allowing the reserved rights of the Declarant listed below.

NOW, THEREFORE, the Declarant hereby declares that the Property, more particularly bounded and described in Appendix "A" attached to and made a part of this Declaration, is subject to the following use restrictions, WHICH SHALL RUN WITH THE LAND IN PERPETUITY, subject only to the provisions of this Declaration:

1. Any activity on or use of the Property inconsistent with the aforesaid purposes of this Declaration is prohibited.
2. The Property shall be maintained in perpetuity in an undeveloped and natural condition, so that all residential, industrial or commercial activities in the Property are prohibited, except agricultural, forestry, educational, conservation and low-impact non-commercial recreational activities as described below, and provided that the capacity of the Property to produce forest and agricultural crops shall not be degraded by on-site activities and that such activities will not cause significant pollution of surface or subsurface waters or soil erosion; also provided that such activities shall not significantly and negatively impact the conservation values of the Property.
 - a. For the purposes hereof "agriculture" and "forestry" shall include agriculture, animal husbandry, floriculture and horticulture activities; the production of plant and animal products for domestic or commercial purposes, for example the growing and stocking of Christmas trees or forest trees of any size capable of producing timber; and the processing and sale of products produced on the Property, for example, pick-your-own fruits and vegetables, maple syrup and other forest products; and the cutting and sale of timber and other forest products not detrimental to the purposes of this Declaration.
 - b. Agriculture and forestry on the Property shall be performed to the extent possible in accordance with a coordinated management plan for the sites and soils of the Property. Forestry and agricultural management activities shall be in accordance with the current scientifically-based practices recommended by the U.S. Cooperative Extension Service, U.S. Soil Conservation Service, or other government or private natural resource conservation and management agencies then active. Management activities shall not materially impair the scenic quality of the Property as viewed from public roads or public trails.

000147

2003 JAN -3 AM 9:13

ROCKINGHAM COUNTY
REGISTRY OF DEEDS

3. The Property shall not be subdivided or otherwise divided into parcels of separate distinct ownership, and none of the individual tracts which together comprise the Property shall be conveyed separately from one another.
4. No structure or improvement, including, but not limited to, a dwelling, any portion of a septic system, parking lot, portable or composting toilet, tennis court, swimming pool, dock, athletic field, pavilion, shooting range, telecommunications facility, aircraft landing strip, tower, conduit or utility line, billboard or other advertising display, driveway or road made of asphalt or other impervious surface, mobile home or other temporary or permanent structure or improvement shall be constructed, placed, or introduced onto the Property; EXCEPT,
 - a. ancillary structures and improvements including, but not limited to, an unpaved road, dam, gate, fence, bridge, culvert, maple sugar house, or wildlife nest structure may be constructed, placed, or introduced onto the Property only to the extent necessary to accomplish the forestry, agricultural, educational, conservation, low-impact non-commercial recreational or wildlife habitat management uses of the Property, and provided that they are not detrimental to the purposes of this Declaration; and
 - b. unpaved pedestrian trails and wildlife blinds may be constructed, placed, or introduced onto the Property only to the extent necessary to accomplish the low-impact non-commercial recreational uses of the Property and provided that they are not detrimental to the purposes of this Declaration;
5. No removal of trees, brush, minerals, gravel, sand, topsoil, nor filling, or other disturbances of the soil surface, nor any changes in topography, surface or subsurface water systems, wetlands, or natural habitat, except to eliminate existing, potential or future safety hazards, shall be allowed unless such activities:
 - a. are commonly necessary in the accomplishment of the forestry, agricultural, educational, conservation, wildlife habitat management, or low-impact non-commercial recreational uses of the Property as permitted by this Declaration;
 - b. do not harm state- or federally-recognized rare, threatened, endangered species or other species of conservation concern, or exemplary natural communities, such determination of harm to be made at the sole discretion of the Declarant and to be based upon information from the New Hampshire Natural Heritage Bureau or the agency then recognized by the State of New Hampshire as having responsibility for identification and/or conservation of such species;
 - c. do not impact wetland vegetation, soils, hydrology or habitat;
 - d. are not detrimental to the purposes of this Declaration; and
 - e. are permitted and approved by all federal, state, local, and other governmental entities, as necessary, before said activities take place.
6. No outdoor signs shall be displayed on the Property except as desirable or necessary in the accomplishment of the forestry, agricultural, educational, conservation or low-impact non-commercial recreational uses of the Property, and provided such signs are not detrimental to the purposes of this Declaration. No sign shall be artificially illuminated.
7. There shall be no mining, quarrying, or excavation of rocks, minerals, gravel, sand, topsoil, or other similar materials on the Property, except in connection with any improvements made pursuant to the provisions of this Declaration. No such rocks, minerals, gravel, sand, topsoil, or other similar materials shall be removed from the Property.
8. There shall be no net loss or reduction in the volume of flood storage on the Property, nor shall there be any permanent obstructions in the floodplain.
9. There shall be no dumping, spreading, filling, injecting, stockpiling, burning, burial or storage of any waste, refuse or natural or man-made materials or substances whatsoever in or on the Property.
10. There shall be no use of pesticides, poisons, biocides or fertilizers, draining of wetlands, burning of marshland or disturbances or changes in the natural habitat of the premises.
11. There shall be no manipulation or alteration of the natural watercourses, lakeshores, marshes or other water bodies, nor shall any uses of or activities upon the Property be permitted which could be detrimental to water purity or to any vegetative, wildlife or hydrological function.
12. There shall be no operation of vehicles, snowmobiles, dune buggies, motorcycles, mini-bikes, go-cars, all-terrain vehicles, or any other type of motorized vehicle upon the Property, EXCEPT emergency vehicles and vehicles associated with wetland creation, restoration or remediation.
13. The Property shall in no way be used to satisfy the density, frontage, setback or other requirements of any applicable zoning ordinance or subdivision regulation with respect to the development of any other property.

14. All other disturbances of the Property are prohibited, except those explicitly authorized by this Declaration or by the Compensatory Mitigation Plan for Permit No. NAE-2004-1342 issued by the Department of the Army, New England District, Army Corps of Engineers dated May 10, 2007.

DECLARANT'S RESERVED RIGHTS

It is expressly understood and agreed that this Declaration does not grant or convey to the members of the general public any rights of ownership, entry or use of the Property. This Declaration is created solely for the protection of the Property, and the Declarant reserves the ownership of the fee simple estate and all remaining rights, including without limitation the right to exclude the general public and the right to use the Property for all purposes consistent with this Declaration. The general public may access the Property only through the auspices of the Declarant, which may allow the general public to participate in limited, low-impact, noncommercial recreational activities on the Property. Prohibition of public access is the responsibility of the Declarant by erection of "No Trespassing" signs around the Property in accordance with RSA 635:4 or other public trespass laws and regulations. Enforcement of any such posting is subject to local or State law enforcement, as provided by State law. The Declarant reserves the right to conduct forestry, forest management, agricultural, educational and conservation activities. The Declarant reserves the right to cut and remove dead, standing dead, diseased or endangering trees, shrubs, or plants on the Property.

LEGAL REMEDIES

The Declarant reserves the right to pursue all legal remedies against any party responsible for any actions detrimental to the purposes of this Declaration. The Declarant shall have the right to enforce this Declaration by appropriate legal means, including injunctive and other equitable relief, such as relief requiring restoration of the Property to its condition prior to the time of the violation, and shall be in addition to, and not in limitation of, any other rights and remedies available to the Declarant. No delay or omission by the Declarant in the exercise of any right or remedy upon any violation shall impair the Declarant's rights or remedies or be construed as a waiver.

TRANSFERABILITY AND TERMINATION

This Declaration preserves the Property in fulfillment of the legal obligations arising as a result of the planned improvements to the NH Route 125 corridor known as Plaistow-Kingston, MGS-STP-T-X5375(010), 10044B, including all projects associated with the widening of NH Route 125 from Plaistow, New Hampshire to Kingston, New Hampshire. In the event that the federal or state approvals requiring the preservation of the Property are found invalid or improper by a court or other body with competent jurisdiction, this Declaration shall be voidable at the sole election of the Grantee within one year after any such approval is found to be invalid or improper. Said Declaration shall otherwise run concurrently with the validity of the corresponding approvals or permits for the construction of said improvements. The remaining provisions of this paragraph are expressly subject to the above provisions of this paragraph, and this Declaration shall not be construed so as to negate the above provisions of this paragraph. The benefits of the restrictive covenants imposed hereby shall not be appurtenant to any particular parcel of land but shall be in gross, held by the Declarant in public trust, with the express intent of creating an equitable servitude, enforceable as against any party, including the Declarant, who hereafter violates the within restrictive covenants. The Declarant shall hold said benefit unless and until the Declarant assigns or transfers the benefit of the restrictive covenants imposed hereby to any other subdivision of the State of New Hampshire or to any subdivision of the U.S. Government, consistent with Section 170(c)(1) of the U.S. Internal Revenue Code of 1986, as amended (the "Code"), or to any qualified organization, within the meaning of Section 170(h)(3) of the Code, that has among its purposes the conservation and preservation of land and water areas and that agrees to and is capable of enforcing the purposes of this Declaration. Until such assignment or transfer, the Declarant expressly admits that it shall be hereafter estopped to deny that the within restrictive covenants do not apply to the Declarant. The assignment or transfer shall be accomplished by the conveyance of a conservation easement approved by the Department of the Army, New England District, Army Corps of Engineers. The burden of the restrictive covenants imposed hereby shall run with the Property and shall be enforceable against all future owners and tenants in perpetuity, until such assignment or transfer, when this Declaration and the restrictive covenants herein shall be terminated by the recording of a Release of Restrictive Covenants by the Declarant, contemporaneously with the conveyance of the aforesaid conservation easement. With the exception of the aforesaid admission of estoppel, nothing in this Declaration shall be interpreted or construed as a waiver of the State's sovereign immunity.

MERGER

In view of the public interest in the creation and enforcement of the restrictive covenants imposed hereby, the Declarant declares that it is its express intent that the provisions of this Declaration set forth herein are to last in perpetuity, subject to assignment or transfer and termination as described above, and that to that end, neither the doctrine of merger nor any other legal doctrine shall be deemed to eliminate

the restrictive covenants imposed hereunder, or any portion thereof. The Declarant expressly admits that it is estopped to argue that any legal or equitable basis exists to eliminate the restrictive covenants imposed hereunder, until the benefit of the restrictive covenants is assigned or transferred and the restrictive covenants are released as described above.

SEVERABILITY

If any provision of this Declaration, or the application thereof to any person or circumstance, is found to be invalid by a court of competent jurisdiction, by confirmation of an arbitration award or otherwise, such provision or the application thereof to persons or circumstances other than those to which it is found to be invalid shall not be affected thereby, nor shall the remainder of the provisions of this Declaration.

Said Declaration is being made in conjunction with the Plaistow-Kingston, MGS-STP-T-X5375(010), 10044B project.

IN WITNESS WHEREOF, the Declarant has hereto under set its hand this 20 day of December, 2007.

THE STATE OF NEW HAMPSHIRE

By: [Signature]
for Commissioner
Department of Transportation

The State of New Hampshire Merrimack SS December 20 A.D., 2007

On this 20 day of December, 2007, before me LINDA M. CLIFFORD the undersigned officer, personally appeared the Commissioner of the Department of Transportation, and that as such Commissioner, being authorized so to do, execute the foregoing instrument for the purposes therein contained, by signing the name of the State of New Hampshire as the Commissioner of the Department of Transportation.

[Signature]
~~Justice of the Peace/Notary Public~~
My Commission expires: May 5, 2009



APPENDIX "A"

Parcel No. 8:

A certain parcel of land, not homestead, situated on the Westerly side of NH Route 125, as now travelled, in the Town of Kingston, County of Rockingham, State of New Hampshire, and being near NH Route 125 Construction Base Line Station 2091+00 as shown on a Plan of Kingston, STP-X-019-1(24), 10044-C, on file in the records of the New Hampshire Department of Transportation and to be recorded in the Rockingham County Registry of Deeds, bounded and described as follows:

Southerly by land now or formerly of Eugene M. Quimby twenty-three (23) rods; Westerly by land now or formerly of said Eugene M. Quimby seven (7) rods; Northerly by land now or formerly of Thomas Barrett twenty-seven (27) rods; and on the Easterly side by the above mentioned highway ten (10) rods and nine (9) links; containing one (1) acre, more or less.

Containing one and thirty hundredths (1.30) acres, more or less.

Parcel Nos. 9 and 9A:

Certain parcels of land, not homestead, situated on the Westerly side of NH Route 125, as now travelled, in the Town of Kingston, County of Rockingham, State of New Hampshire, and being near NH Route 125 Construction Base Line Station 2092+00 as shown on a Plan of Kingston, STP-X-019-1(24), 10044-C, on file in the records of the New Hampshire Department of Transportation and to be recorded in the Rockingham County Registry of Deeds, bounded and described as follows:

Parcel No. 9:

Beginning at the corner of land formerly of Gideon Webster, situated on the road leading from Kingston to Plaistow; thence running Westerly by said land 33 rods to a stake and stones in the old fence; thence Northeasterly by land now or formerly of the late Abby G. Webster as the old fence and wall now stand 28½ rods to stone wall of the old homestead lot; thence by the wall of the old homestead lot 33-1/3 rods to the highway; thence Southeasterly by said highway 29½ rods to the bound begun at. Containing 4 acres, more or less.

EXCEPTING OUT OF THE ABOVE CONVEYANCE:

A certain parcel of land situated on the Westerly side of the Plaistow-Kingston Road in said Kingston, County and State, bounded and described as follows:

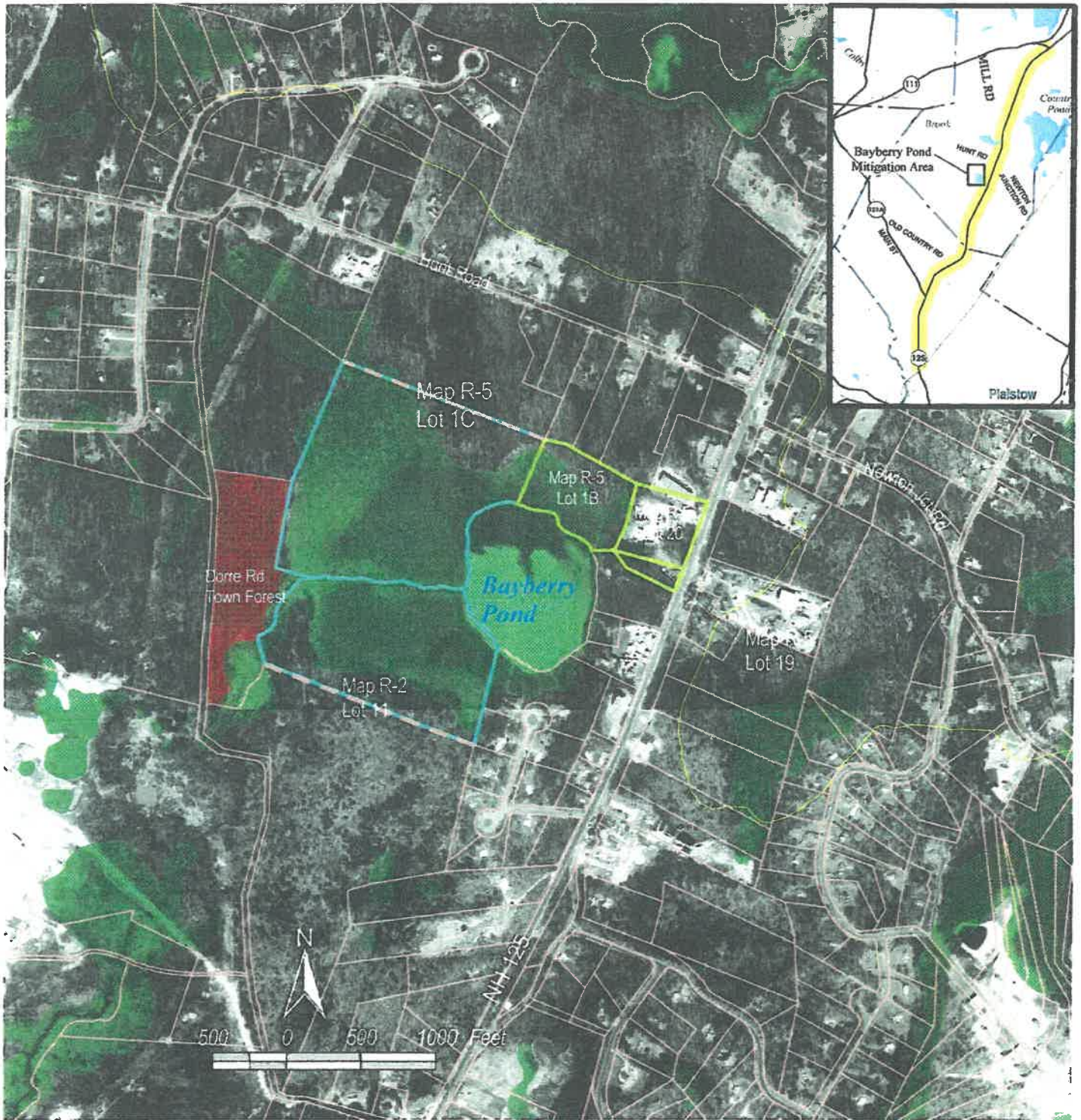
All of the land belonging to John J. Barrett and Christie B. Barrett that comes within a distance of 50 feet measured Easterly and 50 feet measured Westerly from the center line as shown on a plan of Kingston Federal Aid Project S. 300 (2) for 1951 on file in the records of the New Hampshire Department of Public Works and Highways between land now or formerly of Ann Whittier on the South near station 192+50 and land now or formerly of Ruth D. Bradley on the North near station 101+00. Containing 1.2 acres, more or less.

Parcel No. 9A:

A certain parcel of land situated in Kingston, Rockingham County, State of New Hampshire, being shown as Lot Number 1C on plan of land entitled "Subdivision of Land in Kingston, N. H. Prepared for Owner & Subdivider Jesse W. Shaw, 80 Mudnock Road, Salisbury, Mass. 01950", which plan is duly recorded in the Rockingham County Registry of Deeds as Plan Number D-12136, and which lot is more particularly bounded and described as follows:








Beginning at a point at the northeasterly corner of said tract, thence turning and running S. 46° 34' 02" E. 17.72 feet, more or less, to a point, as shown on said plan; thence turning and running S. 60° 25' 16" E. 59.36 feet, more or less, to a point, as shown on said plan; thence turning and running S. 57° 11' 24" E. 83.44 feet, more or less, to a point, as shown on said plan; thence turning and running along a stone wall, S. 43° 24' 26" E. 550.67 feet, more or less, to a point, as shown on said plan; thence turning and running S. 32° 09' 20" W. 317.36 feet, more or less, to a point, as shown on said plan; thence turning and running S. 39° 01' 00" W. 158.54 feet, more or less, to a point, as shown on said plan; thence turning and running S. 76° 15' 30" W. 103.18 feet, more or less, to a point, as shown on said plan; thence turning and running in a generally northwesterly direction 700 feet, more or less, along the shore of Bayberry Pond, to a point, as shown on said plan; thence turning and running N. 40° 06' 11" E. 470.00 feet, more or less, to the point of beginning.

Containing in all fourteen and twenty-nine hundredths (14.29) acres, more or less.



Vanasse Hangen Brustlin, Inc.

**Figure 1 - Aerial Photo
Sullivan Properties & Bayberry Pond
Kingston, New Hampshire**

- | | | | |
|---|---------------------------|---|-----------------------------|
|  | Sullivan Properties |  | Surface Waters |
|  | Potential Mitigation Site |  | NWI Wetlands |
|  | Watershed Boundaries |  | Conservation Lands (GRANIT) |
|  | Tax Parcels | | |

Note: Dashed lot lines represent portions of Map R-5/Lot 1C and R-2/Lot 11 that may be acquired for mitigation.
Aerial: 1998 B&W Digital Orthophoto, GRANIT GIS System

OSullivan, Andrew

From: Laurin, Marc
Sent: Monday, February 26, 2024 3:12 PM
To: Nichols, Emily; Lindsey Lefebvre
Cc: OSullivan, Andrew; Benedict, Karl; Michael Hicks; Brown, Joshua; Detzel, Seta; Tilton, Mary Ann
Subject: RE: Plaistow-Kingston, 10044E - Mitigation (email 1 of 2)
Attachments: Wetland Impact Summary Table Final.pdf; Plaistow-Kingston 10044B - Corps Permit Figures.pdf

Emily and Lindsey,

As requested, enclosed please find the Wetland Impact Summary Table with the information you requested. The impacts are based on As-Build plans.

I am also attaching the Corps Permit Figure that was included in the Corps wetland application, as it shows the original proposed impacts along the whole 6 mile corridor from East Road in Plaistow northerly to Stoney Brook Lane in Kingston. As previously noted, the 10044I construction contract is no longer being considered by DOT.

Let me know if you have any questions or need clarification.

Marc

From: Nichols, Emily <Emily.P.Nichols@des.nh.gov>
Sent: Tuesday, January 16, 2024 2:34 PM
To: Laurin, Marc <marc.g.laurin@dot.nh.gov>; Lindsey Lefebvre <lindsey.e.lefebvre@usace.army.mil>
Cc: OSullivan, Andrew <Andrew.M.OSullivan@dot.nh.gov>; Benedict, Karl <Karl.D.Benedict@des.nh.gov>; Michael Hicks <Michael.C.Hicks@usace.army.mil>; Brown, Joshua <Joshua.R.Brown@dot.nh.gov>; Detzel, Seta <Seta.A.Detzel@des.nh.gov>; Tilton, Mary Ann <mary.a.tilton@des.nh.gov>
Subject: RE: Plaistow-Kingston, 10044E - Mitigation (email 1 of 2)

Hi Marc,

Thank you for your patience with our response to the above referenced Wetland Bureau Files. NHDES met with the Corps and EPA to discuss the proposed impacts and potential compensatory mitigation needs. Compensatory mitigation requirements and applicability of prior mitigation package towards the pending proposed impacts must be evaluated based on current mitigation requirements and ratios spelled out in Env-Wt 800 and the 2020 [NEW ENGLAND DISTRICT COMPENSATORY MITIGATION STANDARD OPERATING PROCEDURE](#) (Table C-1)).

To determine compensatory mitigation for unavoidable impacts, additional clarification is needed on impact quantities. The impact summary table provided is dated 2015. Please provide an updated summary table for the total impacts by wetland types and other impacts such as streams. The table should include a clear summary of the impacts initially proposed, constructed, and new/current proposed impacts. For constructed impacts please clarify how these impact quantities were derived (i.e. based on as-built surveys) and a note when construction was completed.

Town	Wetland type or other impacts	Impacts authorized under #2004-0763		Constructed/Proposed Impacts 2004-00763 or pending application #2023-00958		Construction Status (Completed/Pending)	Contract # and completion date
		Permanent	Temporary	Permanent	Temporary		

	such as streams	SF	LF	SF	LF	SF	LF	SF	SF		
Totals											

Upon receipt of this requested information, the Corps, EPA, and NHDES will reconvene to determine the compensatory mitigation requirements for the pending permit application.

Thank you,

Emily

Emily Nichols
[Aquatic Resource Mitigation Program](#)
 Wetlands Bureau, Land Resources Management
 Water Division, NH Department of Environmental Services
 P.O. Box 95
 Concord, NH 03302-0095
 Email: Emily.P.Nichols@des.nh.gov
 Phone: (603) 271-4059

We value your feedback. Please consider completing a 3-minute [customer satisfaction survey](#).

From: Laurin, Marc <marc.g.laurin@dot.nh.gov>
Sent: Thursday, January 4, 2024 11:19 AM
To: Nichols, Emily <Emily.P.Nichols@des.nh.gov>; Lindsey Lefebvre <lindsey.e.lefebvre@usace.army.mil>
Cc: OSullivan, Andrew <Andrew.M.OSullivan@dot.nh.gov>; Benedict, Karl <Karl.D.Benedict@des.nh.gov>; Michael Hicks <Michael.C.Hicks@usace.army.mil>; Brown, Joshua <Joshua.R.Brown@dot.nh.gov>; Detzel, Seta <Seta.A.Detzel@des.nh.gov>
Subject: RE: Plaistow-Kingston, 10044E - Mitigation (email 1 of 2)

Emily and Lindsey,

Have you had a chance to review this information yet? We were hoping to provide the response to the RFMI in the near future as this application has been in the works for a while.

Let me know if you have any questions.

Thanks,

Marc

From: Laurin, Marc <marc.g.laurin@dot.nh.gov>
Sent: Monday, December 11, 2023 8:04 AM
To: Nichols, Emily <Emily.P.Nichols@des.nh.gov>; Lindsey Lefebvre <lindsey.e.lefebvre@usace.army.mil>
Cc: OSullivan, Andrew <Andrew.M.OSullivan@dot.nh.gov>; Benedict, Karl <Karl.D.Benedict@des.nh.gov>; Michael Hicks <Michael.C.Hicks@usace.army.mil>; Brown, Joshua <Joshua.R.Brown@dot.nh.gov>; Detzel, Seta <Seta.A.Detzel@des.nh.gov>
Subject: RE: Plaistow-Kingston, 10044E - Mitigation (email 1 of 2)

Emily and Lindsey,

Attached is a memorandum *Plaistow-Kingston 10044E Mitigation Summary Update* that addresses justification that appropriate mitigation for the 10044E contract would be covered under the existing Plaistow-Kingston, 10044B corridor mitigation package.

Regarding the Sullivan Properties, attached is the *Declaration of Restrictive Covenant* for the site with the *Sullivan Mitigation Tax Map Aerial*.

I have also included in this email, and due to the size of the files in a second email, the following supporting information as enclosures to this memorandum:

- October 2009 *Wetland Mitigation Technical Report, Reconstruction of NH 125 Wetland Mitigation, Plaistow and Kingston, NH*
- March 2006 *Addendum to: the Final Environmental Assessment & Section 4(f) Evaluation*
- September 2006 *Wetland Mitigation Technical Report, Sullivan Properties (Map R5, Lots 20,19 and 1B), Kingston, NH*
- Plaistow-Kingston, 10044F *Wetland Mitigation Grading Plan*, and 2011 transmittal letters to DES and ACOE of the full plans
- 08/18/2015, *Plaistow-Kingston 10044-G, DES Permit #2004-00736 Wetlands Mitigation Summary/Proposal* memorandum
- *Plaistow-Kingston (Project #10044) Wetland Impacts Summary* matrix

Let me know if you require more information or need clarification on this submittal.

Marc

From: Nichols, Emily <Emily.P.Nichols@des.nh.gov>

Sent: Tuesday, November 28, 2023 11:08 AM

To: Laurin, Marc <marc.g.laurin@dot.nh.gov>

Cc: OSullivan, Andrew <Andrew.M.OSullivan@dot.nh.gov>; Benedict, Karl <Karl.D.Benedict@des.nh.gov>; Lindsey Lefebvre <lindsey.e.lefebvre@usace.army.mil>; Michael Hicks <Michael.C.Hicks@usace.army.mil>; Brown, Joshua <Joshua.R.Brown@dot.nh.gov>; Detzel, Seta <Seta.A.Detzel@des.nh.gov>

Subject: RE: Plaistow-Kingston, 10044E - Mitigation

Good morning Marc.

I understand that NHDOT and the Corps met yesterday to discuss NHDOT Project 10044E and mitigation requirements. NHDES reviewed the documentation on file and agrees with the Corps that more information is needed to determine if additional mitigation is required. NHDES requests to be copied on future correspondence that identifies the aquatic resources on the preserved parcels, previous impacts and new proposed impacts.

The original project scope for Wetlands Permit 2004-0763/NHDOT 10044B included Dredge and / or fill approximately 4.49 acres of palustrine and riverine to reconstruct and widen approximately 6 miles of Route 125 to provide through lanes, a center left turn lane, intersection improvements and the construction of a service road. Compensatory mitigation for NHDOT Project 10044B included a total of **80.8 acres** of conservation land including restoration of **2 acres** of wetlands.

Review of our files indicates that the following compensatory mitigation was completed:

- Pow-Wow Conservation Easement (Nichols Property) Kingston protecting **22.3 acres** of land depicted on Plan D-7324, recorded at Rockingham County Registry of Deeds (BK4848 PG0226)

- Frog Pond (Kelly Brook Area, Plaistow) Declaration of Restrictive Covenants for Conservation Purposes, protecting **43.82** acres of land depicted on Plan D-4490, recorded at Rockingham County Registry of Deeds (BK4875 PG0738)
- Sullivan property mitigation project included wetland creation resulting in **3.4 acres** of wetlands

The final mitigation package documentation in our files documents the conservation of **66.12 acres** and restoration/creation of **3.4 acres** wetland. Is there correspondence in your files that documents NHDES or USACE approval of the reduction in conservation lands/additional restoration areas? Was a conservation easement or other long-term protection mechanism established for the restoration areas on the Sullivan Property?

Please provide clarification on the completed mitigation components in addition to information requested by the Corps.

Reach out if you have questions or wish to discuss.

Thanks,

Emily

Emily Nichols
[Aquatic Resource Mitigation Program](#)
Wetlands Bureau, Land Resources Management
Water Division, NH Department of Environmental Services
P.O. Box 95
Concord, NH 03302-0095
Email: Emily.P.Nichols@des.nh.gov
Phone: (603) 271-4059

We value your feedback. Please consider completing a 3-minute [customer satisfaction survey](#).

From: Laurin, Marc <marc.g.laurin@dot.nh.gov>
Sent: Thursday, November 16, 2023 7:41 AM
To: Nichols, Emily <Emily.P.Nichols@des.nh.gov>
Cc: OSullivan, Andrew <Andrew.M.OSullivan@dot.nh.gov>; Benedict, Karl <Karl.D.Benedict@des.nh.gov>
Subject: RE: Plaistow-Kingston, 10044E - Mitigation

Emily,

Thanks for making this a priority. I talked to Mike Hicks on this yesterday, so he should be up to speed on the details.

Let me know if you have any questions or need further clarification.

Marc

From: Nichols, Emily <Emily.P.Nichols@des.nh.gov>
Sent: Thursday, November 16, 2023 6:33 AM
To: Laurin, Marc <marc.g.laurin@dot.nh.gov>
Cc: OSullivan, Andrew <Andrew.M.OSullivan@dot.nh.gov>; Benedict, Karl <Karl.D.Benedict@des.nh.gov>
Subject: RE: Plaistow-Kingston, 10044E - Mitigation

Hi Marc,

My apologies for taking so long to review this. I have scheduled some time to go through everything on Monday. I will try to coordinate a response with the Corps and get back to you before Thanksgiving.

Again, my apologies for the delay. My schedule is extremely packed with meetings lately and I am struggling to keep up with tasks. This is a priority, and I will respond next week if that is a sufficient timeline.

Thanks for your patience.

Emily

Emily Nichols

[Aquatic Resource Mitigation Program](#)

Wetlands Bureau, Land Resources Management

Water Division, NH Department of Environmental Services

P.O. Box 95

Concord, NH 03302-0095

Email: Emily.P.Nichols@des.nh.gov

Phone: (603) 271-4059

We value your feedback. Please consider completing a 3-minute [customer satisfaction survey](#).

From: Laurin, Marc <marc.g.laurin@dot.nh.gov>

Sent: Wednesday, November 15, 2023 11:27 AM

To: Nichols, Emily <Emily.P.Nichols@des.nh.gov>

Cc: OSullivan, Andrew <Andrew.M.OSullivan@dot.nh.gov>

Subject: RE: Plaistow-Kingston, 10044E - Mitigation

Emily,

Can you confirm your concurrence with the mitigation for this latest Plaistow-Kingston construction contract, as has been requested of NHDOT by Karl in order for him to finalize the permit issuance.

Thanks,

Marc

From: Laurin, Marc

Sent: Thursday, October 26, 2023 10:41 AM

To: Nichols, Emily <Emily.P.Nichols@des.nh.gov>

Cc: OSullivan, Andrew <Andrew.M.OSullivan@dot.nh.gov>

Subject: Plaistow-Kingston, 10044E - Mitigation

Emily,

This project entails re-evaluating and updating the design of previously proposed improvements to a 1.7-mile segment of the NH Route 125 corridor located in Plaistow and Kingston. The 1.7-mile segment is the only remaining segment that has not yet been constructed from a 6-mile project corridor that was previously studied and approved (Plaistow-Kingston, 10044B).

Wetland impacts were previously mitigated as part of the overall Plaistow-Kingston 10044B project under NHDES Wetlands Permit #2004-00763 and US Army Corps Permit NAE-2004-01342. This mitigation package included 80.8 acres of land preservation and restoration of two wetlands. The previous permit and mitigation package allowed for up to 1.95

acres of permanent wetland impact under Contract 10044E. With the reduced project footprint (from 5 lanes to 3 lanes), wetland impacts were substantially reduced. The currently proposed 10044E Contract will have 0.354 acres of permanent wetland and bank impacts.

Pursuant to NHDOT's submittal of the NHDES Wetland Permit application for the Plaistow-Kingston, 10044E contract, Karl Benedict has requested that we inform you of the previous decisions that Lori Sommer made on the mitigation performed under the Plaistow-Kingston 10044B project, and that previous mitigation measures meets the current mitigation requirements for permitting Contract E.

Attached is the November 18, 2020 Natural Resource Agency meeting minutes and November 20, 2020 email where Lori concurred that "... stream mitigation has been provided to adequately compensate for the lost functions that may occur through [this] project."

Let me know if you have any questions.

Thanks,

Marc

**Plaistow-Kingston, 10044E
Wetland Impact Summary**

Town	Wetland type or other impacts such as streams	Wetland ID	Impacts authorized under #2004-0763				Constructed/Proposed Impacts #2004-00763 and Pending Application # 2023-00958				Construction Status (Completion/Pending)	Contract # and completion date
			Permanent		Temporary		Permanent		Temporary			
			SF	LF	SF	LF	SF	LF	SF	SF		
Kingston	POW	A	280				0				Completed	F, 2013
Plaistow	PEM/R2UB	B	0				588				Completed	G, 2018
Plaistow		AA	0				827				Completed	F, 2013
Plaistow	PFO/R2UB	C	16				1,110				Completed	G, 2018
Plaistow	PFO	FFF	9,005				7,730				Completed	G, 2018
Plaistow	PFO/PSS/PEM	EEE	9,520				6,713				Completed	F, 2013
Plaistow	PEM	H	997				379				Completed	F, 2013
Plaistow	PEM	I	571				1,020				Completed	F, 2013
Plaistow	PFO	J	6,567				8,656				Completed	D, 2010 & F, 2013
Plaistow	PSS/PFO	DDD	562				355				Completed	F, 2013
Plaistow	PFO/PEM/R2UB	CCC	5,427				6,589				Completed	D, 2010
Plaistow	PFO/POW	K	6,771				13,661				Completed	D, 2010 & F, 2013
Plaistow	Non Jurisdictional Detention Basin	DB1	5,784				5,784				Completed	D, 2010
Kingston	PFO	BBB	0				482				Completed (with 4 sf Pending in E)	D, 2010 & E, 2028
Kingston	PFO	DA	1,825				0				Pending	E, 2028
Kingston	PFO	AAA	11,464				797				Pending	E, 2028
Kingston	PFO	ZZ	10,094				1,833				Pending	E, 2028
Kingston	PEM	YY	3,359				0				Pending	E, 2028
Kingston	PFO/PEM/R2UB	M	9,306				2,558	5	886	8	Pending	E, 2028
Kingston	PFO	XX	4,216				736				Pending	E, 2028
Kingston	PFO/PEM	N & O	2,271				966				Pending	E, 2028
Kingston	PFO	ISO1	161				982				Pending	E, 2028
Kingston	PFO	P	645				884		45		Pending	E, 2028
Kingston	PFO	WW	41				256				Pending	E, 2028
Kingston	PFO/PSS	Q	1,975				53		331		Pending	E, 2028
Kingston	R2UB	T	363								N/A	I, no longer a project
Kingston	R2UB/PFO	PP	7,721								N/A	I, no longer a project
Kingston	PFO	U	5,865								N/A	I, no longer a project
Kingston	PFO	V	14,288								N/A	I, no longer a project
Kingston	PFO	OO	3,978								N/A	I, no longer a project
Kingston	PFO	W	108								N/A	I, no longer a project
Kingston	PFO	NN	2,452								N/A	I, no longer a project
Kingston	PFO/PEM	X	2,840								N/A	I, no longer a project
Kingston	PFO	Y	9								N/A	I, no longer a project
Plaistow	PSS/PEM	D	10,487				0				Completed	G, 2018
Plaistow	PEM	FR1	3,448				17,218				Completed	G, 2018
Plaistow	PFO/PSS/PEM	FR2	29,944				26,038				Completed	G, 2018
Plaistow	PEM	GGG	0				9,240				Completed	G, 2018
Plaistow	PSS	E	4,335				0				Completed	G, 2018
Kingston	PFO	L	15,200				6,228		517		Pending	E, 2028
Kingston	PSS	FR5	24,455				0				Pending	E, 2028
Kingston	PFO	GR	0				80				Pending	E, 2028
Totals			216,330	0	0	0	121,763	5	1779	8		

Kensington, 43809 Wetland Delineation

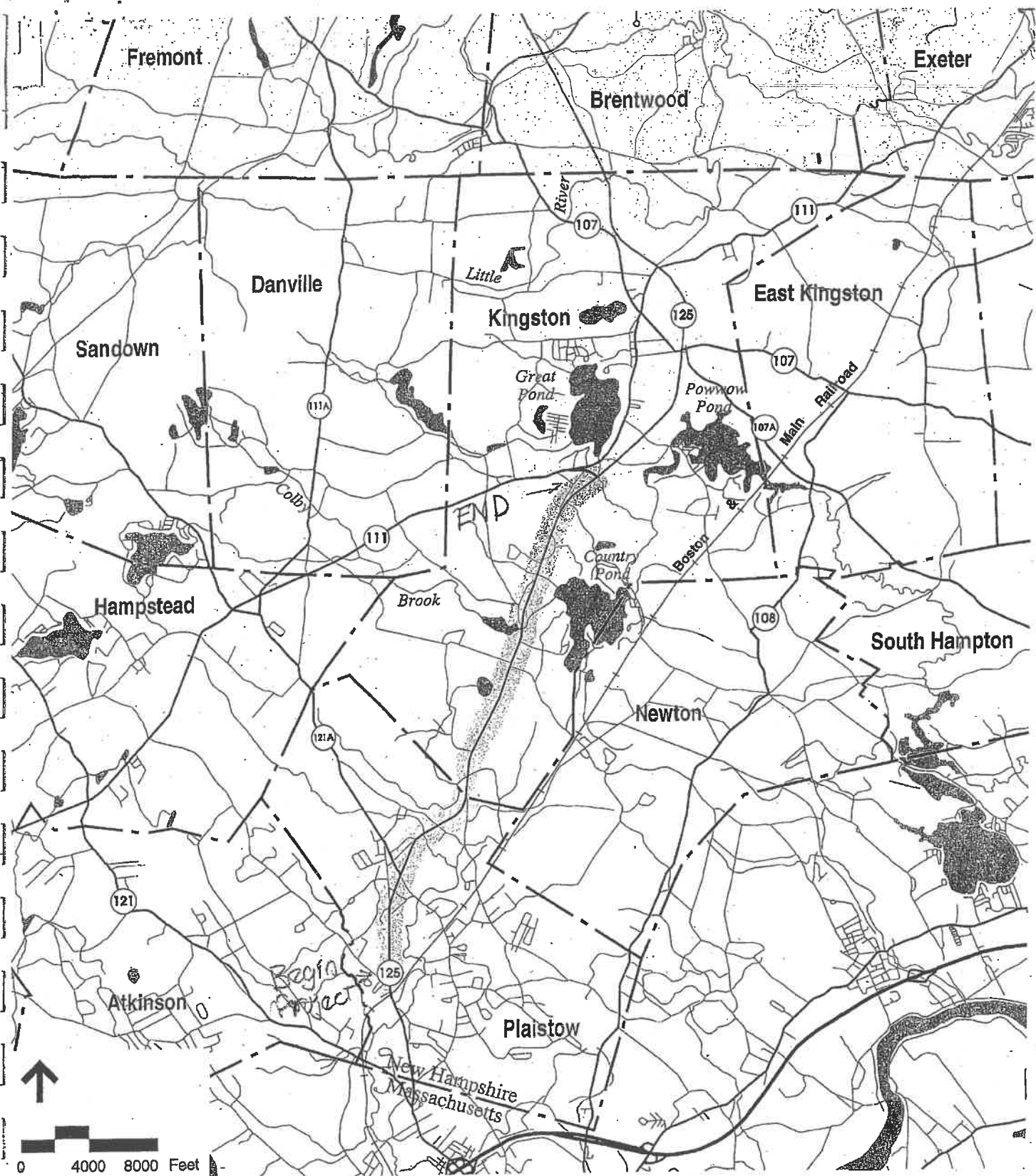


Legend

— Kensington_43908

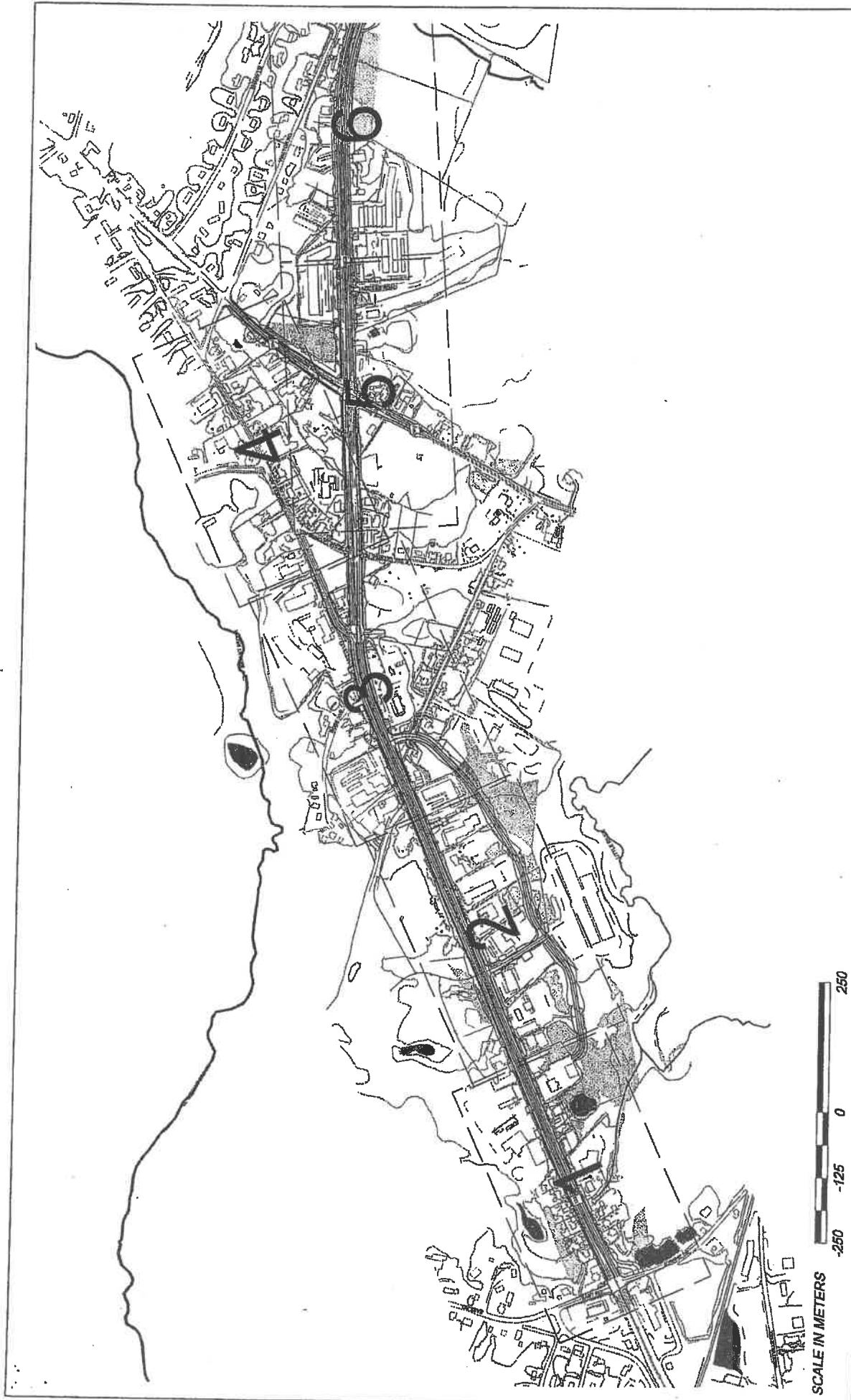
0 25 50 100 Feet

1:460



Vanasse Hangen Brustlin, Inc.

Figure 1
Project Location Map



INDEX TO WETLAND IMPACT PLANS

**PLAISTOW - KINGSTON
RECONSTRUCTION OF NH 125
MGS-STP-T-X-5375 (010), 10044B**

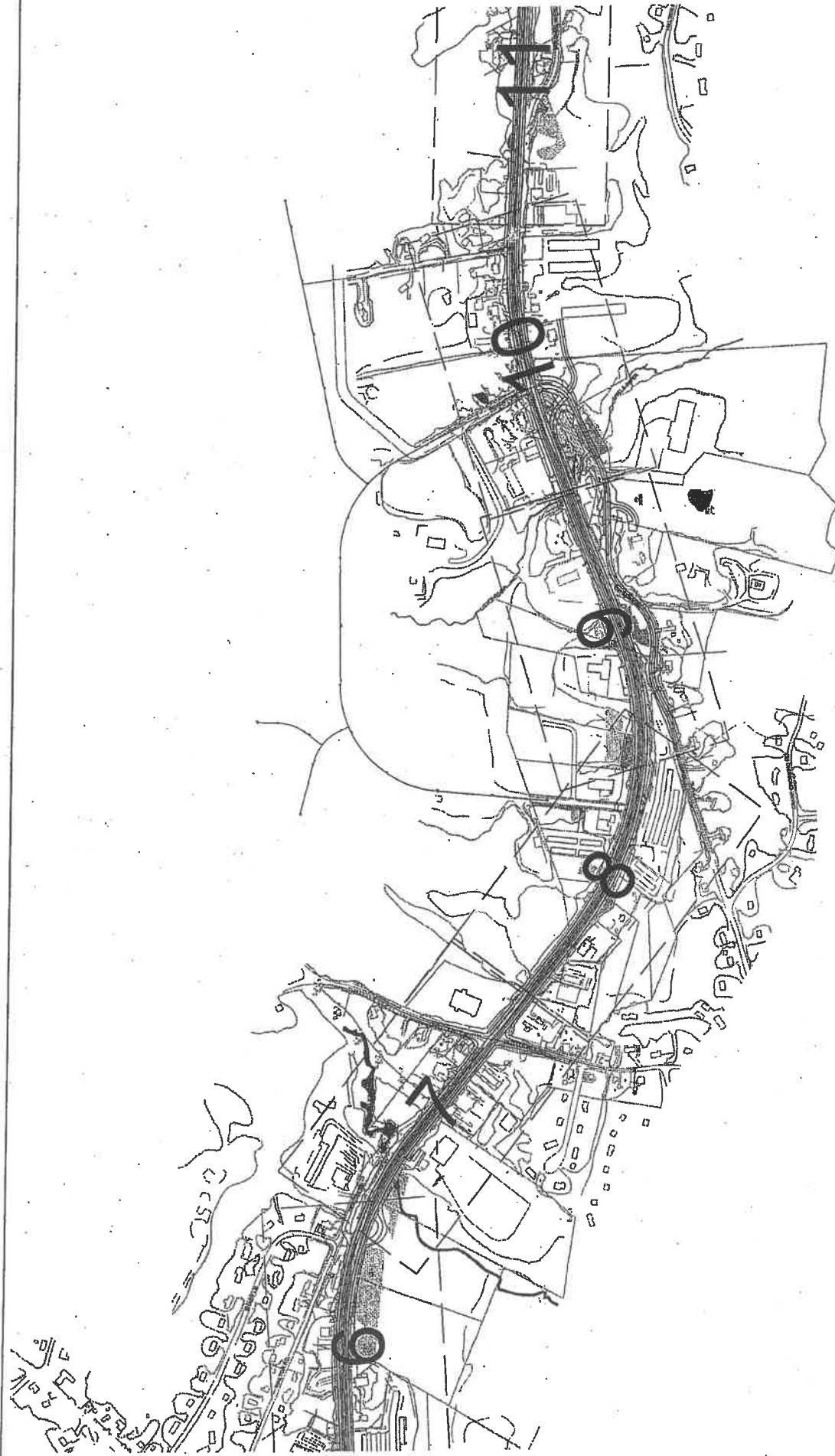
AT: PLAISTOW AND KINGSTON
IN: ROCKINGHAM COUNTY, NEW HAMPSHIRE

NOTE: ADDITIONAL INFORMATION ON WETLAND
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APPLICATION BY:
**NEW HAMPSHIRE DEPARTMENT
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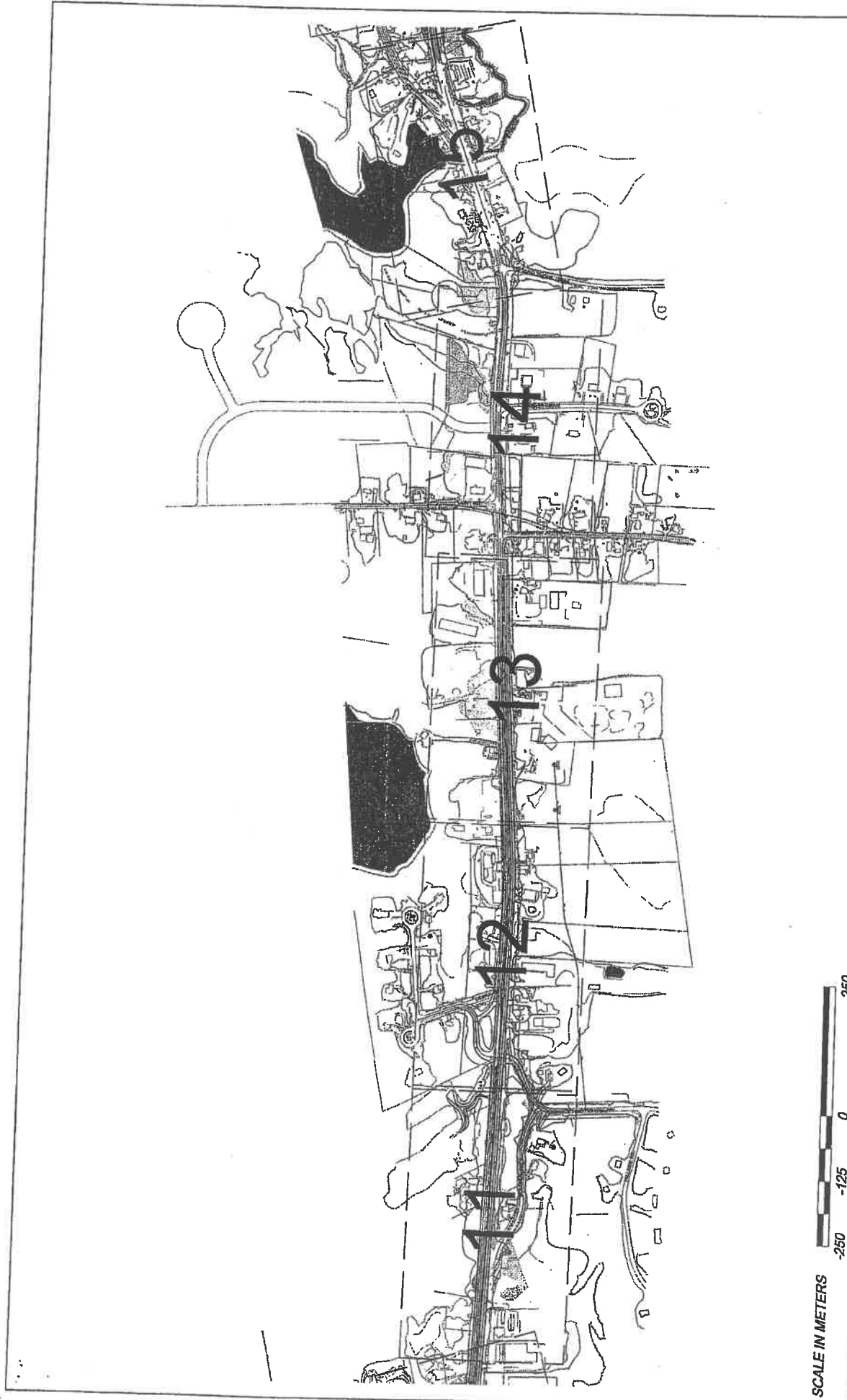
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SCALE IN METERS

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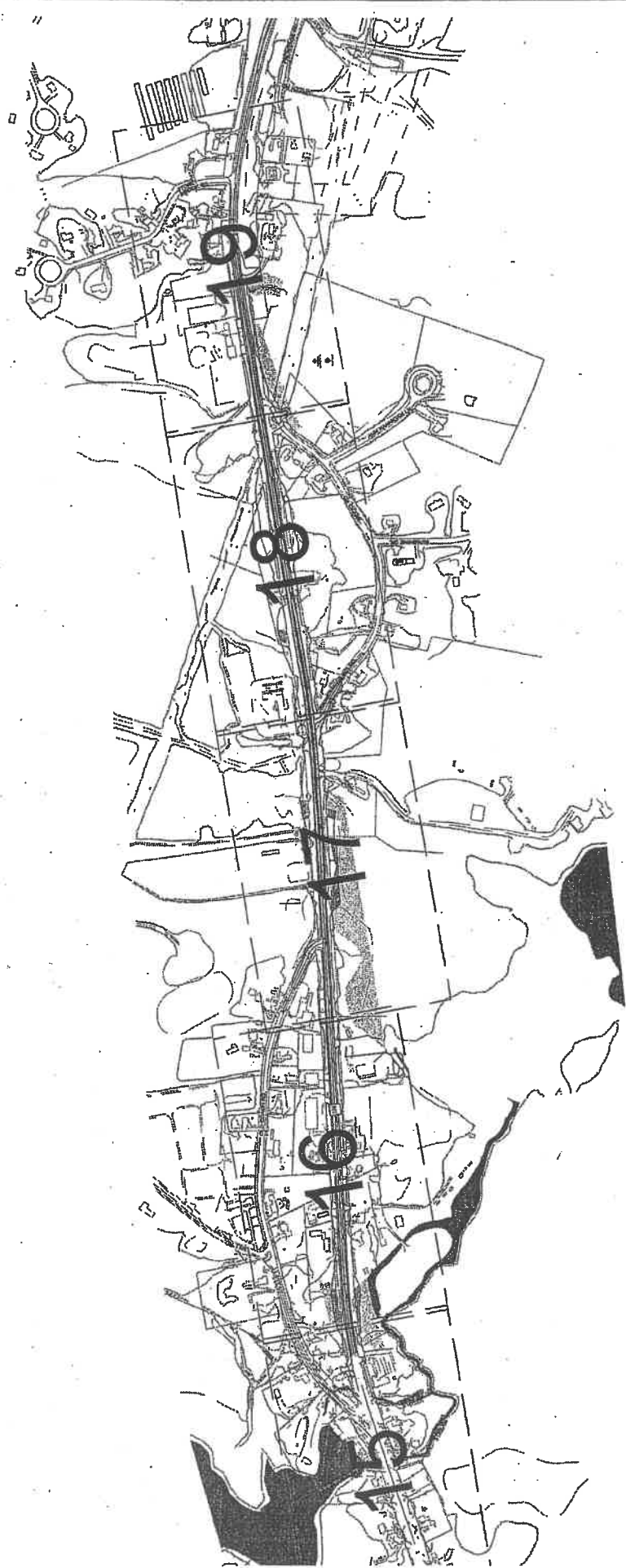
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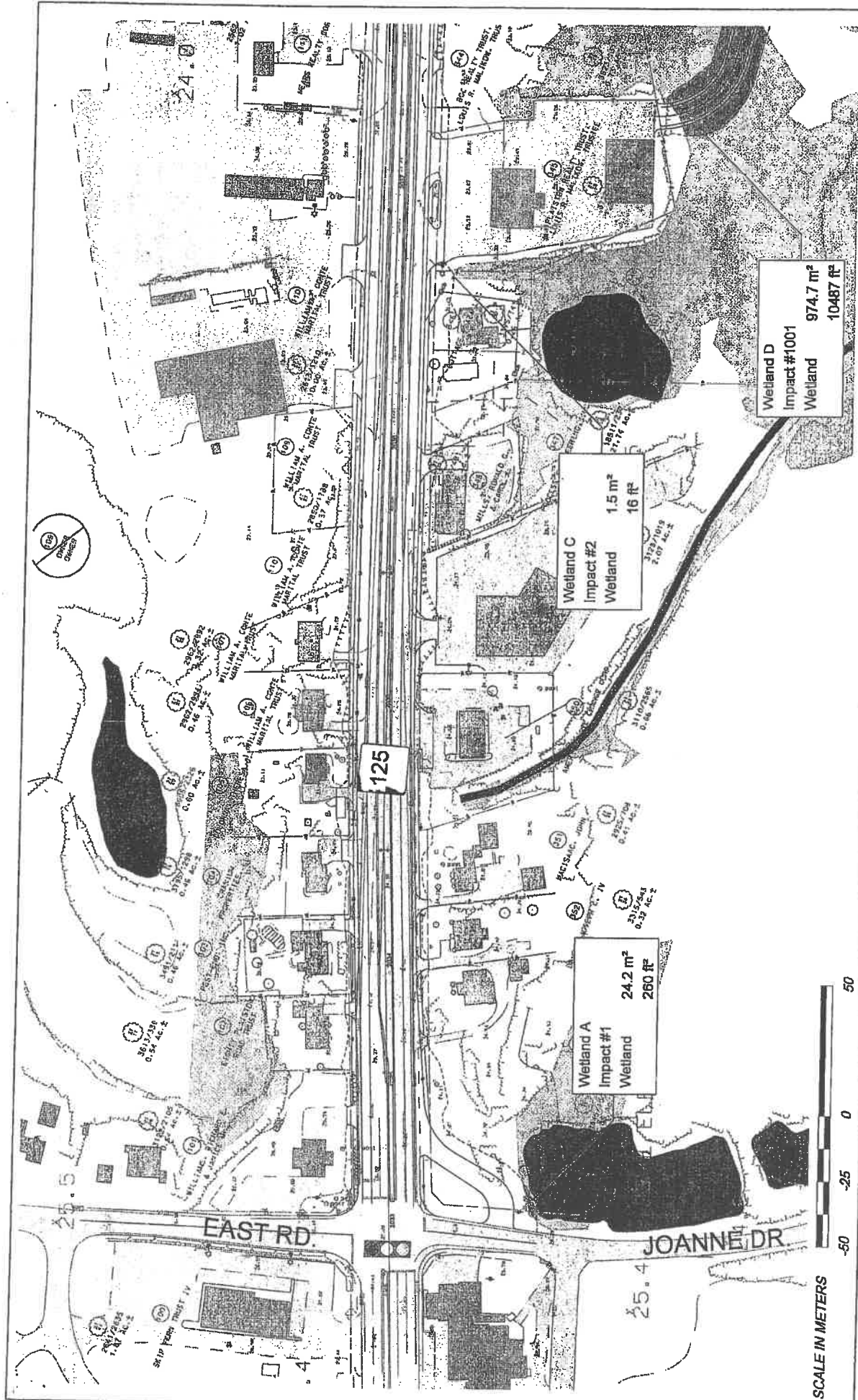
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SHEET 4 OF 4



Wetland D
Impact #1001
Wetland 974.7 m²
10487 ft²

Wetland C
Impact #2
Wetland 1.5 m²
16 ft²

Wetland A
Impact #1
Wetland 24.2 m²
260 ft²

LEGEND

	WETLAND
	CUT
	FILL
	SURFACE WATERS



PLAISTOW - KINGSTON
RECONSTRUCTION OF NH 125
MGS-STP-T-X-5375 (010), 10044B

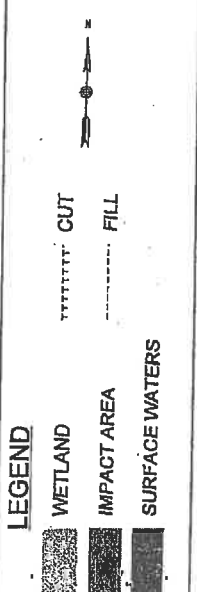
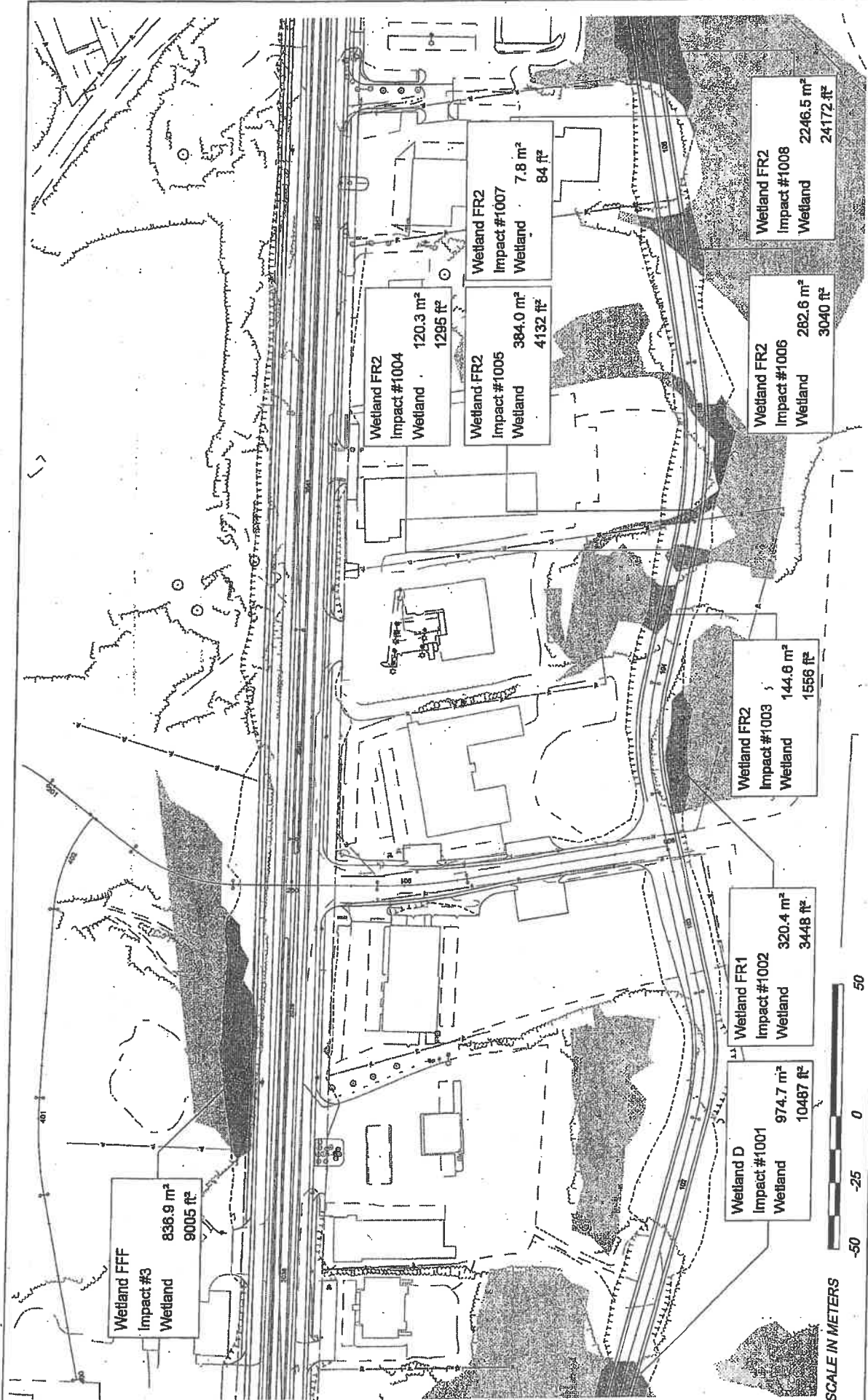
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**PLAISTOW - KINGSTON
RECONSTRUCTION OF NH 125
MGS-STP-T-X-5375 (010), 10044B**

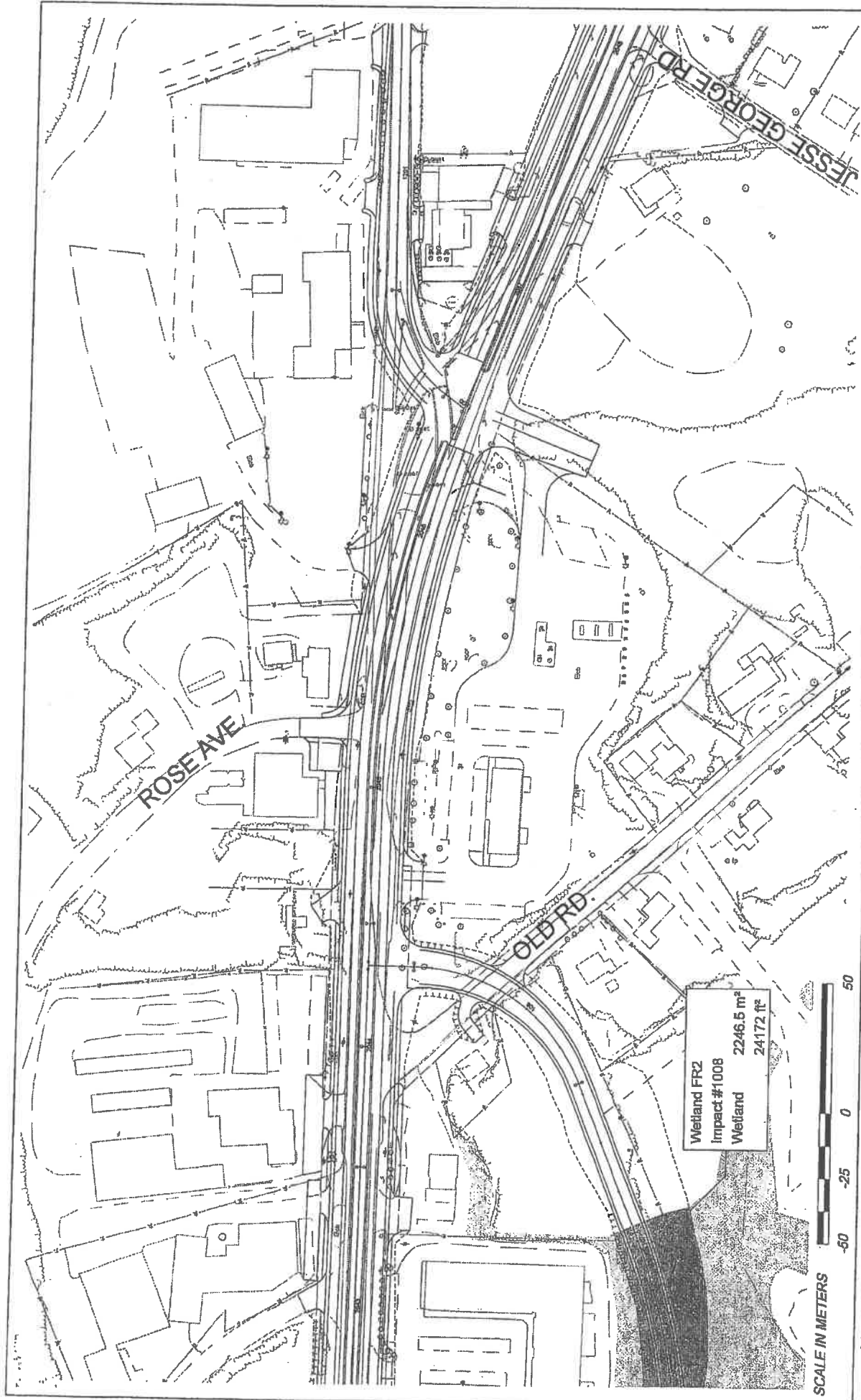
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SHEET 2 OF 19



Wetland FR2
Impact #1008
Wetland
2246.5 m²
24172 ft²



LEGEND

- WETLAND
- IMPACT AREA
- SURFACE WATERS
- CUT
- FILL

PLAISTOW - KINGSTON
RECONSTRUCTION OF NH 125
MGS-STP-T-X-5375 (010), 10044B

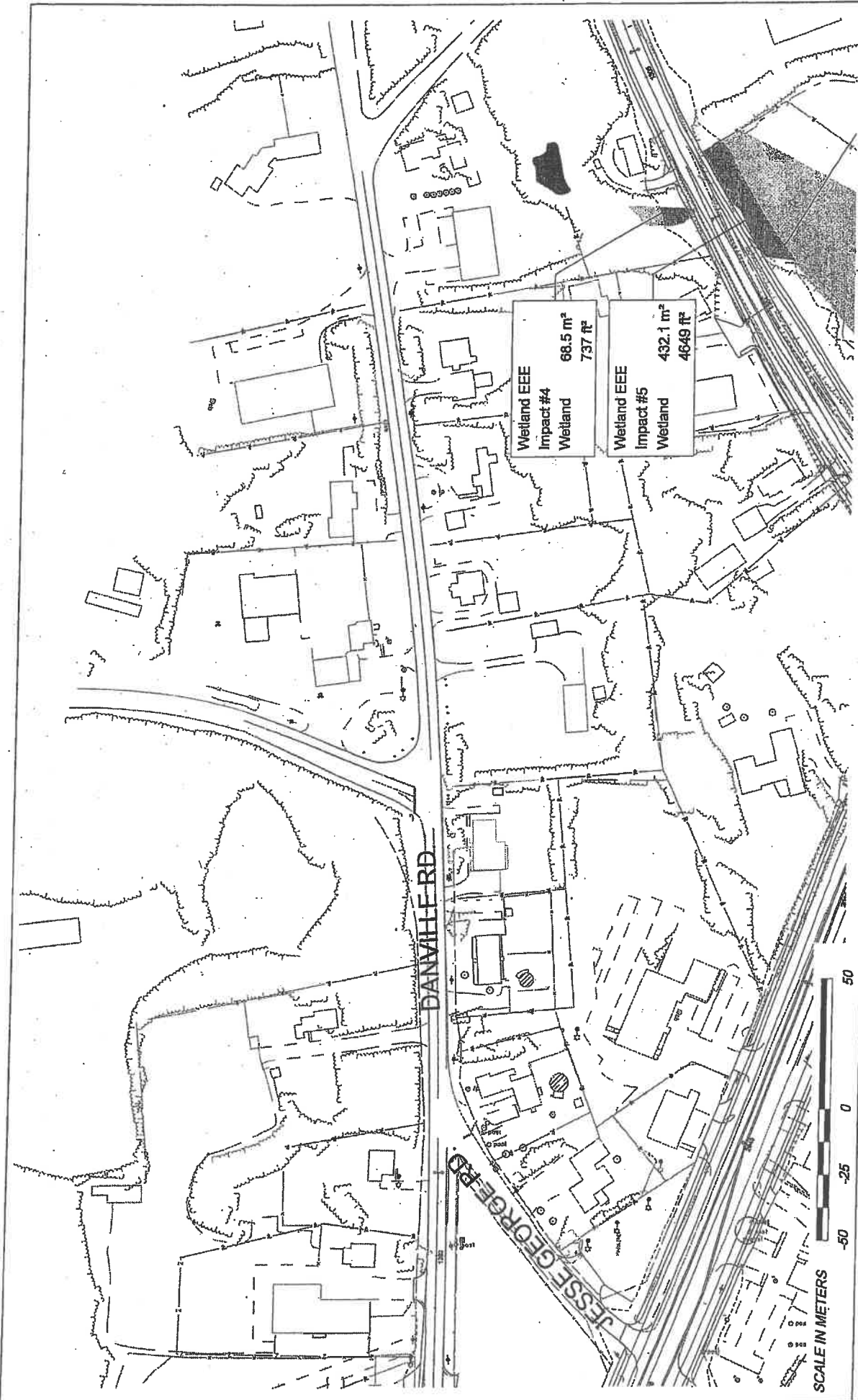
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NEW HAMPSHIRE DEPARTMENT
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Wetland EEE
Impact #4
Wetland
68.5 m²
737 ft²

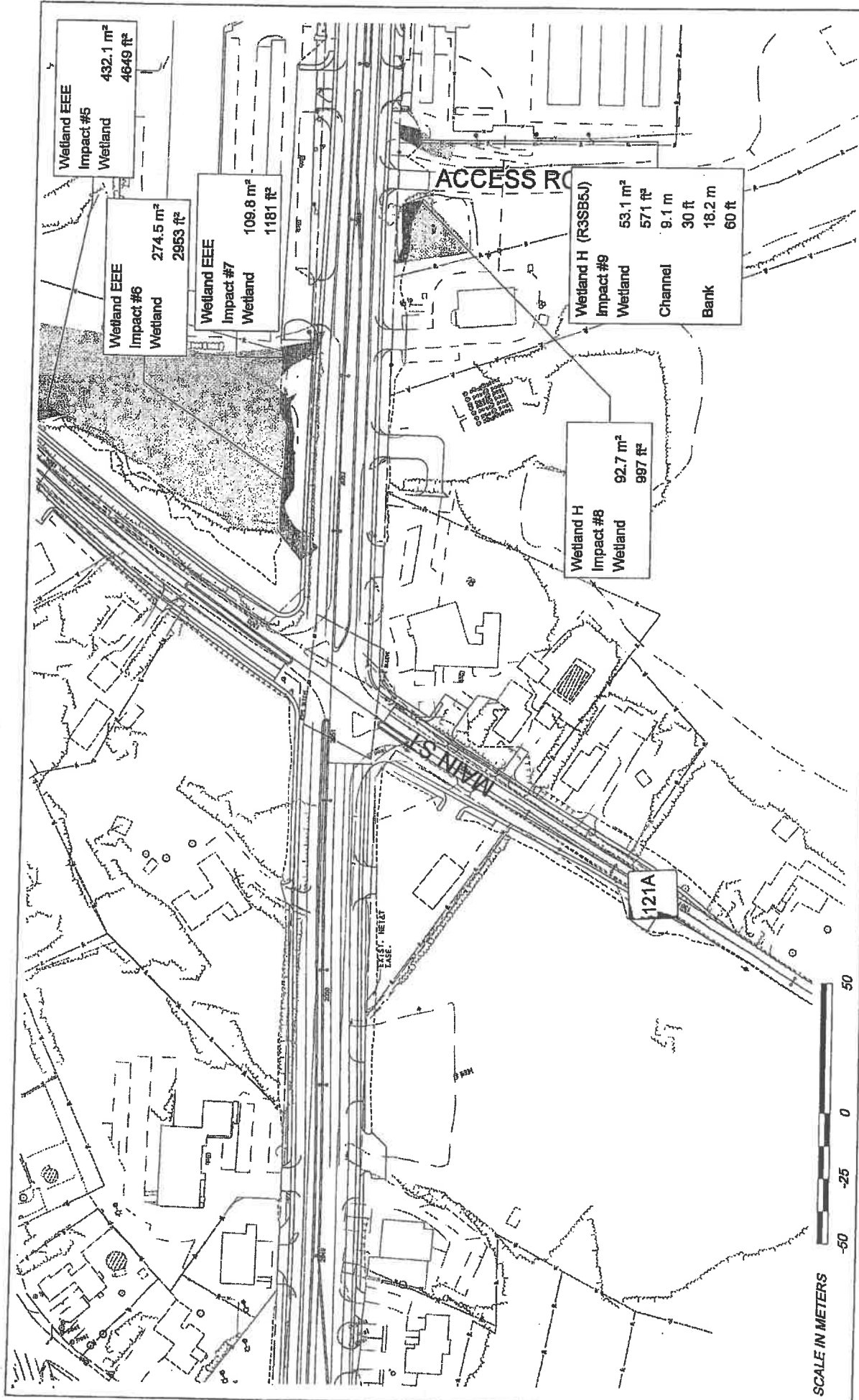
Wetland EEE
Impact #5
Wetland
432.1 m²
4649 ft²

<p>NOTE: ADDITIONAL INFORMATION ON WETLAND IMPACTS IS CONTAINED IN TABLES 1 AND 2.</p>	<p>PLAISTOW - KINGSTON RECONSTRUCTION OF NH 125 MGS-STP-T-X-5375 (010), 10044B AT: PLAISTOW AND KINGSTON IN: ROCKINGHAM COUNTY, NEW HAMPSHIRE</p>	<p>DATE: 4/15/2004</p>
<p>APPLICATION BY: NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION</p>		<p>SHEET 4 OF 19</p>

LEGEND

- WETLAND
- IMPACT AREA
- CUT
- FILL
- SURFACE WATERS





Wetland EEE
Impact #5
Wetland
432.1 m²
4649 ft²

Wetland EEE
Impact #6
Wetland
274.5 m²
2953 ft²

Wetland EEE
Impact #7
Wetland
109.8 m²
1181 ft²

Wetland H (R3SB5L)
Impact #9
Wetland
53.1 m²
571 ft²
Channel
9.1 m
30 ft
Bank
18.2 m
60 ft

Wetland H
Impact #8
Wetland
92.7 m²
997 ft²

PLAISTOW - KINGSTON
RECONSTRUCTION OF NH 125
MGS-STP-T-X-5375 (010), 10044B
AT: PLAISTOW AND KINGSTON
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APPLICATION BY:
NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION

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LEGEND

WETLAND

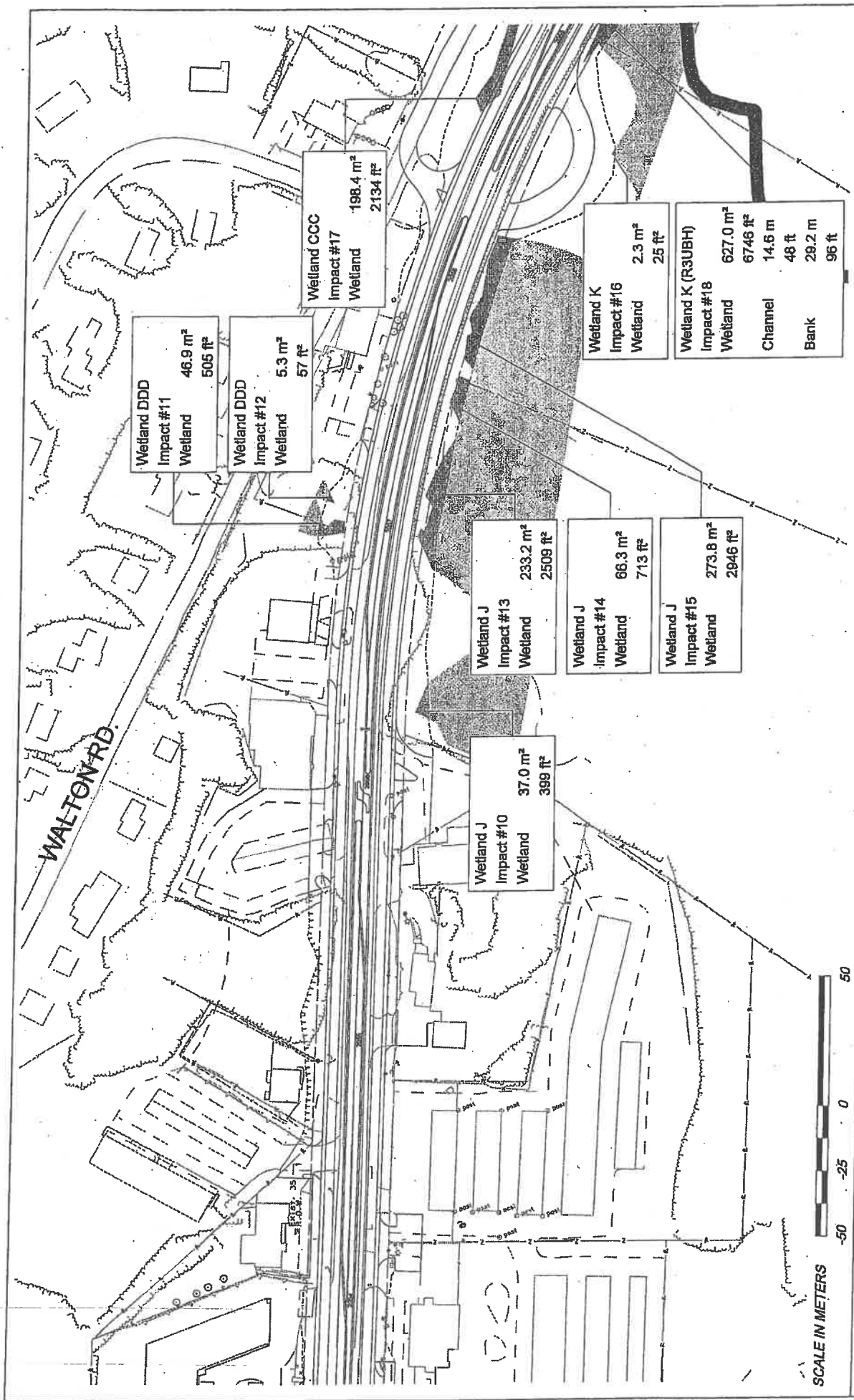
IMPACT AREA

SURFACE WATERS

CUT

FILL





Wetland DDD
Impact #11
Wetland 46.9 m²
505 ft²

Wetland DDD
Impact #12
Wetland 5.3 m²
57 ft²

Wetland CCC
Impact #17
Wetland 198.4 m²
2134 ft²

Wetland J
Impact #13
Wetland 233.2 m²
2509 ft²

Wetland J
Impact #14
Wetland 66.3 m²
713 ft²

Wetland J
Impact #15
Wetland 273.8 m²
2946 ft²

Wetland J
Impact #10
Wetland 37.0 m²
399 ft²

Wetland K
Impact #16
Wetland 2.3 m²
25 ft²

Wetland K (R3UBH)
Impact #18
Wetland 627.0 m²
6748 ft²
Channel 14.6 m
48 ft
Bank 29.2 m
96 ft



LEGEND

- WETLAND
- IMPACT AREA
- SURFACE WATERS
- CUT
- FILL

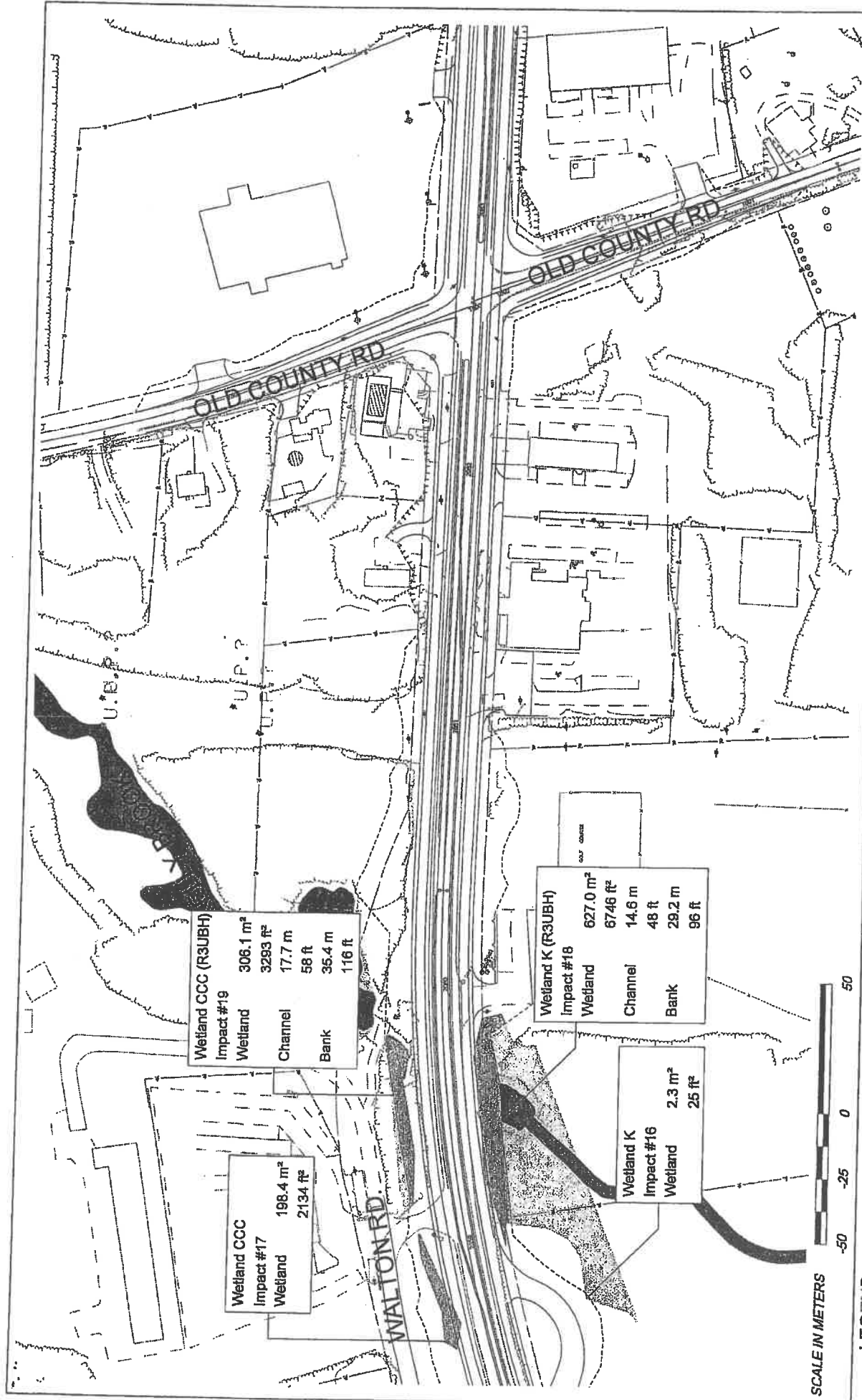
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APPLICATION BY:
NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION

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LEGEND

- WETLAND
- IMPACT AREA
- SURFACE WATERS
- CUT
- FILL

SCALE IN METERS

-50 0 50

PLAISTOW - KINGSTON
RECONSTRUCTION OF NH 125
MGS-STP-T-X-5375 (010), 10044B

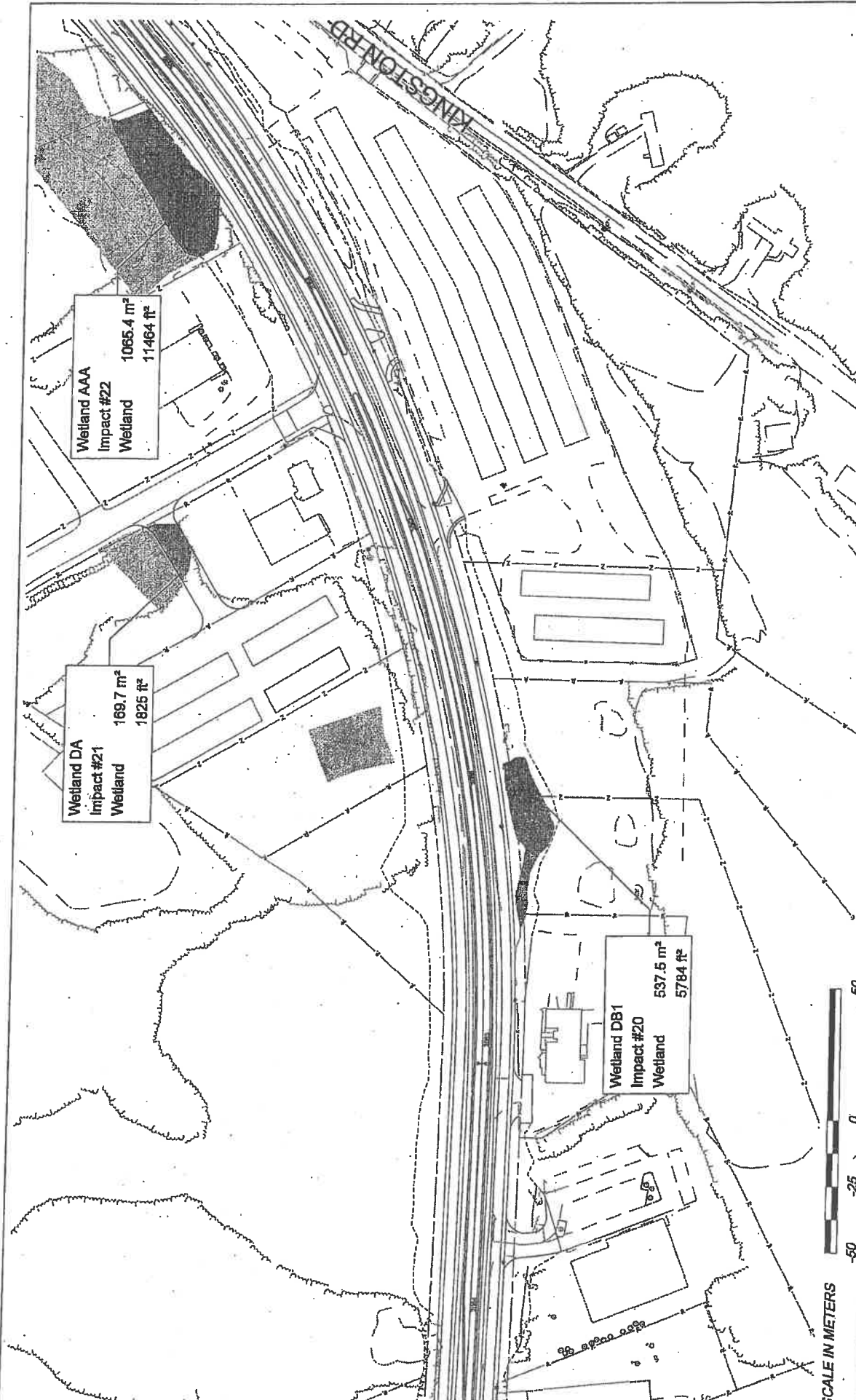
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NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION

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SHEET 7 OF 19



Wetland AAA
Impact #22
Wetland
1065.4 m²
11464 ft²

Wetland DA
Impact #21
Wetland
169.7 m²
1825 ft²

Wetland DB1
Impact #20
Wetland
537.5 m²
5784 ft²

PLAISTOW - KINGSTON
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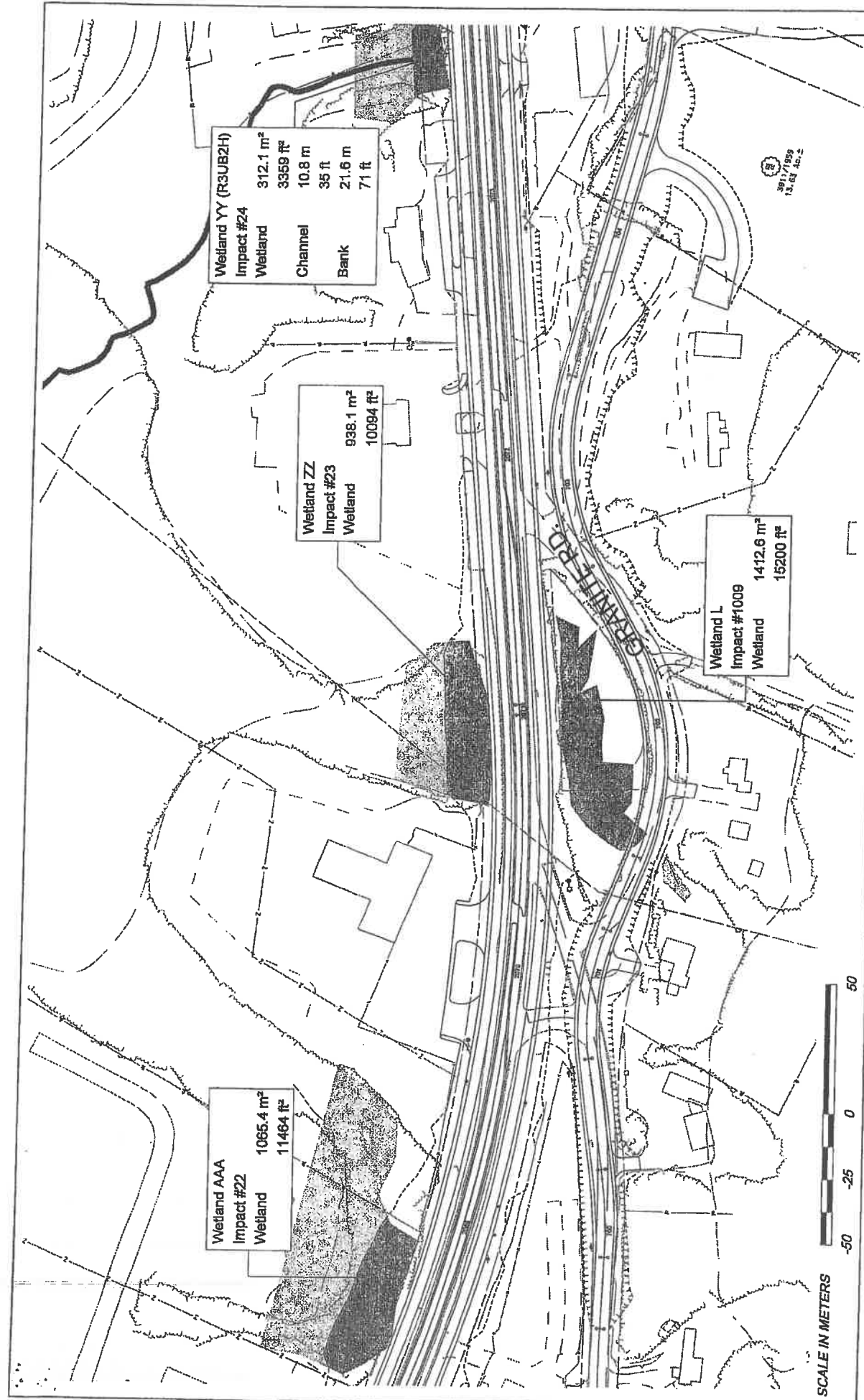
DATE: 4/15/2004

SHEET 8 OF 19

SCALE IN METERS

LEGEND

- WETLAND
- IMPACT AREA
- SURFACE WATERS
- CUT
- FILL



Wetland AAA
Impact #22
Wetland 1065.4 m²
11464 ft²

Wetland ZZ
Impact #23
Wetland 938.1 m²
10084 ft²

Wetland YY (R3UB2H)
Impact #24
Wetland 312.1 m²
3359 ft²
Channel 10.8 m
35 ft
Bank 21.6 m
71 ft

Wetland L
Impact #1009
Wetland 1412.6 m²
15200 ft²

3917
13.61
13.61



LEGEND

- WETLAND
- IMPACT AREA
- SURFACE WATERS
- CUT
- FILL

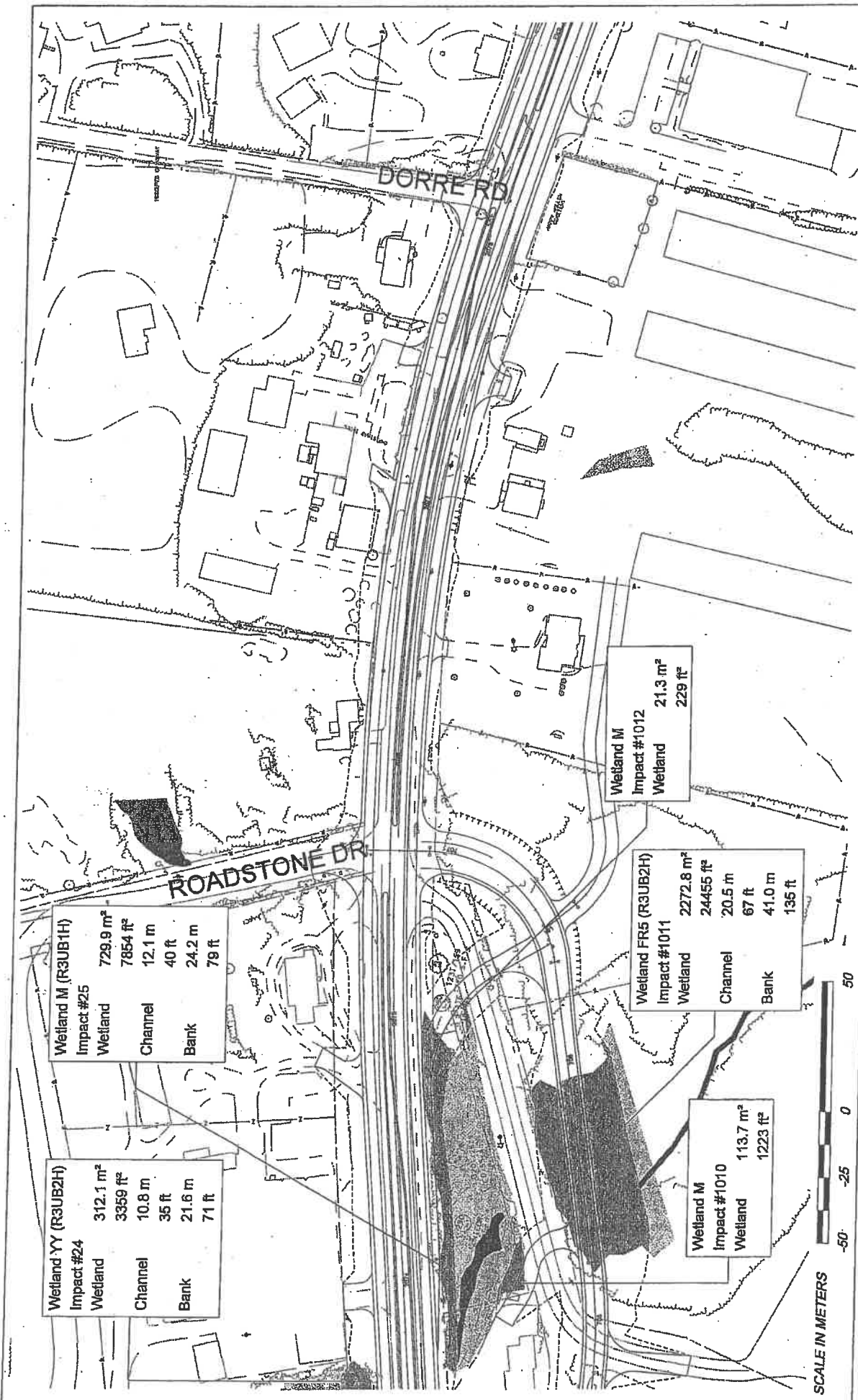
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NEW HAMPSHIRE DEPARTMENT
OF TRANSPORTATION

DATE: 4/15/2004

SHEET 9 OF 19



Wetland YY (R3UB2H)	312.1 m ²
Impact #24	3359 ft ²
Wetland	10.8 m
Channel	35 ft
Bank	21.6 m
	71 ft

Wetland M (R3UB1H)	729.9 m ²
Impact #25	7854 ft ²
Wetland	12.1 m
Channel	40 ft
Bank	24.2 m
	79 ft

Wetland M	113.7 m ²
Impact #1010	1223 ft ²
Wetland	

Wetland FR5 (R3UB2H)	2272.8 m ²
Impact #1011	24455 ft ²
Wetland	20.5 m
Channel	67 ft
Bank	41.0 m
	135 ft

Wetland M	21.3 m ²
Impact #1012	229 ft ²
Wetland	



LEGEND

- WETLAND
- IMPACT AREA
- SURFACE WATERS
- CUT
- FILL

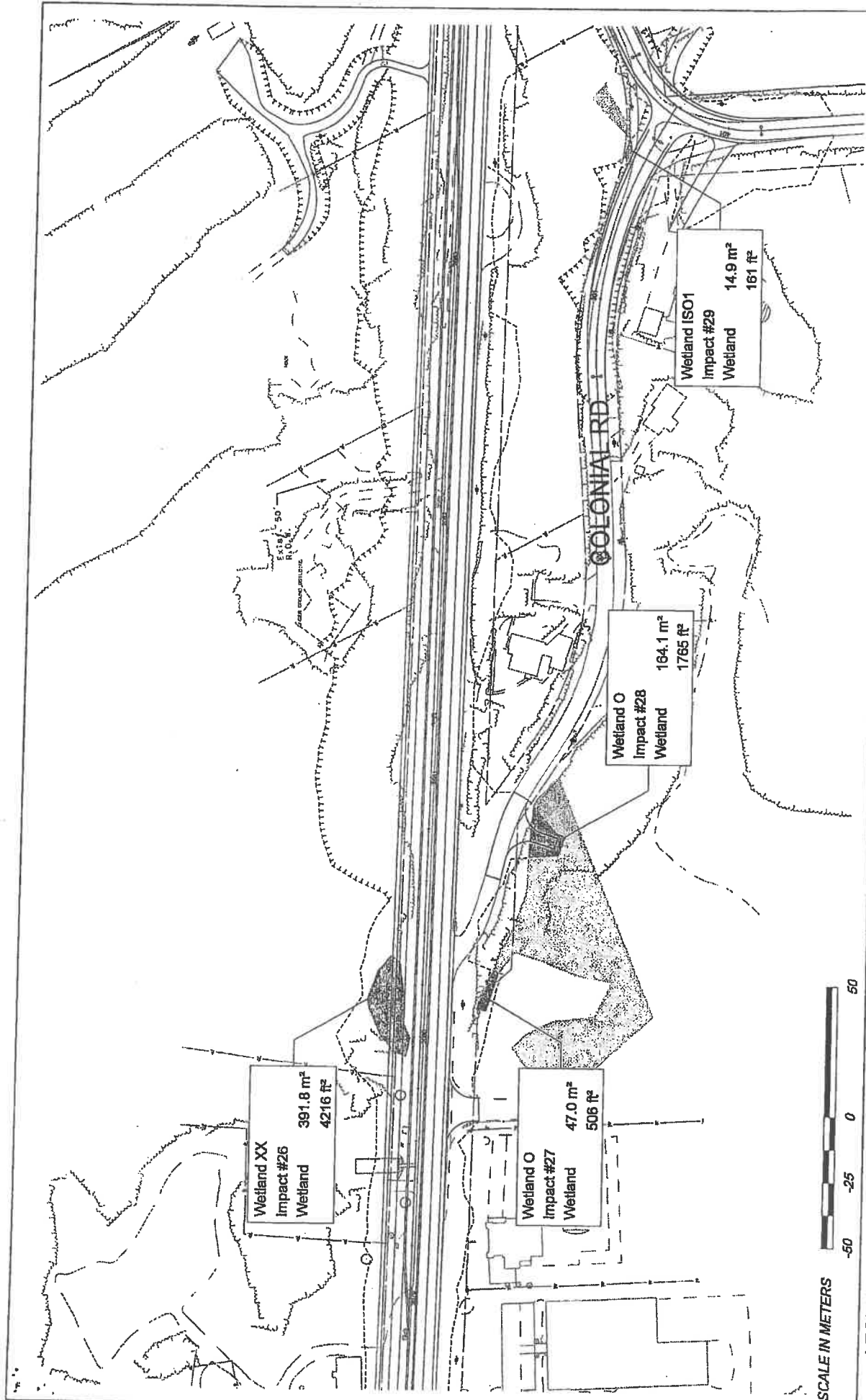
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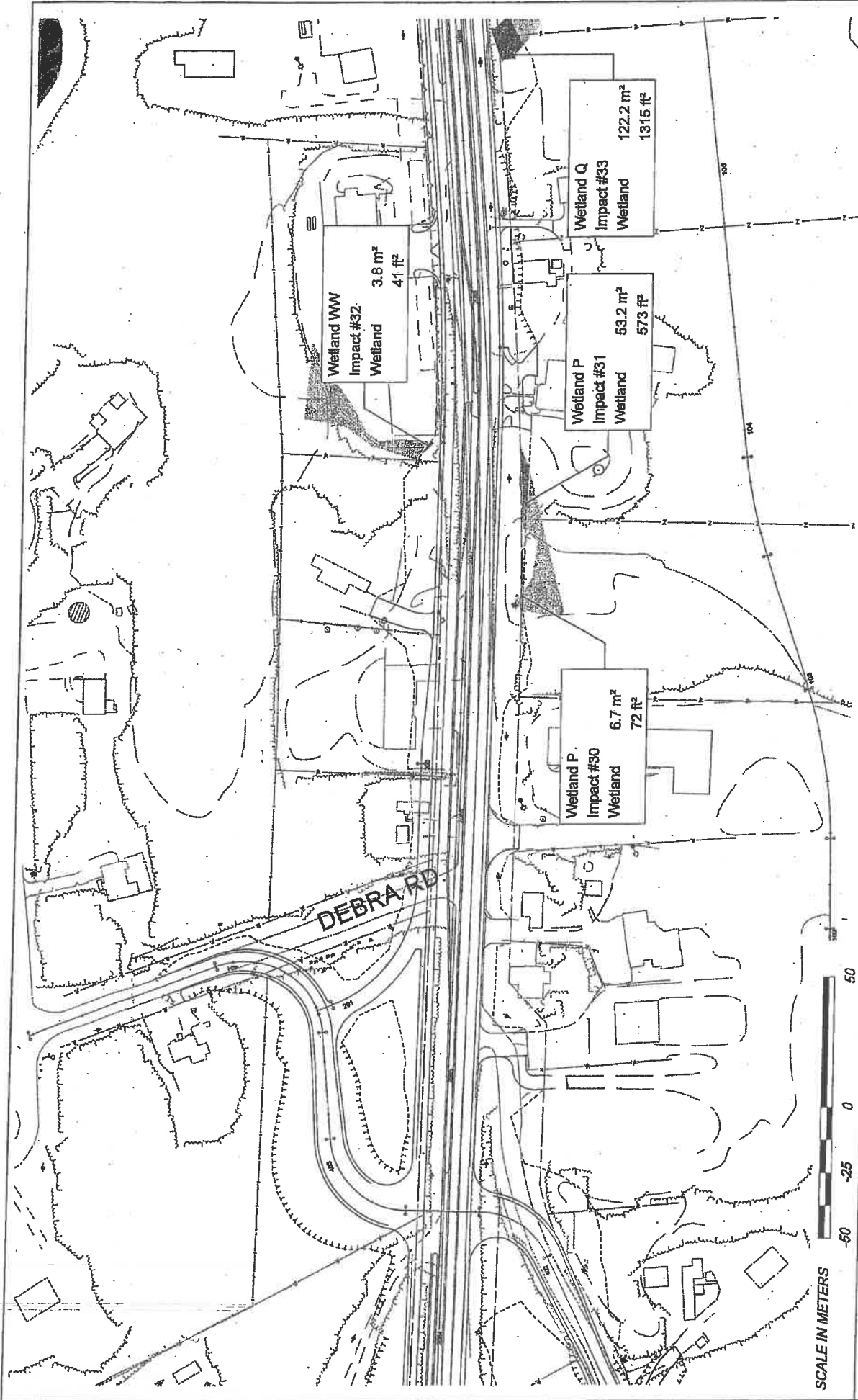
APPLICATION BY:
**NEW HAMPSHIRE DEPARTMENT
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
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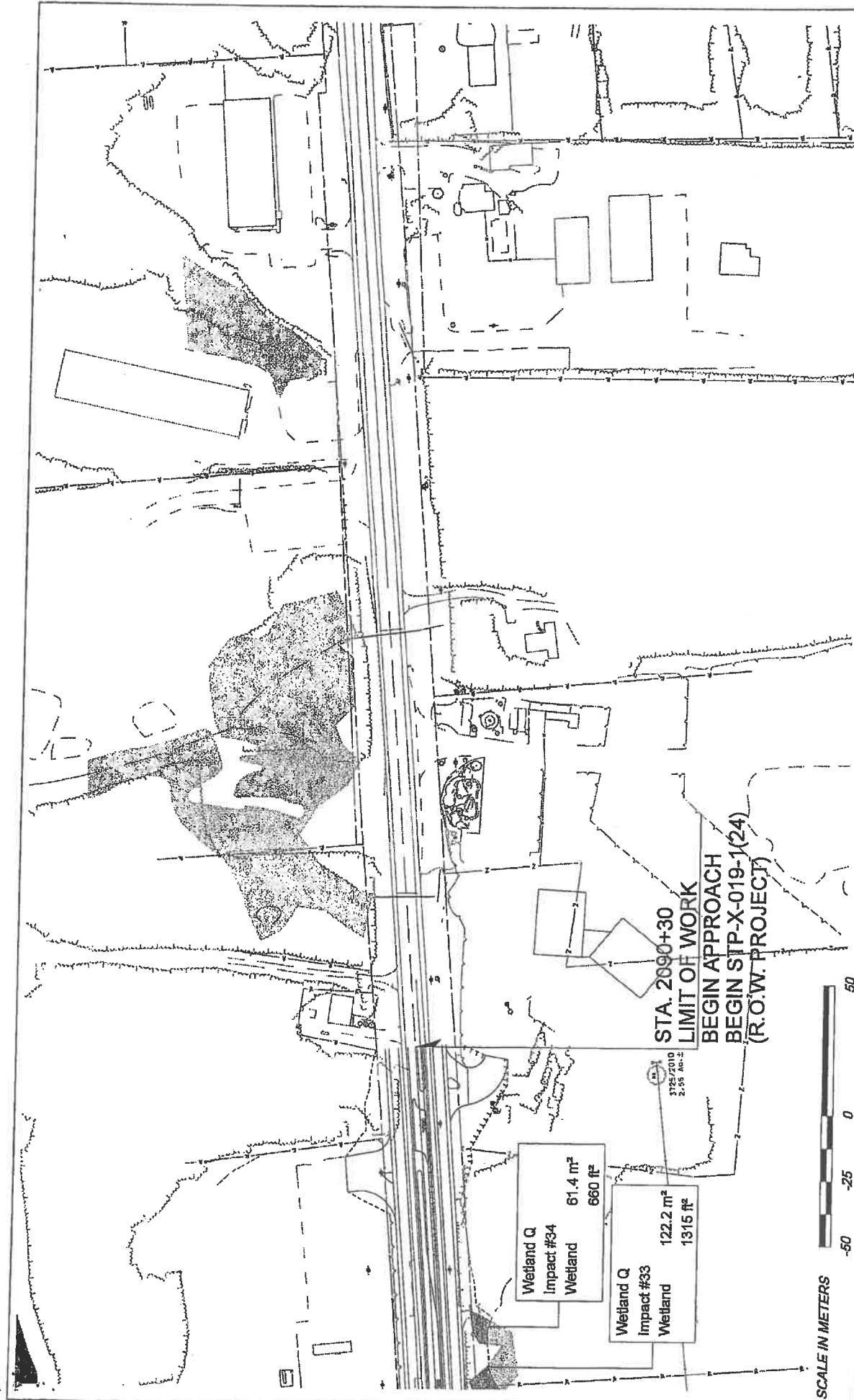
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<p>PLAISTOW - KINGSTON RECONSTRUCTION OF NH 125 MGS-STP-T-X-5375 (010), 10044B</p>	<p>NOTE: ADDITIONAL INFORMATION ON WETLAND IMPACTS IS CONTAINED IN TABLES 1 AND 2.</p>	<p>DATE: 4/15/2004</p>
<p>AT: PLAISTOW AND KINGSTON IN: ROCKINGHAM COUNTY, NEW HAMPSHIRE</p>	<p>APPLICATION BY: NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION</p>	<p>SHEET 11 OF 19</p>



<p>LEGEND</p> <ul style="list-style-type: none">  WETLAND  IMPACT AREA  SURFACE WATERS  CUT  FILL 	<p>PLAISTOW - KINGSTON RECONSTRUCTION OF NH 125 MGS-STP-T-X-5375 (010), 10044B AT: PLAISTOW AND KINGSTON IN: ROCKINGHAM COUNTY, NEW HAMPSHIRE</p>	<p>NOTE: ADDITIONAL INFORMATION ON WETLAND IMPACTS IS CONTAINED IN TABLES 1 AND 2.</p>	<p>DATE: 4/15/2004</p> <p>APPLICATION BY: NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION</p> <p>SHEET 12 OF 19</p>
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STA. 2090+30
 LIMIT OF WORK
 BEGIN APPROACH
 BEGIN STP-X-019-1(24)
 (R.O.W. PROJECT)

Wetland Q
 Impact #34
 Wetland 61.4 m²
 660 ft²

Wetland Q
 Impact #33
 Wetland 122.2 m²
 1315 ft²



LEGEND

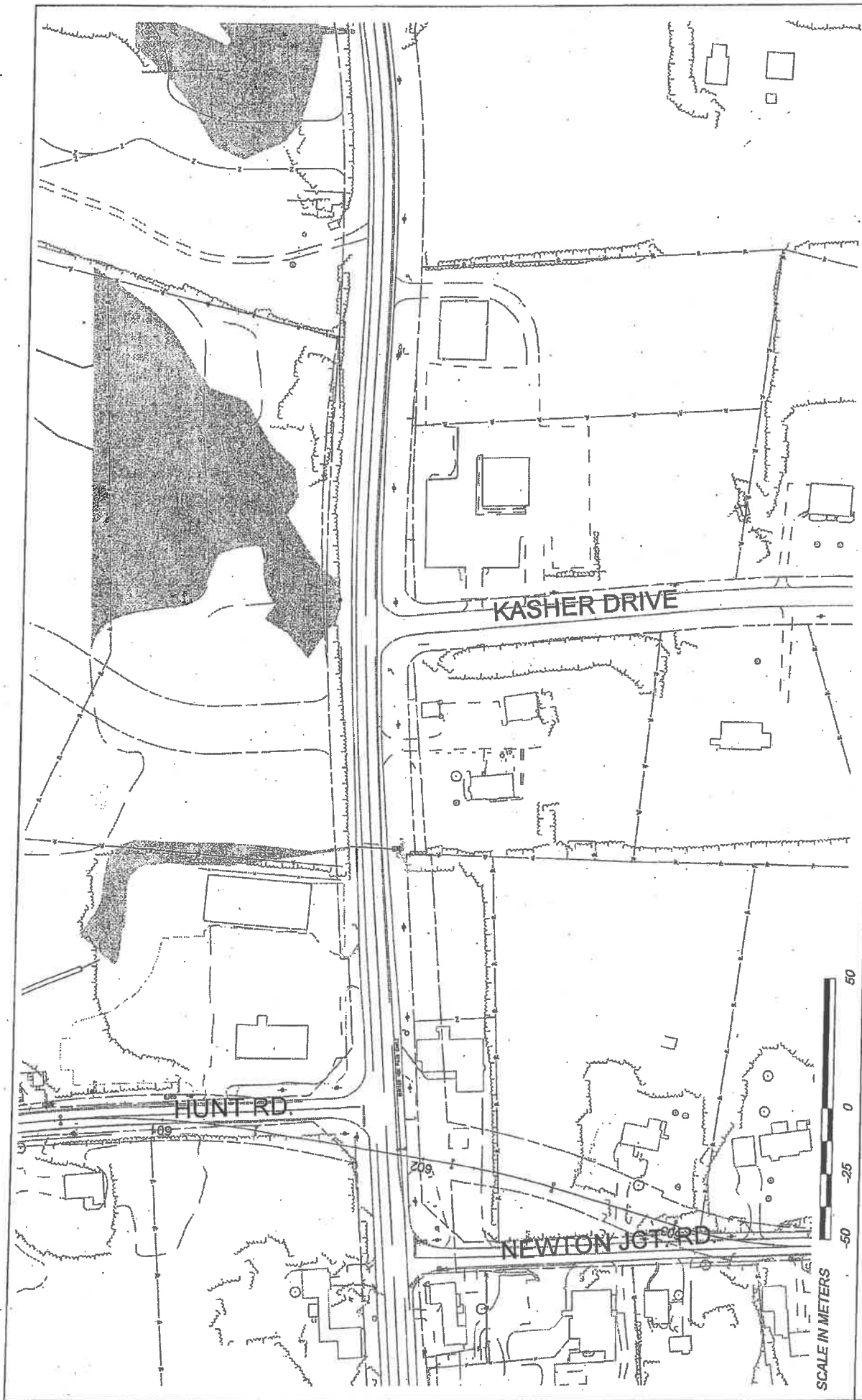
- WETLAND
- IMPACT AREA
- SURFACE WATERS
- CUT
- FILL

PLAISTOW - KINGSTON
 RECONSTRUCTION OF NH 125
 MGS-STP-T-X-5375 (010), 10044B
 AT: PLAISTOW AND KINGSTON
 IN: ROCKINGHAM COUNTY, NEW HAMPSHIRE

NOTE: ADDITIONAL INFORMATION ON WETLAND
 IMPACTS IS CONTAINED IN TABLES 1 AND 2.

APPLICATION BY:
 NEW HAMPSHIRE DEPARTMENT
 OF TRANSPORTATION

DATE: 4/15/2004



NOTE: ADDITIONAL INFORMATION ON WETLAND IMPACTS IS CONTAINED IN TABLES 1 AND 2.

APPLICATION BY:
NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION






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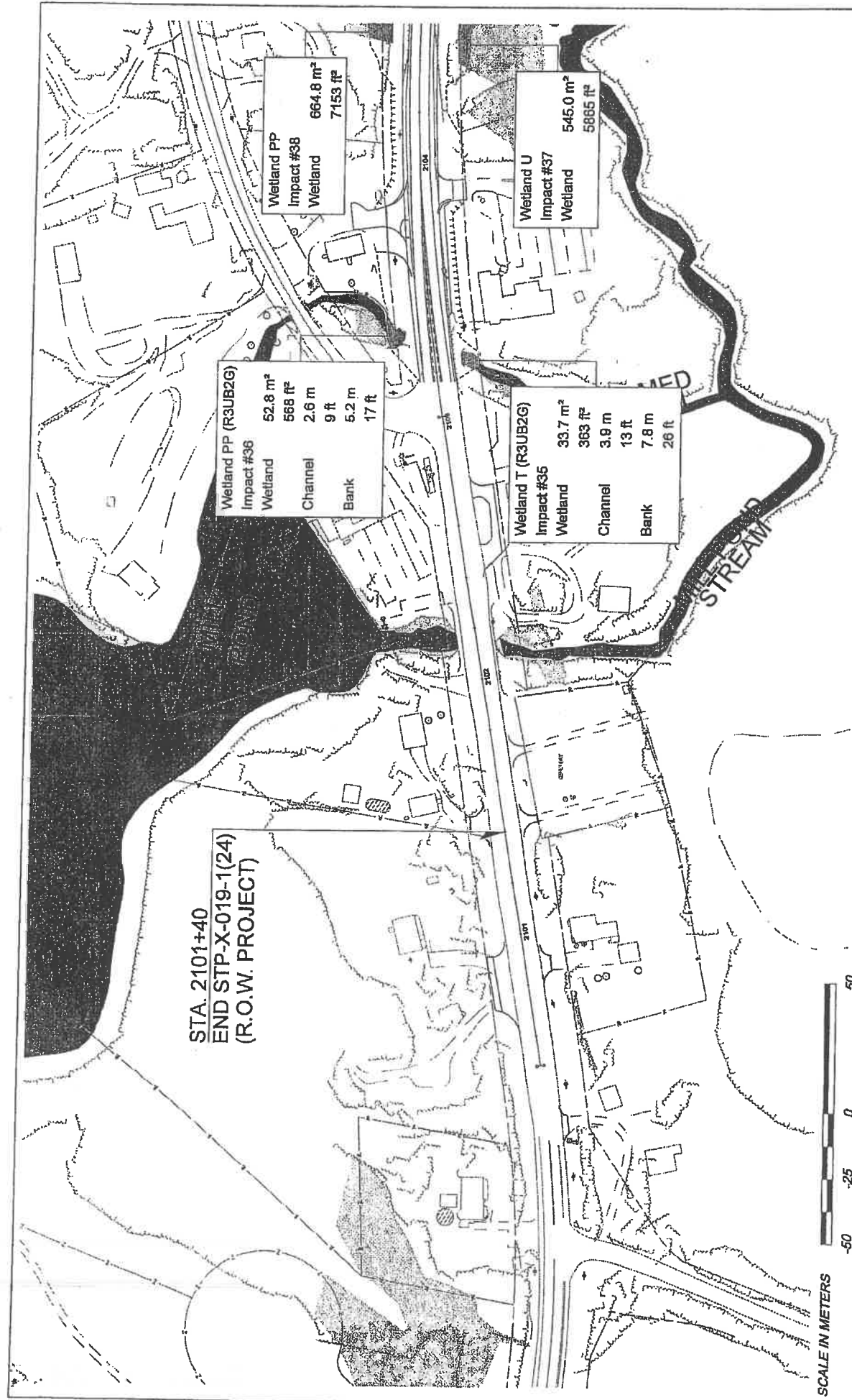
SHEET 14 OF 19

PLAISTOW - KINGSTON
RECONSTRUCTION OF NH 125
MGS-STP-T-X-5375 (010), 10044B

AT: PLAISTOW AND KINGSTON
 IN: ROCKINGHAM COUNTY, NEW HAMPSHIRE

LEGEND

-  WETLAND
-  IMPACT AREA
-  SURFACE WATERS
-  CUT
-  FILL



STA. 2101+40
 END STP-X-019-1(24)
 (R.O.W. PROJECT)

Wetland PP (R3UB2G)
 Impact #36
 Wetland
 Channel
 Bank
 52.8 m²
 568 ft²
 2.6 m
 9 ft
 5.2 m
 17 ft

Wetland PP
 Impact #38
 Wetland
 664.8 m²
 7153 ft²

Wetland T (R3UB2G)
 Impact #35
 Wetland
 Channel
 Bank
 33.7 m²
 363 ft²
 3.9 m
 13 ft
 7.8 m
 26 ft

Wetland U
 Impact #37
 Wetland
 545.0 m²
 5865 ft²



LEGEND

- WETLAND
- IMPACT AREA
- SURFACE WATERS
- CUT
- FILL



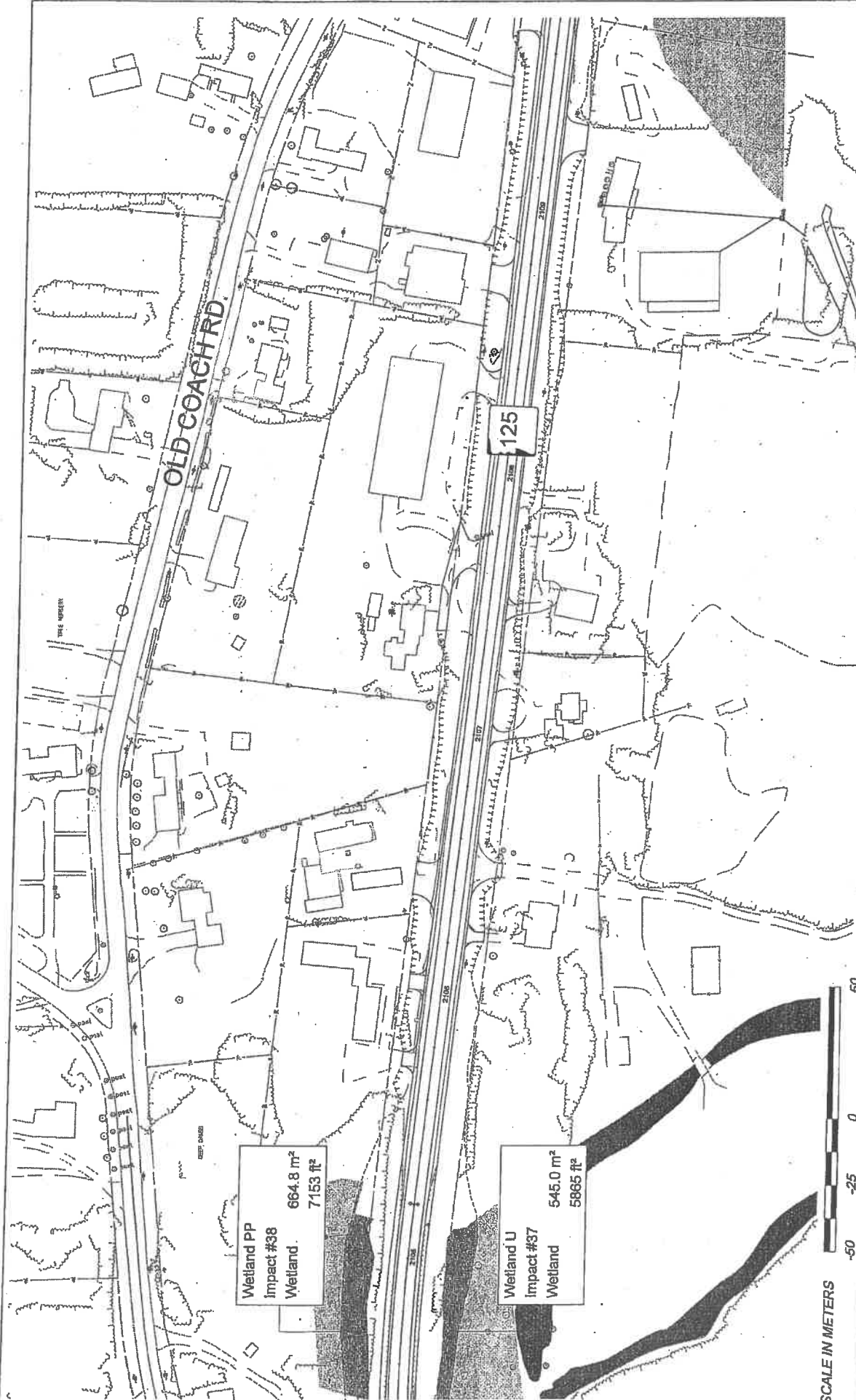
PLAISTOW - KINGSTON
 RECONSTRUCTION OF NH 125
 MGS-STP-T-X-5375 (010), 10044B
 AT: PLAISTOW AND KINGSTON
 IN: ROCKINGHAM COUNTY, NEW HAMPSHIRE

NOTE: ADDITIONAL INFORMATION ON WETLAND
 IMPACTS IS CONTAINED IN TABLES 1 AND 2.

APPLICATION BY:
 NEW HAMPSHIRE DEPARTMENT
 OF TRANSPORTATION

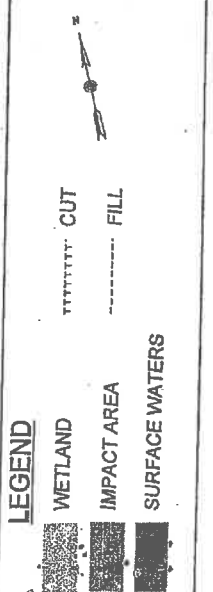
DATE: 4/15/2004

SHEET 15 OF 19



Wetland PP
Impact #38
Wetland
664.8 m²
7153 ft²

Wetland U
Impact #37
Wetland
545.0 m²
5865 ft²



**PLAISTOW - KINGSTON
RECONSTRUCTION OF NH 125
MGS-STP-T-X-5375 (010), 10044B**

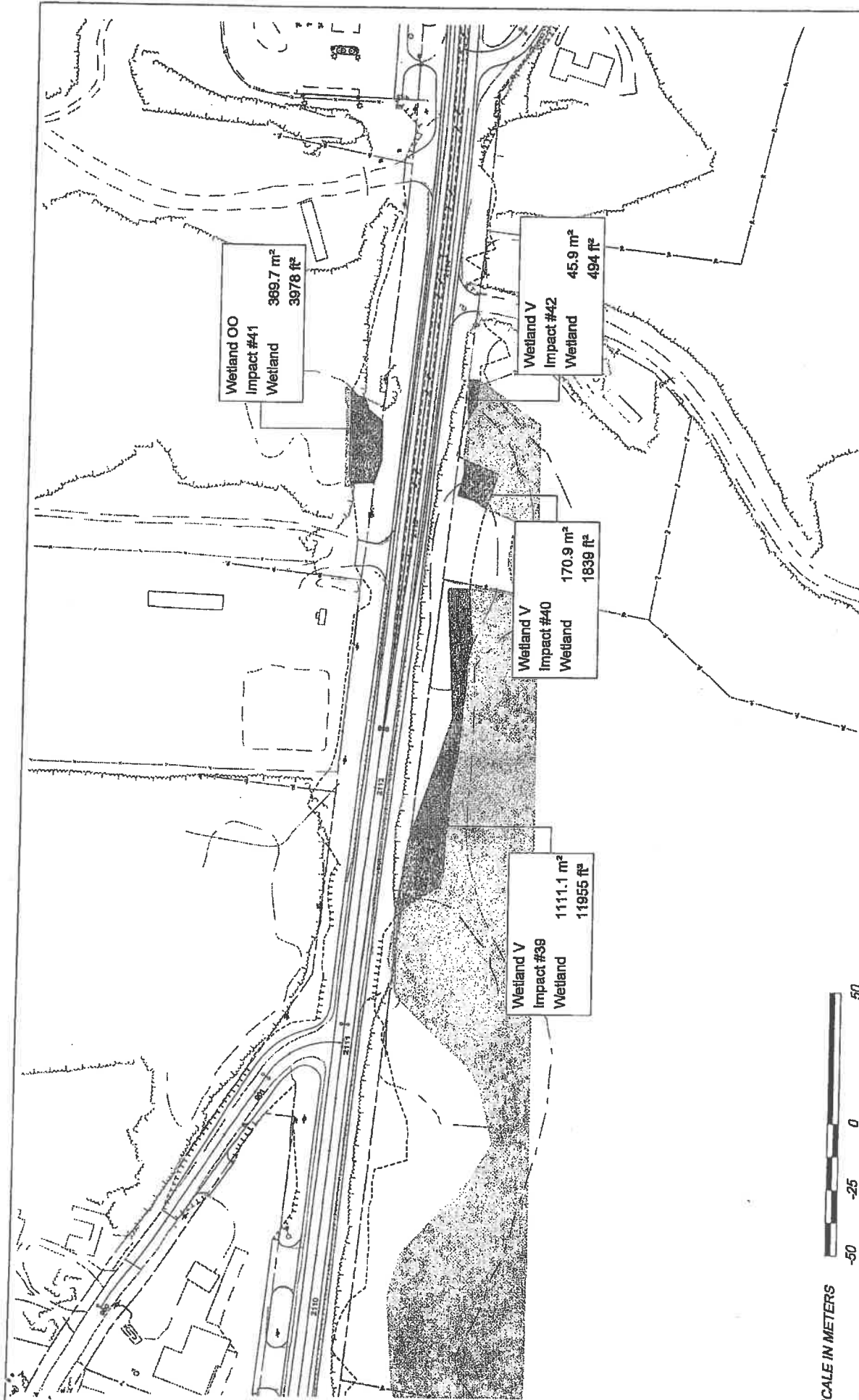
AT: PLAISTOW AND KINGSTON
IN: ROCKINGHAM COUNTY, NEW HAMPSHIRE

NOTE: ADDITIONAL INFORMATION ON WETLAND
IMPACTS IS CONTAINED IN TABLES 1 AND 2.

APPLICATION BY:
**NEW HAMPSHIRE DEPARTMENT
OF TRANSPORTATION**

DATE: 4/15/2004

SHEET 16 OF 19



LEGEND

- WETLAND
- IMPACT AREA
- SURFACE WATERS
- CUT
- FILL

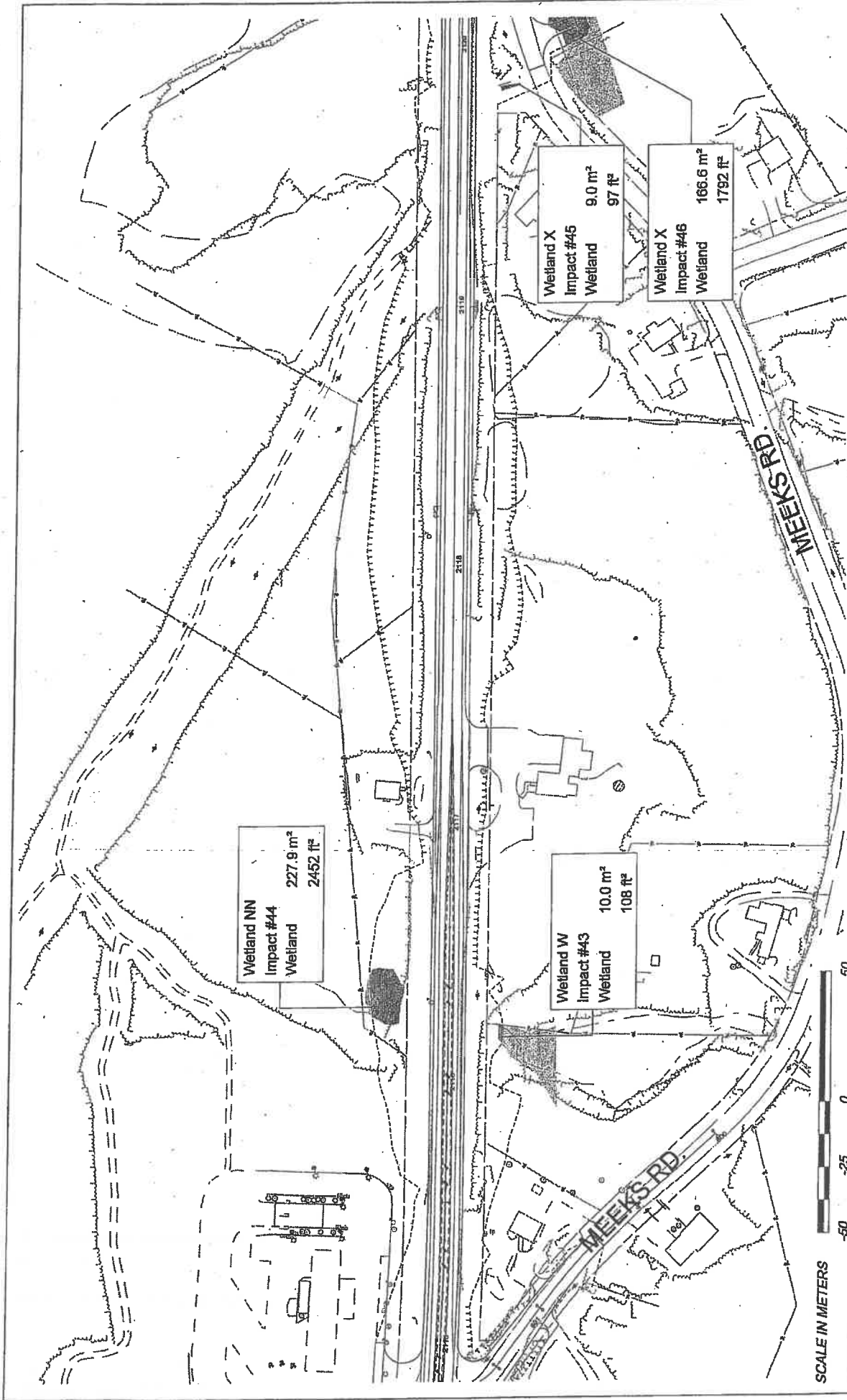
PLAISTOW - KINGSTON
 RECONSTRUCTION OF NH 125
 MGS-STP-T-X-5375 (010), 10044B
 AT: PLAISTOW AND KINGSTON
 IN: ROCKINGHAM COUNTY, NEW HAMPSHIRE

NOTE: ADDITIONAL INFORMATION ON WETLAND
 IMPACTS IS CONTAINED IN TABLES 1 AND 2.

APPLICATION BY:
 NEW HAMPSHIRE DEPARTMENT
 OF TRANSPORTATION

DATE: 4/15/2004

SHEET 17 OF 19



PLAISTOW - KINGSTON
RECONSTRUCTION OF NH 125
MG5-STP-T-X-5375 (010), 10044B

NOTE: ADDITIONAL INFORMATION ON WETLAND IMPACTS IS CONTAINED IN TABLES 1 AND 2.

APPLICATION BY:
NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION

AT: PLAISTOW AND KINGSTON
 IN: ROCKINGHAM COUNTY, NEW HAMPSHIRE

LEGEND

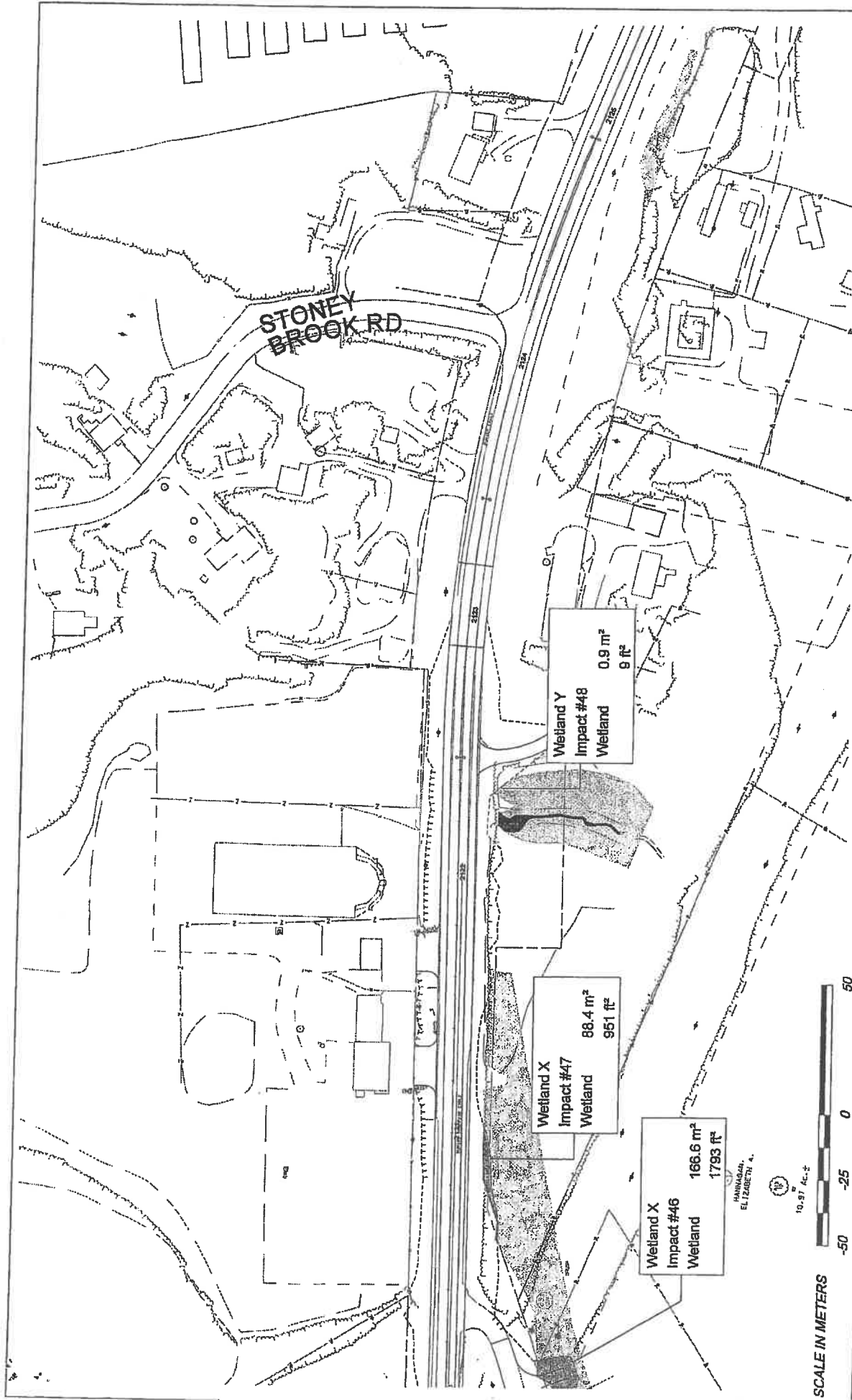
- WETLAND
- IMPACT AREA
- SURFACE WATERS

----- CUT
 - - - - - FILL

SCALE IN METERS
 -50 0 25 50

DATE: 4/15/2004

SHEET 18 OF 19



PLAISTOW - KINGSTON
RECONSTRUCTION OF NH 125
MGS-STP-T-X-5375 (010), 10044B

AT: PLAISTOW AND KINGSTON
 IN: ROCKINGHAM COUNTY, NEW HAMPSHIRE

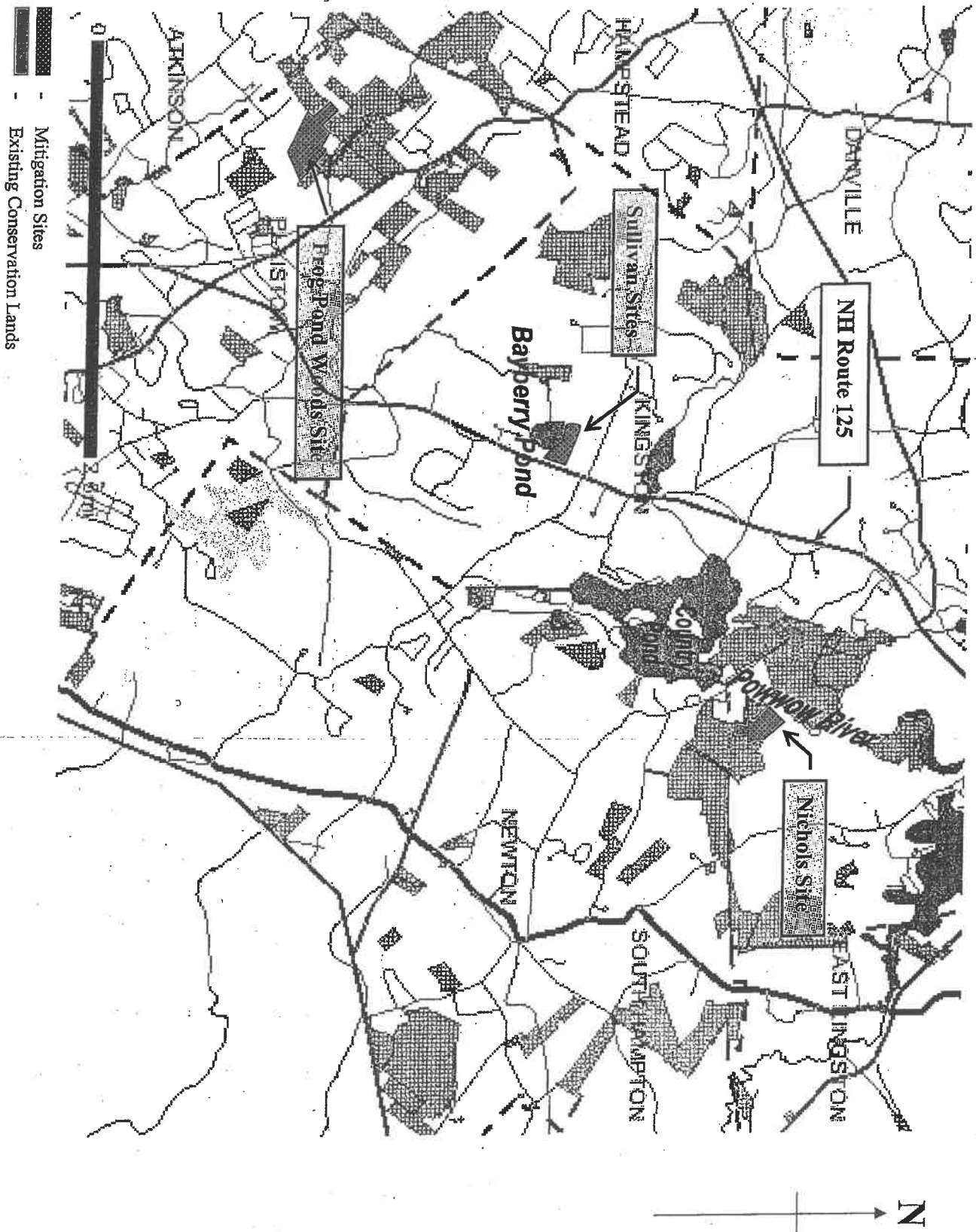
NOTE: ADDITIONAL INFORMATION ON WETLAND
 IMPACTS IS CONTAINED IN TABLES 1 AND 2.

APPLICATION BY:
**NEW HAMPSHIRE DEPARTMENT
 OF TRANSPORTATION**

DATE: 4/15/2004

SHEET 19 OF 19

Plaistow-Kingston, 10044B
Wetland Mitigation Compensation Sites



OSullivan, Andrew

From: Laurin, Marc
Sent: Monday, December 11, 2023 8:05 AM
To: Nichols, Emily; Lindsey Lefebvre
Cc: OSullivan, Andrew; Benedict, Karl; Michael Hicks; Brown, Joshua; Detzel, Seta
Subject: RE: Plaistow-Kingston, 10044E - Mitigation (email 2 of 2)
Attachments: October 2009 Wetland Mitigation Technical Report.pdf; March 2006 Addendum to FEA (Sections 4.3.4, 4.8.2.3, 6).pdf; September 2006 Sullivan Mitigation Tech Report.pdf; 20110125tr-Infascelli.doc; 20110125tr-Roach.doc; 08182015 Wetlands Mitigation Summary .pdf; 10044B Wetland Impacts Summary Project Wide (08_06_15).pdf

All,

Continuation email of supporting information.

Marc

Reconstruction of NH 125 Wetland Mitigation, Plaistow and Kingston, NH

Plaistow to Kingston,
MGS-STP-T-X-5375(010),
10044-B
New Hampshire

Prepared for New Hampshire Department of Transportation and
Federal Highway Administration

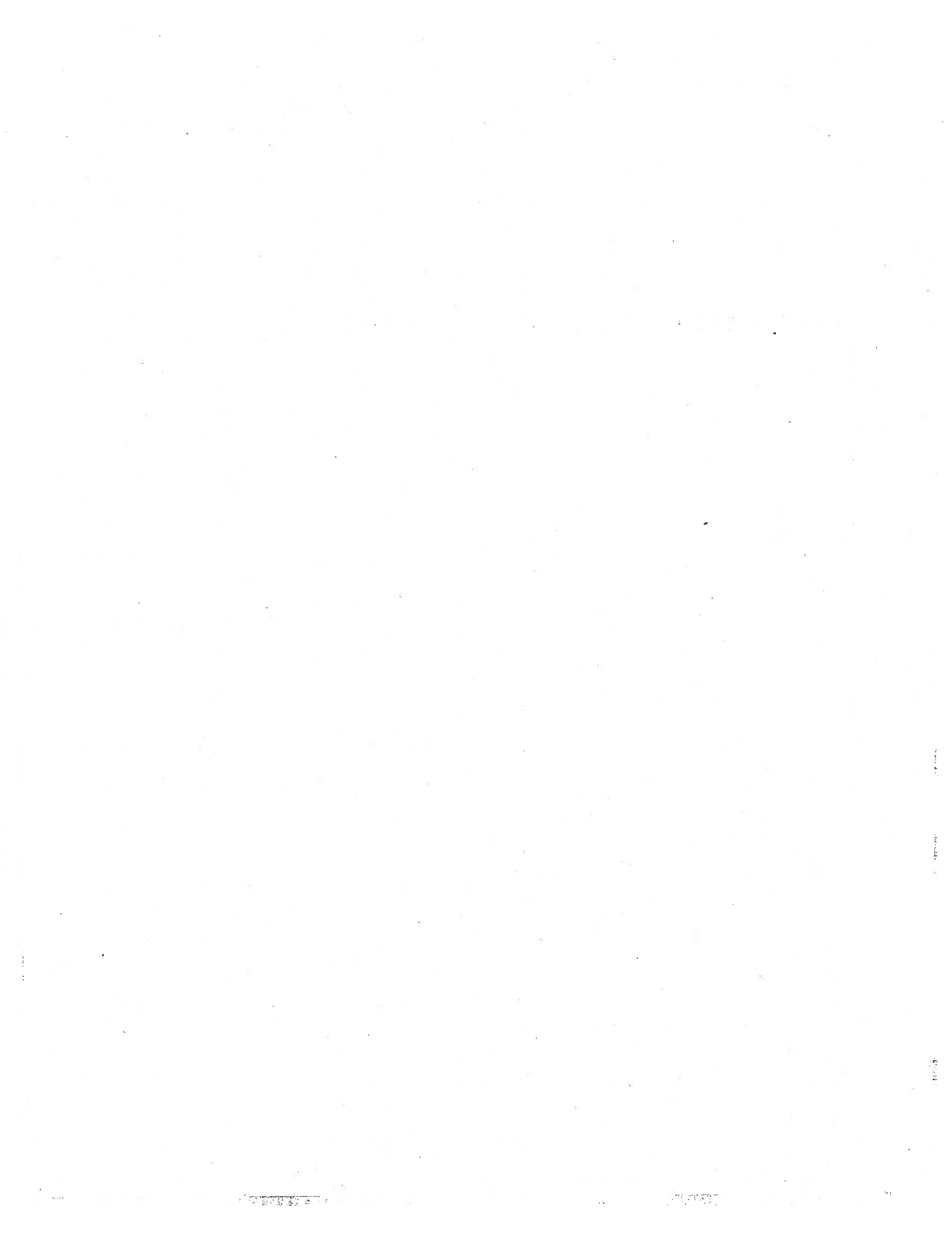


Prepared by **VHB/Vanasse Hangen Brustlin, Inc.**
Bedford, NH

October 2009

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1

Introduction

There are three components of the wetland mitigation package described in the Final Environmental Assessment (FEA) for the Plaistow-Kingston Project. These components include both restoration/creation activities as well as the conservation and preservation of ecologically valuable parcels within the towns of Plaistow and Kingston. This mitigation package is intended to fully compensate for the unavoidable wetland impacts of the project. The complete history and additional details of the site selection process and package components are provided in the FEA, Section 4.3.4.2 – *Development of the Mitigation Package* (VHB, October 2005).

The mitigation package originally proposed the acquisition of up to 40 acres adjacent to Bayberry Pond for preservation. In 2006, after being contacted by the Nature Conservancy and with subsequent agency consultation and support, NHDOT instead agreed to contribute to the purchase of 22.3 acres of land (the Nichols' property) lying along the Powwow River about 2 miles north of the Bayberry Pond area, but also in the Town of Kingston. Ownership will be by the Town of Kingston, subject to a conservation easement held by The Nature Conservancy or the NH Fish and Game Department, with NHDOT holding an executory interest in the conservation easement.

The second component of the mitigation package is the purchase of a parcel in Plaistow (Map 6, Lot 15) totaling approximately 43.8 acres in the Kelly Brook watershed. The property will be transferred to the Town of Plaistow subject to the placement of a conservation easement held by NHDOT. Preservation of this parcel will add to a block of approximately 500 acres of existing conservation land in that community.

The third component of the wetland mitigation plan includes restoration and wetland creation activities planned for the Sullivan Properties in Plaistow. The Sullivan Properties include three parcels totaling 14.7 acres that were acquired by NHDOT for the Hunt Road-Newton Junction Road Project (construction completed in 2005). The latter project was split out from the larger Plaistow-Kingston Project because of the pressing need for safety improvements at the Hunt Rd.-Newton Junction Rd. intersection with NH 125. Mitigation on the Sullivan Properties will include a mix of wetland restoration/creation, habitat restoration, and land preservation – all occurring adjacent to the ecologically important Bayberry Pond in Kingston, NH.

2

Project Impacts

2.1 Direct Impacts

Both the FEA and the Wetlands Permit Application for *Plaistow-Kingston, Reconstruction of NH 125, MGS-STP-T-X-5375 (010), 10044B* (VHB, April 2004) provide an extensive discussion and additional details of the potential wetland impacts of the NH 125 roadway improvement project. Maps showing the location of all impacted wetlands along the highway corridor were included in the permit application. A detailed database of wetland impacts by location and wetland type was also included in these two earlier documents.

The Plaistow-Kingston Project (10044B) will result in approximately 4.5 acres of permanent impacts to wetlands. In addition, the proposed mitigation package will compensate for approximately 1.2 acres associated with the earlier Hunt Road/Newton Junction Road intersection reconstruction (in Kingston) whose construction was completed in 2005 and the 1.0 acres of impact associated with recently completed Kingston Road Bridge replacement project in Plaistow. The package is also intended to compensate for 0.65 acres of impact associated with the reconstruction of the Old Coach Road and New Boston Road intersections completed in 2000. Combined, these three projects have approximately 7.34 acres of impact as summarized in Table 2-1.

All of the impacted wetlands lie within the Merrimack River watershed, Hydrologic Unit Code 01070002. A number of local, state and regional watershed councils and alliances have established long-term goals for this watershed - primarily water quality, recreation, and flood protection.

**Table 2-1
Summary of Permanent Wetland Impacts for Which Mitigation is Proposed¹**

Town	Plaistow-Kingston #10044B) Hectares (Acres)	Hunt Rd/Newton Jct (Kingston #10044C) Hectares (Acres)	Kingston Rd. Bridge Replacement (Plaistow #10005) Hectares (Acres)	Old Coach/ New Boston Roads (Kingston #13012) Hectares (Acres)	Total Impacts (For Mitigation) Hectares (Acres)
Plaistow	2.20	0.0	1.0	0.0	3.20
Kingston	2.29	1.2 ²	0.0	0.65	4.14
Total	4.49	1.2	1.0	0.65	7.34

¹ Due to rounding, impact area measurements do not convert exactly between hectares and acres.

² Impact measurements are the amount of wetland impact stated in the NHDES Wetlands and Non-Site Specific Permit (#2003-01010) issued for NHDOT project # 10044C.

The majority of wetlands impacted by the project are palustrine forested wetlands (Table 2-2). Lesser amounts of emergent marsh, shrub-dominated wetlands, riverine habitat, and open water are affected. The scrub-shrub wetlands are generally found in the transition zone between wooded and herbaceous wetlands or as the margin to larger forested or emergent systems adjacent to the roadway. Small areas of highly disturbed scrub-shrub wetlands located adjacent to commercial properties are also affected. There are no tidal or prime wetlands located in the project study area and hence none is affected. While the initial study area contains some Atlantic white cedar swamps (*Chamaecyparis thyoides*), these areas are not impacted by the project, and are located far from proposed roadway improvements, including those on the mitigation parcels (see Section 3.1).

**Table 2-2
Impacts by Wetland Type. Units in Acres**

Dominant Wetland Class ¹	Project Impacts ²
Palustrine Forested	2.85
Palustrine Emergent Marsh	0.67
Palustrine Scrub-Shrub	0.71
Palustrine Open Water	0.03
Riverine	0.23
Totals	4.49

¹ Wetland Class as defined by Cowardin et al. 1979.

² Impacts were calculated from the conceptual design and permit application wetland plans current as of April 15, 2005.

2.2 Functions and Values

Functions and values for the impacted wetlands were determined through field investigations conducted in 2002. *The Highway Methodology Workbook Supplement: Wetland Functions and Values - A Descriptive Approach* (USACOE 1999) was followed for this assessment. The results are summarized in Table 2-3.

Forested wetlands in the study corridor function principally as areas of flood protection, nutrient removal, and wildlife habitat. Most impacts to forested wetlands will be incremental in nature due to the already disturbed nature of the wetlands that extend to the bottom of the slopes along NH 125. A few small depressional, forested wetlands located adjacent to commercial or residential development will also be impacted. These wetlands function primarily for groundwater recharge/discharge and nutrient removal.

The principal functions of the emergent marshes include sediment and toxicant retention, groundwater recharge/discharge, nutrient removal, and wildlife habitat. Because the widening will occur adjacent to the existing highway, there is minimal impact on important wetland functions such as floodflow alteration or wildlife habitat that are better performed by larger wetlands and those further from the highway. Impacts to marshes within the study area are largely to those areas that have been altered by commercial development and illegal dumping, or are overrun by invasive species, such as purple loosestrife or common reed.

The shrub wetlands along the project corridor provide functions similar to the forested wetlands. Most of the impacts to shrub wetlands will occur in the vicinity of the new service road to be constructed just north of East Road in Plaistow. Much of the wetland landscape in this area has been altered by clearing, filling, and deposition of eroded materials from upgradient areas, and as such, natural wetland functions have already been negatively impacted.

Table 2-3
Summary of Wetland Functions and Values Assessment¹

Wetland ID ²	Functions and Values												
	Groundwater Recharge & Discharge	Floodflow Alteration	Fish & Shellfish Habitat	Sediment & Toxicant Retention	Nutrient Removal, Retention & Transformation	Production & Export	Sediment & Shoreline Stabilization	Wildlife Habitat	Recreation	Educational & Scientific Value	Uniqueness & Heritage	Visual Quality & Aesthetics	Endangered Species Habitat
Platow													
K-E	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
EEE-W	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FFF-W	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Kingston													
L-E		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
V-E	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PP-W	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SS-W	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
VV-W	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

¹ Wetland functional assessments performed at representative impact locations only.

² Wetland IDs are indicated by one, two or three letter codes. Location is indicated by E (east) or W (west) and refers to landscape position relative to NY 125.

✓ Denotes that wetland has a particular function or value.

☑ Denotes a potential wetland function or value.



Preservation – Nichols Property and Kelly Brook Watershed Conservation Area

3.1 Nichols Property

In December, 2005, NHDES and TNC proposed that NHDOT consider participating in the fee simple acquisition of a 22.3 acre property along the Powwow River as part of the mitigation for the NH-125 roadway project. The parcel is described below and is depicted in Figure 3.

Surrounding Land Use and Wildlife Habitat

Located in Kinston, the Nichols Property represents 22.3 acres of undeveloped, forested land, completely surrounded by large, unfragmented habitat blocks. According to the National Wetlands Inventory (NWI), the tract includes approximately 4.2 acres of Palustrine Scrub-Shrub/Emergent and approximately 1.4 acres of Palustrine Forested wetlands. The parcel has approximately 400 linear feet of frontage along the Powwow River, as well, which has been identified as a significant natural resource area by the NH Natural Heritage Bureau for its importance to fish and wildlife.

In addition to valuable wetland and riparian habitat, the Nichols Property also supports a diversity of other important ecological features, including portions of two inland Atlantic white cedar basin swamps, streamside fens, and mature hemlock-oak-pine forests in the uplands. Atlantic white cedar swamps are a globally rare community. The Nichols Property gains additional conservation value due to its location between Powwow Pond and Country Pond. This central portion of the Powwow River contains the most extensive complex of Atlantic white cedar swamp forests wetlands in New Hampshire¹. The positioning of the Nichols Property also creates an important linkage between a 78 acre conservation property to the south

¹

¹ The Nature Conservancy. February 7, 2006. The Nature Conservancy Protects More Atlantic White Cedar Habitat in Kinston. [web] <http://www.nature.org/wherewework/northamerica/states/newhampshire/press/press2257.html>

(Mayhew Land) and the 350 acre Powwow River Conservation Area to the west and northwest.

The Nichols Parcel supports a host of rare and common species, due to its diverse and unique habitat types. Atlantic white cedar swamps may provide habitat to the Hessel's hairstreak butterfly, a rare species in New Hampshire. According to Swain and Kearsley² other rare species associated with this habitat type include the jefferson salamander (*Ambystoma jeffersonianum*), blue-spotted salamander (*Ambystoma laterale*), spotted turtle (*Clemmys guttata*), mystic valley amphipod (*Crangonyx aberrans*), and four-toed salamander (*Hemidactylium scutatum*). The Nature Conservancy (2006) notes that these swamps also provide breeding grounds for a multitude of birds, including the downy woodpecker (*Picoides pubescens*), brown creeper (*Certhia americana*), magnolia warbler (*Dendroica magnolia*), black-throated blue warbler (*Dendroica caerulescens*), and ovenbird (*Seiurus aurocapilla*). Waterfowl also inhabit this portion of the Powwow River including American black ducks (*Anas rubripes*), bufflehead (*Bucephala albeola*), mergansers (*Lophodytes cucullatus*), wood ducks (*Aix sponsa*), and pied-billed grebes (*Podilymbus Podiceps*). Green herons (*Butorides virescens*) and great blue herons (*Ardea herodias*) inhabit the area, as well.

Soils

The *Soil Survey of Rockingham County, New Hampshire*³ maps four soil types on the mitigation site:

- 97 - Greenwood and Ossipee Soils, Pondered
- 295 - Greenwood Mucky Pete
- 26A - Windsor Loamy Sand, 0-3 percent slopes
- 26C - Windsor Loamy Sand, 8-15 percent slopes

The majority of the Nichols Property is mapped as Windsor Loamy Sand, accounting for roughly three-quarters of the parcel. These soils are excessively drained with a depth to a seasonal high water table of more than 6 feet and are often associated with oak-pine forests, such as those found within the Nichols Property. The other soil types within the site exist within the boundaries of mapped NWI wetlands and are very poorly drained.

Cover Types and Existing Vegetation

Atlantic White Cedar-Leather-Leaf Swamp

1

- 2 Swain, P.C. & J.B. Kearsley. 2001. Classification of the Natural Communities of Massachusetts. Version 1.3. Natural Heritage & Endangered Species Program, Division of Fisheries & Wildlife. Westborough, MA.
- 3 Soil Conservation Service. 1994. Soil Survey of Rockingham County, New Hampshire, Parts 1 and 2. U.S. Department of Agriculture.

The two Atlantic white cedar basin swamps and streamside fens onsite represent very similar communities, classified by Sperduto and Nichols⁴ as Atlantic white cedar leather-leaf swamps. These communities occur within 30+ miles of the coast and are characterized by a broken woodland canopy of Atlantic white cedar (*Chamaecyparis thyoides*), sparse cover of red maple (*Acer rubrum*), and a dense shrub layer dominated by leather leaf (*Chamaedaphne calyculata*) and sheep laurel (*Kalmia angustifolia*). According to Sperduto and Nichols, this community type is also characterized by large cranberry (*Vaccinium macrocarpon*), pitcher plant (*Sarracenia purpuria*), Virginia chain-fern (*Woodwardia virginica*), round-leaved sundew (*Drosera rotundifolia*), tawny cotton-grass (*Eriophorum virginicum*), and three-sided sedge (*Carex trisperma* var. *trisperma*). Tall shrubs may be scattered including highbush blueberry (*Vaccinium corymbosum*), and sweet pepperbush (*Clethra alnifolia*). *Sphagnum* moss is also abundant and may include *Sphagnum fallax* and *Sphagnum flavicomans*. Soils are made up of poorly decomposed peat. Atlantic white cedar swamps are rare in New Hampshire and globally.

Hemlock-Oak-Pine Forest

Hemlock-oak-pine forests compose the rest of the site. As defined by Sperduto and Nichols (2004), characteristic late successional tree species include eastern hemlock (*Tsuga canadensis*), American beech (*Fagus grandifolia*), red oak (*Quercus rubra*), and white pine (*Pinus strobus*). With the history of logging on this site, the majority of the area is likely early to mid successional, with hemlock and beech present mainly in the understory. Paper birch (*Betula papyrifera*), red maple (*Acer rubrum*), and striped maple (*Acer pensylvanicum*) may also be abundant in this type of natural community. In the understory, black cherry (*Prunus serotina*), black birch (*Betula lenta*), yellow birch (*Betula alleghaniensis*), and white ash (*Fraxinus americana*) may be present in lesser abundance. Herbaceous plants associated with this habitat type include witch hazel (*Hamamelis virginiana*), wintergreen (*Gaultheria procumbens*), northern wood sorrow (*Oxalis acetosella*), shining clubmoss (*Huperzia lucidula*), Canadian honeysuckle (*Lonicera canadensis*), mountain wood fern (*Dryopteris campyloptera*), and blue-bead lily (*Clintonia borealis*).

3.2 Kelly Brook Watershed Conservation Area – Map 6, Lot 15

Total wetland impacts in Plaistow are estimated to be approximately 3.20 acres. Upon review of mitigation opportunities, a strategy was recommended that would acquire conservation land within the Kelly Brook watershed in northwest Plaistow. The Kelly Brook watershed has been and is currently under severe pressure from

⁴

4 Sperduto, D.D. and W.F. Nichols. 2004. Natural Communities of New Hampshire. New Hampshire Natural Heritage Bureau, Concord, NH. Pub. UNH Cooperative Extension, Durham, NH.

residential development. Despite this, the Towns of Plaistow, Hampstead, and Atkinson have preserved portions of the watershed as town forests and other conservation lands totaling more than 500 acres. The preferred preservation parcel within the Kelly Brook Conservation Area is Map 6, Lot 15 and site location can be found in Figure 4.

Surrounding Land Use and Wildlife Habitat

The Kelly Brook Parcel (Map 6, Lot 15) is a 43.8 acre lot, surrounded mainly by undeveloped, forested land. Adjacent residential lots exist to the south; however there is a forested buffer (approximately 800 to 1000 feet) of undeveloped space separating the Kelly Brook Parcel from any cleared or built upon land. The majority of the site is surrounded by parcels that have already been set aside for conservation as part of the Kelly Brook Watershed Conservation Area, providing large blocks of unfragmented interior habitat.

The parcel identified as Map 6, Lot 15 is composed of mixed coniferous/deciduous forested upland and wetland. Approximately 90 percent of this area is upland which has been logged regularly. The property is also impacted by some ATV use and illegal dumping of junked automobiles and construction debris. Despite these human impacts, the large areas of unfragmented upland interior forest habitat likely support white-tailed deer (*Odocoileus virginianus*) and other mammals such as red foxes (*Vulpes vulpes*), coyotes (*Canis latrans*), raccoons (*Procyon lotor*), porcupines (*Erethizon dorsatum*), and eastern gray squirrels (*Sciurus carolinensis*). The dense canopy also likely provides habitat to a multitude of bird species including songbirds such as the black-capped chickadee (*Parus atricapillus*), tufted titmouse (*Parus bicolor*), northern bobwhite (*Colinus virginianus*), white-breasted nuthatch (*Sitta carolinensis*), brown creeper, American robin (*Turdus migratorius*), song sparrow (*Melospiza melodia*), and dark-eyed junco, as well as the downy woodpecker and the pileated woodpecker (*Dryocopus pileatus*). Kelly Brook, flowing through the center of the conservation area to the north, also provides valuable riparian habitat and edge habitat which may be used by foragers and predators. Bats and predatory birds, such as the northern goshawk (*Accipiter gentilis*) and red-shouldered hawk (*Buteo lineatus*), rely on such riparian corridors for hunting and roost nearby in the forest interior.

Wetlands represent only about 10 percent of the site and include a single Palustrine, Forested, Broad-leaved Deciduous, Seasonally Flooded/Saturated area, as mapped by NWI. This onsite wetland likely supports common amphibian species such as green frogs (*Rana clamitans*), pickerel frogs (*Rana palustris*), northern spring peepers (*Pseudacris crucifer*), yellow-spotted salamanders (*Ambystoma maculatum*), and red eft salamanders (*Notophthalmus viridescens*). It also likely provides important bird habitat for similar species as listed above.

Soils

The *Soil Survey of Rockingham County, New Hampshire*⁵ maps four soil types on the mitigation site:

- 447B - Scituate-Newfields Complex, 3 to 8 percent slopes, very stony
- 125 - Scarboro Muck, very stony
- 495 - Ossipee Mucky Peat
- 43C - Canton Gravelly Fine Sandy Loam, 8-15 percent slopes, very stony

Nearly half of the site is mapped as Canton Gravelly Fine Sandy Loam. These are well-drained soils with a seasonal high water table at a depth of more than 6 feet. According to the Rockingham County Soil Survey, these soils are well suited both to woodland/timber production and to urban development. As the Kelly Brook watershed has been and is currently under severe pressure from residential development, the inclusion of this mitigation parcel will ensure its protection.

Soils surrounding the wetland at the center of the parcel (Scarboro Muck (10%) and Ossipee Mucky Peat (15%)) are very poorly drained, and the Chatfield-Hollis-Canton Complex in the western portion of the site is moderately well drained, each representing approximately 25 percent of the groundcover.

Cover Types and Existing Vegetation

Hemlock-Oak-Pine Forest

The majority of the site is composed of upland mixed forest. Mainly a hemlock-oak-pine community, the characteristics of forested areas on the Kelly Brook Parcel will be very similar to those described for the Nichols Property in Section 3.1.

Wetlands

Wetlands onsite represent 10 percent of the ground cover and are represented by a single PFO1E wetland at the center of the site. Typical vegetation associated with seasonally flooded/saturated forested wetland communities may include an overstory consisting mainly of red maple (*Acer rubrum*), with clusters of eastern hemlocks (*Tsuga canadensis*) at the wetland edge. Interspersed, secondary growth may also include American elm (*Ulmus Americana*) and other hardwoods. Shrubs likely include highbush blueberry (*Vaccinium corymbosum*), speckled alder (*Alnus incana*), silky dogwood (*Cornus amomum*), glossy buckthorn (*Frangula alnus*), and climbing poison ivy (*Toxicodendron radicans*). The herbaceous layer is likely co-dominated by sensitive fern (*Onoclea sensibilis*) and tussock sedge (*Carex stricta*).

⁵ Soil Conservation Service. 1994. *Soil Survey of Rockingham County, New Hampshire, Parts 1 and 2*. U.S. Department of Agriculture.

Creation/Restoration - Sullivan Properties

4.1 Site Description

The largest Sullivan property (Map R5/Lot 20) is approximately 5.4 acres. It has been heavily disturbed by filling and grading. The site's topographic characteristics suggest that some of the historical filling may have been in wetlands, presumably prior to current wetland regulations. Because of the parcel's altered state and its position next to an extensive wooded wetland surrounding Bayberry Pond, the site was considered an excellent candidate for wetland creation and habitat restoration. About 0.24 acres of the parcel have been used for the construction of a stormwater detention basin for the Hunt Road-Newton Junction Road project. The second Sullivan parcel (R5/Lot 19) is approximately 1.3 acres and located just south of the previous parcel. This parcel is comprised of nearly 100 percent undisturbed forest and per resource agency recommendations will be preserved intact. The third parcel (R5/Lot 1B) is 8.0 acres and is comprised of approximately 75 percent wetland and 25 percent upland. The latter parcel lies almost entirely within the Aquifer Protection Zone (APZ) for Bayberry Pond and will also be preserved intact.

The conceptual design for R5/Lot 20 contained in the FEA indicated that approximately 1.2 acres of forested wetlands could be created (see Appendix A, Figure A-1.) The design proposed a transition to restored upland shrub and forested habitat as one moves upslope towards NH 125 to the east. This design, which is the subject of this technical report, is intended to maximize wildlife habitat value and includes an upland island that will provide a sandy area for turtle nesting. The mature trees that currently grow along the boundary of much of the parcel, including close to NH 125, will also be preserved to the greatest extent possible. The detention basin constructed in 2004 provides both flood storage and stormwater treatment for the adjacent NH 125.

The remainder of all three Sullivan parcels, or approximately 12 acres, will remain undisturbed and will provide an important conservation buffer to Bayberry Pond.

The above described package complies with recent guidance on mitigation from USACOE (RGL 02-02). The mitigation contains a combined strategy of restoration

and preservation of wetlands as well as upland buffer preservation and has a clear connection to the watersheds impacted by the NH 125 project. The restoration portion of the package will mitigate for wildlife habitat and water quality functions lost due to the NH 125 project, while the preservation component will help to ensure the future integrity of Bayberry Pond, Powwow River, and Kelly Brook, including their associated wetland systems. The proposed mitigation is in addition to a variety of stormwater treatment measures that will be employed by NHDOT to minimize both potential permanent and temporary impacts on water quality due to the project.

4.2 Surrounding Land Use

A site location map for the Sullivan Properties is shown in Figure 5. The latitude and longitude for the center of parcel R5/Lot 20 (where wetland creation and restoration will take place) is 042°51'44.75"N, 071°05'4.62"W. The site's Hydrologic Unit Code is 01070002-310, representing its location in the Little River subwatershed of the greater Merrimack River Watershed.

The Sullivan Properties are bounded on the east by NH 125, the north by a commercial/industrial property, the south by a residential lot and driveway that extends to Bayberry Pond, and on the west by Bayberry Pond and its extensive bordering wetlands.

Before its purchase by NHDOT, parcel R5/Lot 20 was used for the storage of construction vehicles on a paved upper portion immediately adjacent to NH 125 (see Photo 1). The lower, flat portion of the lot was used for the storage of various construction materials including piles of fill (see Photos 3-5). A paved driveway with a gate connects the upper and lower portions of the site (see Photo 2). Prior to the State's purchase, all of the fill piles were removed.

4.3 Wildlife & Fisheries

The value of the existing habitat on the majority of the mitigation parcels has been reduced by their proximity to NH 125. Nonetheless there are a variety of species, especially song birds which will find the wooded habitats very suitable. The presence of both upland and wetland habitats along with substantial vertical diversity (herbaceous, shrub, and both sub-canopy and canopy tree layers) greatly increases the expected number of avian species. The mature trees, especially along the boundary of the central portion of the mitigation site also serve as ideal perching sites for raptors, like broad-winged hawks (*Buteo platypterus*) and barred owls (*Strix varia*). The juxtaposition of the site adjacent to Bayberry Pond also increases the opportunity for a variety of amphibians and reptiles, as well as mammals, to use the enhanced habitats. The current mitigation design takes this into account and provides a soft, sandy substrate on an "upland island" for turtle nesting. Such areas

are especially important for female snapping turtles (*Chelydra serpentina*), which will move considerable distances through upland habitats to find a suitable substrate to lay their eggs.

A complete list of vertebrate wildlife species potentially occurring on the mitigation site and preferring the habitats found there was generated using NEWILD⁶ (see Appendix C).

Field observations suggest that the small, unnamed perennial stream that courses through the center of site does not support fish. Since it is presumed that this unnamed stream is primarily fed by groundwater, it would be expected to have a rich macroinvertebrate population, especially considering its rock and cobble substrate. Highway runoff reaching this stream, although now diverted to the nearby detention basin, would have historically impacted this stream's water quality and ultimately Bayberry Pond.

4.4 Soils

The *Soil Survey of Rockingham County, New Hampshire*⁷ maps three soil types on the mitigation site:

- 43B - Canton gravelly fine sandy loam, 3 to 8% slopes, very stony
- 547B - Walpole very fine sandy loam, 3 to 8% slopes, very stony
- 295 - Greenwood mucky peat

The majority of parcel R5/Lot 20 is mapped as the Canton soil indicative of its side slope landscape position. Canton soils are well drained. In contrast, Parcel R5/Lot 1B, just to the west, is mapped as Greenwood mucky peat - a classic very poorly drained wetland soil. Parcel R5/Lot 19, to the south, is mapped as Walpole, a gently sloping soil found typically in drainageways. The current detention basin is located primarily in this latter soil type, which is characterized as poorly drained.

The Soil Survey (Table 16) indicates the following depths to the high water table for the mapped soils:

<u>Soil Type</u>	<u>Depth to High Water Table (ft)</u>	<u>Months</u>
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⁶ Thomasma, S.A., L.E. Thomasma, and M.J. Twery. 1998. NEWILD (version 1.0) User's Manual [Computer Program]. Gen. Tech. Rep. NE-242. USDA, Forest Service, NE Research Station. 28 pp. plus computer disk.

⁷ Soil Conservation Service. 1994. Soil Survey of Rockingham County, New Hampshire, Parts 1 and 2. U.S. Department of Agriculture.

43B	> 6.0	-----
547B	0.0-1.0	Nov-May
295	+1-0.5	Jan-Dec

These typical depths to groundwater are consistent with the delineation of wetlands on the Sullivan Properties and where the soils lie on the current landscape. Soil borings conducted by NHDOT in March 2003 also bear this out as the depth to groundwater was recorded as ranging from 0.4 to 11.0 feet immediately adjacent to NH 125 in this area. Boring logs recorded in the vicinity of the Sullivan Properties are provided in Appendix B.

4.5 Wetlands

Wetlands exist on all three Sullivan Properties and are contiguous with the larger undisturbed wooded wetlands surrounding Bayberry Pond (see Figure 5). In general, the wetlands closest to NH 125 receive runoff during storm events from upslope areas, including the highway, while at other times they are fed primarily by groundwater seeping from the side slope. The forested and scrub-shrub wetlands immediately surrounding Bayberry Pond are believed to have formed on peatland that is fed primarily by groundwater in the underlying stratified drift aquifer. According to the USGS map (see Figure 1), a perennial stream exits Bayberry Pond in its southwest corner. The unnamed stream forms a headwaters' tributary to Little River south and east of the site.

The Cowardin and hydrogeomorphic classifications of the on-site wetlands are given in Table 3-1. Wetland A includes wetland areas immediately adjacent to NH 125, on parcels R5/Lots 19 and 20. Wetland A' includes the mixed scrub-shrub and forested wetland found on parcel R5/Lot 1B (see Photos 6-7). This latter wetland makes up a portion of the much larger wetland fringing Bayberry Pond. Although not physically a part of this mitigation site, NWI mapping indicates Bayberry Pond as L1UBH (Lacustrine, Limnetic, Unconsolidated Bottom, Permanently Flooded).

Wetlands on the three mitigation parcels total approximately 7.5 acres or about 51 percent of the entire 14.7-acre site. A list of plant species observed during field investigations conducted in 2006 is provided in Table 4-2.

Of special note is the presence of Atlantic White Cedar on Parcel R5/1B. This is a rare species and when more abundant forms a classic community type referred to as an "Atlantic White Cedar Basin Swamp. An example of this "exemplary natural community," as classified by the NH Natural Heritage Inventory, can be found just north of the mitigation site along the Powwow River. NHDOT has contributed to the

purchase of this latter area as another component of the mitigation package for this project (see Introduction – Section 1.0). Atlantic white cedar is particularly sensitive to changes in hydrology (e.g., flooding or drying) and increased nutrient levels. The permanent protection of the Sullivan Properties, including the presence of additional stormwater treatment in the created wetland, will contribute to this species' long term viability.

**Table 4-1
Cowardin¹ and Hydrogeomorphic Classifications of On-Site Wetlands – Sullivan Properties, Kingston, NH**

Wetland ID	Cowardin Classification	Geomorphic Setting	Water Source	Hydrodynamics
A	PF01E	Depressional, Groundwater Slope	Surface Flow & Groundwater	Vertical Fluctuation & Unidirectional Flow
A ²	PSS1/PFO1/4E	Depressional	Surface Flow & Groundwater	Vertical Fluctuation & Unidirectional Flow

1 Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. Fish and Wildlife Service, U.S. Department of Interior. 131 pp.
 2 Brinson, M.M. 1993. A Hydrogeomorphic Classification for Wetlands. U.S. Army Corps of Engineers, Waterways Experiment Station. 79 pp. plus appendices.

**Table 4-2
Plant Species List – Sullivan
Properties, Kingston, NH**

Common Name	Scientific Name	NWI Region 1 Indicator Status
<u>Area 1 - Disturbed Area</u>		
Alternatleaf dogwood	<i>Cornus alternifolia</i>	NI
American elm	<i>Ulmus americana</i>	FACW-
Annual ragweed	<i>Ambrosia artemisiifolia</i>	FACU
Big-tooth aspen	<i>Populus grandidentata</i>	FACU-
Birds-foot trefoil	<i>Lotus corniculatus</i>	FACU-
Black willow	<i>Salix nigra</i>	FACW+
Blackberry	<i>Rubus uvidus</i>	NI
Black-eyed susan	<i>Rudbeckia hirta</i>	FACU-
Bracken fern	<i>Pteridium aquilinum</i>	FACU
Bristley blackberry	<i>Rubus hispidus</i>	FACW
Common boneset	<i>Eupatorium perfoliatum</i>	FACW+
Common juniper	<i>Juniperus communis</i>	NL
Common pokeweed	<i>Phytolacca americana</i>	FACU+
Common reed	<i>Phragmites australis</i>	FACW
Common winterberry	<i>Ilex verticillata</i>	FACW+
Cow vetch	<i>Vicia</i> sp.	-
Early goldenrod	<i>Solidago juncea</i>	NI
Eastern white pine	<i>Pinus strobus</i>	FACU
Grape	<i>Vitus</i> sp.	-
Grass	<i>Poa</i> spp.	-
Gray birch	<i>Betula populifolia</i>	FAC
Hay scented fern	<i>Dennstaedtia punctilobula</i>	NI
Honey-locust	<i>Gleditsia triacanthos</i>	FAC-
Japenese knotweed	<i>Polygonum cuspidatum</i>	FACU-
Milkweed	<i>Asclepias</i> sp.	-
Multiflora rose	<i>Rosa multiflora</i>	FACU
Northern red oak	<i>Quercus rubra</i>	FACU-
Oriental bitter-sweet	<i>Celastrus orbiculata</i>	UPL
Poison ivy	<i>Toxicodendron radicans</i>	FAC
Polytrichum moss	<i>Polytrichum</i> sp.	-
Purple loosestrife	<i>Lythrum salicaria</i>	FACW+
Quaking aspen	<i>Populus tremula</i>	FACU
Queen Anne's lace	<i>Daucus carota</i>	NL
Rabbitfoot clover	<i>Trifolium arvense</i>	NL
Red clover	<i>Trifolium pratense</i>	FACU-
Red maple	<i>Acer rubrum</i>	FAC
Red raspberry	<i>Rubus strigosus</i>	NI
Redtop	<i>Agrostis alba</i>	FACW
Rhubarb	<i>Rheum</i> sp.	-

**Table 4-2
Plant Species List – Sullivan
Properties, Kingston, NH**

Common Name	Scientific Name	NWI Region 1 Indicator Status
Russian olive	<i>Elaeagnus angustifolia</i>	FACU
Slender fragrant goldenrod	<i>Euthamia minor</i>	FACU
Smartweed	<i>Polygonum</i> sp.	-
Speckled alder	<i>Alnus rugosa</i>	FACW+
Spotted joe-pye-weed	<i>Eupatoriadelphus maculatus</i>	FACW
Spotted touch-me-not	<i>Impatiens capensis</i>	FACW
Staghorn sumac	<i>Rhus typhina</i>	NL
Sweet fern	<i>Comptonia peregrina</i>	NL
Virginia creeper	<i>Parthenocissus quinquefolia</i>	FACU
Virginia strawberry	<i>Fragaria virginiana</i>	FACU
White ash	<i>Fraxinus americana</i>	FACU
White birch	<i>Betula alba</i>	FAC+
Woodland horsetail	<i>Equisetum sylvaticum</i>	FACW

Area 2 - Natural Wetland Swale A

Alaska goldthread	<i>Coptis trifolia</i>	FACW
Alternateleaf dogwood	<i>Cornus alternifolia</i>	NI
American elder	<i>Sambucus canadensis</i>	FACW-
American elm	<i>Ulmus americana</i>	FACW-
Arrow-wood	<i>Viburnum dentatum</i>	FAC
Black cherry	<i>Prunus serotina</i>	FACU
Broad-leaf cattail	<i>Typha latifolia</i>	OBL
Broad-leaf meadow-sweet	<i>Spiraea latifolia</i>	FAC+
Carex spp.	Sedge	-
Cinnamon fern	<i>Osmunda cinnamomea</i>	FACW
Common boneset	<i>Eupatorium perfoliatum</i>	FACW+
Common buckthorn	<i>Rhamnus cathartica</i>	UPL
Common juniper	<i>Juniperus communis</i>	NL
Common winterberry	<i>Ilex verticillata</i>	FACW+
Corylus comuta	Beaked hazel-nut	FACU-
Early meadow rue	<i>Thalictrum dioicum</i>	FAC
Eastern hemlock	<i>Tsuga canadensis</i>	FACU
Eastern white pine	<i>Pinus strobus</i>	FACU
Fringed sedge	<i>Carex crinita</i>	OBL
Grape	<i>Vitis</i> sp.	-
Gray birch	<i>Betula populifolia</i>	FAC
Green ash	<i>Fraxinus pennsylvanica</i>	FACW
Highbush blueberry	<i>Vaccinium amoenum</i>	FACW
Maleberry	<i>Lyonia ligustrina</i>	FACW
Multiflora rose	<i>Rosa multiflora</i>	FACU
New York fern	<i>Thelypteris noveboracensis</i>	FAC
Northern red oak	<i>Quercus rubra</i>	FACU-

**Table 4-2
Plant Species List – Sullivan
Properties, Kingston, NH**

Common Name	Scientific Name	NWI Region 1 Indicator Status
Partridge-berry	<i>Mitchella repens</i>	FACU
Poison ivy	<i>Toxicodendron radicans</i>	FAC
Purple loosestrife	<i>Lythrum salicaria</i>	FACW+
Red maple	<i>Acer rubrum</i>	FAC
Royal fern	<i>Osmunda regalis</i>	OBL
Sensitive fern	<i>Onoclea sensibilis</i>	FACW
Soft rush	<i>Juncus effusus</i>	FACW+
Speckled alder	<i>Alnus rugosa</i>	FACW+
Spotted joe-pye-weed	<i>Eupatoriadelphus maculatus</i>	FACW
Spotted touch-me-not	<i>Impatiens capensis</i>	FACW
Steeple-bush	<i>Spiraea tomentosa</i>	FACW
Subarctic lady fern	<i>Athyrium filix-femina</i>	FAC
Swamp jack in the pulpit	<i>Arisaema triphyllum</i>	FACW-
Sweet birch	<i>Betula lenta</i>	FACU
Virginia creeper	<i>Parthenocissus quinquefolia</i>	FACU
White birch	<i>Betula alba</i>	FAC+
White oak	<i>Quercus alba</i>	FACU-
Wild lily of the valley	<i>Maianthemum canadense</i>	FAC-
Woodland horsetail	<i>Equisetum sylvaticum</i>	FACW
Wool-grass	<i>Scirpus cyperinus</i>	FACW+

Area 3 - Detention Basin

Arrow arum	<i>Peltandra virginica</i>	OBL
Broad-leaf cattail	<i>Typha latifolia</i>	OBL
Hop sedge	<i>Carex lupulina</i>	OBL
Common boneset	<i>Eupatorium perfoliatum</i>	FACW+
Common pokeweed	<i>Phytolacca americana</i>	FACU+
Fringed sedge	<i>Carex crinita</i>	OBL
Nut sedge	<i>Cyperus esculentas</i>	NI
Purple loosestrife	<i>Lythrum salicaria</i>	FACW+
Redtop	<i>Agrostis alba</i>	FACW
Shallow sedge	<i>Carex lurida</i>	OBL
Soft rush	<i>Juncus effusus</i>	FACW+
Spikerush	<i>Eleocharis sp.</i>	-
Wool-grass	<i>Scirpus cyperinus</i>	FACW+

Area 4 - Detention Basin Outfall

Arrow-wood	<i>Viburnum dentatum</i>	FAC
Beggar-ticks	<i>Bidens sp.</i>	-
Birds-foot trefoil	<i>Lotus corniculatus</i>	FACU-
Blackberry	<i>Rubus uvidus</i>	NI

**Table 4-2
Plant Species List – Sullivan
Properties, Kingston, NH**

Common Name	Scientific Name	NWI Region 1 Indicator Status
Bracken fern	<i>Pteridium aquilinum</i>	FACU
Broad-leaf cattail	<i>Typha latifolia</i>	OBL
Cinnamon fern	<i>Osmunda cinnamomea</i>	FACW
Giant goldenrod	<i>Solidago gigantea</i>	FACW
Purple loosestrife	<i>Lythrum salicaria</i>	FACW+
Queen Anne's lace	<i>Daucus carota</i>	NL
Redtop	<i>Agrostis alba</i>	FACW
Royal fern	<i>Osmunda regalis</i>	OBL
Spotted touch-me-not	<i>Impatiens capensis</i>	FACW
White birch	<i>Betula alba</i>	FAC+
<u>Area 5 - Upland Community</u>		
American starflower	<i>Trientalis borealis</i>	FAC
American witch-hazel	<i>Hamamelis virginiana</i>	FAC-
Apple	<i>Malus</i> sp.	-
Black cherry	<i>Prunus serotina</i>	FACU
Bracken fern	<i>Pteridium aquilinum</i>	FACU
Eastern white pine	<i>Pinus strobus</i>	FACU-
Lowbush blueberry	<i>Vaccinium angustifolium</i>	FACW
Maleberry	<i>Lyonia ligustrina</i>	FACW
Maple-leaf viburnum	<i>Viburnum acerifolium</i>	UPL*
Nannyberry	<i>Viburnum lentago</i>	FAC
Northern red oak	<i>Quercus rubra</i>	FACU-
Tree clubmoss	<i>Lycopodium obscurum</i>	FACU
White ash	<i>Fraxinus americana</i>	FACU
White oak	<i>Quercus alba</i>	FACU-
Wild lily of the valley	<i>Maianthemum canadense</i>	FAC-
<u>Area 6 - Natural Wetland A</u>		
Alaska goldthread	<i>Coptis trifolia</i>	FACW
American elm	<i>Ulmus americana</i>	FACW-
American hornbeam	<i>Carpinus caroliniana</i>	FAC
Arrow-wood	<i>Viburnum dentatum</i>	FAC
Atlantic white cedar	<i>Chamaecyparis thyoides</i>	OBL
Blackberry	<i>Rubus uvidus</i>	NI
Broad-leaf cattail	<i>Typha latifolia</i>	OBL
Broad-leaf meadow-sweet	<i>Spiraea latifolia</i>	FAC+
Carex spp.	Sedge	-
Cinnamon fern	<i>Osmunda cinnamomea</i>	FACW
Common winterberry	<i>Ilex verticillata</i>	FACW+
Early meadow rue	<i>Thalictrum dioicum</i>	FAC

**Table 4-2
Plant Species List – Sullivan
Properties, Kingston, NH**

Common Name	Scientific Name	NWI Region 1 Indicator Status
Feather false-solomen's-seal	<i>Smilacina racemosa</i>	FACU-
Green ash	<i>Fraxinus pennsylvanica</i>	FACW
Green biar	<i>Smilax rotundifolia</i>	FAC
Highbush blueberry	<i>Vaccinium amoenum</i>	FACW
Japanese barberry	<i>Berberis thunbergii</i>	FACU
Multiflora rose	<i>Rosa multiflora</i>	FACU
Nannyberry	<i>Viburnum lentago</i>	FAC
Partridge-berry	<i>Mitchella repens</i>	FACU
Peat moss	<i>Sphagnum</i> sp.	-
Poison ivy	<i>Toxicodendron radicans</i>	FAC
Purple loosestrife	<i>Lythrum salicaria</i>	FACW+
Red maple	<i>Acer rubrum</i>	FAC
Royal fern	<i>Osmunda regalis</i>	OBL
Sensitive fern	<i>Onoclea sensibilis</i>	FACW
Silky dogwood	<i>Cornus amomum</i>	FACW
Speckled alder	<i>Alnus rugosa</i>	FACW+
Spotted joe-pye-weed	<i>Eupatoriadelphus maculatus</i>	FACW
Spotted touch-me-not	<i>Impatiens capensis</i>	FACW
Steeple-bush	<i>Spiraea tomentosa</i>	FACW
Swamp jack in the pulpit	<i>Arisaema triphyllum</i>	FACW-
Tussock sedge	<i>Carex stricta</i>	OBL
Virginia creeper	<i>Parthenocissus quinquefolia</i>	FACU
Wild sarsaparilla	<i>Aralia nudicaulis</i>	FACU
Woodland horsetail	<i>Equisetum sylvaticum</i>	FACW

Notes: NL = not listed on the National List since the species does not occur in wetlands in any region.
 NI = insufficient information to assign an indicator status by the USFWS Review Panel.
 Dash (-) = indicator status is indeterminate since species level identification was not possible.
 Asterisk (*) = tentative assignment of indicator status by USFWS.

The U.S. Fish and Wildlife Service (USFWS) has both reviewed the EA for the NH 125 Project and attended Natural Resource Agency Coordination Meetings in which details of the mitigation package were discussed. That agency has expressed approval of the package. In addition, the State Historic Preservation Office (SHPO) has provided the required approvals for the project and has determined that there are no cultural resource concerns at the project mitigation site.

Wetland Design & Construction

5.1 Design Elements Related to Principal Wetland Functions

The mitigation design described in this report is intended to provide replacement for the principal wetland functions and values impacted by the project, i.e., groundwater recharge/discharge, floodflow alteration, sediment/toxicant retention, nutrient removal, and wildlife habitat (or more generally, biological productivity). See Section 2.0 for details.

5.1.1 Groundwater Recharge/Discharge

Since the majority of the NH 125 project corridor overlays stratified drift aquifer, the groundwater recharge/discharge function of the wetlands is an important function. In New England, most wetland situations are net discharge areas, while the surrounding landscape is important for recharging the substantial aquifer found where stratified drift deposits were formed by the melting glaciers.

The basic function of groundwater discharge in wetlands is typically to provide base flow to streams formed in the wetlands or flowing through them. This support for streams is critical during the dry season when stormwater runoff is insufficient to generate enough stream flow. The base flow generated from groundwater discharge is especially important in maintaining key habitat characteristics associated with a cold water fishery such as ample water depths, velocity, and cool temperatures.

Groundwater discharge is also important in that the water provides support for the growth of hydrophytic vegetation in the wetland itself, contributing to habitat diversity. Design elements that promote groundwater recharge/discharge include⁸:

- Excavation to depths which intercept the underlying water table, leading to discharge.

⁸ Marble, A.D. 1990. A Guide to Wetland Functional Design. U.S. Department of Transportation, Federal Highway Administration. Report No. FHWA-IP-90-010. 230 pp.

- Restoration (along with preservation) of a significant portion of the surrounding watershed to ensure adequate recharge of the water table down gradient where the wetland is located.

5.1.2 Floodflow Alteration (Flood Storage)

One of the most common functions performed by the majority of wetlands impacted by the highway widening project is floodflow alteration or flood storage. The U.S. Army Corps of Engineers (USACE), the U.S. Environmental Protection Agency (EPA) and the New Hampshire Department of Environmental Services (NHDES) all recommend that projects like this one should not contribute to the additional loss of flood storage that has already occurred due to development.

In addition to wetland creation, compensatory flood storage will be augmented by a number of extended-detention basins that will provide both water quality treatment and stormwater storage at a number of locations along the widened highway. Following standard practice, these basins are being designed for a 25-year storm event with a spillway for discharging the 50-year storm event to a nearby watercourse.

The ability of a wetland to function in floodflow alteration is dependent upon its storage capacity and position in the watershed. Effective desynchronization of downstream peak flows is a function of a wetland's outlet size and elevation. Design elements which typically promote floodflow alteration and storage include⁹:

- A basin-like morphology to increase available floodwater storage.
- Plant establishment with wetland species which are well adapted to the specific planting location (for high productivity and density).
- Establishment of persistent vegetation which provides increased frictional resistance to flowing water.
- A minimal amount of open water in relation to the total wetland area.
- A maximum amount of area where water depth does not exceed 50 percent of plant height.
- Absence of an outlet which limits the rate of discharge from the site.

Not all of the above elements are possible at the Sullivan Properties site. The current design for the site (see Plan Set and overview provided in Section 7) essentially creates a broad wetland with mound-and-pool microtopography, whose persistent woody vegetation will slow the movement of water towards Bayberry Pond. The

⁹ *ibid.*

constructed wetland will also retain water adding to the substantial water holding capacity of the natural wetlands already surrounding the pond.

5.1.3 Water Quality Treatment

Both sediment/toxicant retention and nutrient removal are key components of a wetland's water quality treatment function. The design elements for both are similar as discussed below.

The ability of a wetland to provide treatment and attenuation of water-borne pollutants in surface runoff is a function of its size in relation to the watershed, the period of surface water detention or retention, and the density and type of vegetation within the wetland. The proposed wetlands will be supported by both groundwater and surface runoff during storm events, primarily from upslope areas including NH 125.

The present design provides for treatment of surface water through removal of suspended solids (sediments) and nutrients. As the flow velocity of surface water is reduced in the wetland through contact with vegetation, suspended solids will be trapped and deposited in the wetland. Any pollutants that are attached to the sediments will also be removed. Prolonged contact of water borne pollutants with the vegetation/soil interface as occurs in low gradient and ponded wetlands also encourages nutrient uptake by the plants and chemical breakdown of some pollutants through microbial activity.

Specific design elements intended to address these processes include¹⁰:

- Plant establishment with multi-stemmed wetland species that are well adapted to the specific planting zone enabling dense and productive vegetative establishment.
- Basin development with a constricted outlet to maximize retention time.
- Flat slopes that minimize the velocity of surface runoff into the wetland.
- Vegetated zones lined with highly organic soil amendments to increase toxicant retention efficiency.

5.1.4 Biological Productivity (including Wildlife Habitat)

The habitat value of the wetlands on the mitigation site varies widely. Wetlands immediately adjacent to NH 125 are relatively low in value due to the proximity of

¹⁰ *ibid.*

the highway and frequent disturbance. As one proceeds west, however, the wetlands become much more pristine with a much higher habitat quality.

The proposed design will enhance the biological productivity function so as to promote long-term biological health and diversity at the site. Basic site factors such as slope, basin configuration, water quality and quantity, water level variation, and substrate are important in terms of plant productivity, species composition, and system stability. Diversity in cover type and terrain, including vegetative layering, and open water-vegetation interspersions are all important factors influencing wildlife habitat value. Specific design elements which typically address biological productivity include¹¹:

- Variable shape and grading to increase "edge effect" between zones.
- Creation of limited areas of open water interspersed with several vegetated classes to increase habitat diversity and interspersions.
- Plantings of trees, shrubs, and emergents arranged in separate and distinct clusters rather than concentric zones.
- Locating species within and among groupings according to their specific environmental requirements.
- Preservation of coarse woody debris in all salvaged topsoil to provide refuges for amphibian larvae and adults (e.g., mole salamanders and wood frogs).
- Provision of logs, stumps and boulders as hiding, perching, or loafing sites for wildlife.
- Planting of native species typical of natural or undisturbed wetlands in the region and which have high wildlife food value.
- Provision of a highly organic substrate (i.e., use of salvaged wetland topsoil or a clean compost mix with a high organic content) to increase primary productivity.
- Establishment of side slopes of 10:1 or less whenever practicable.

5.2 Design Constraints

The major design constraint on the mitigation site is the presence of steep slopes along NH 125. A large wetland basin can not be excavated as it would necessitate even steeper slopes in the transition from wetland to upland as one proceeds

¹¹ Marble, A.D. 1990. A Guide to Wetland Functional Design. U.S. Department of Transportation, Federal Highway Administration. Report No. FHWA-IP-90-010. 230 pp.

eastward towards NH 125. The presence of a number of very large, mature trees having important wildlife value also limits any desire to clear and excavate a larger area for wetland creation. Both constraints were discussed in a joint site visit with the Army Corps on April 12, 2005. It was concluded that the goals of the mitigation should include both habitat restoration and wetland creation, instead of simply maximizing the acreage of created wetlands. It was also agreed that suitable benchmarks could be found in the nearby natural wetlands to establish grading elevations for the vegetation zones in the created wetlands.

5.3 Phased Construction

Phased development of the mitigation area so that it is concurrent with highway construction is necessary to facilitate the excavation and salvage of sufficient quantities of wetland humus and topsoil. A determination will also be made of the suitability of the excess borrow material from the mitigation site for use as fill for the highway widening and other planned improvements.

Construction of the mitigation area will require extensive grading. Care will need to be exercised in minimizing activities within the finish graded areas to prevent sedimentation and disturbance of substrate soil structure, e.g., compaction. Excavation can be performed at any time of year, however construction during the late summer will enable excavation to occur with minimal or no dewatering. Seepage of groundwater from side slopes may be more of a problem during the spring. Tree and shrub planting can be performed throughout the growing season if certain precautions relative to watering and pruning are followed. Bare-rooted or dormant woody stock will have to be planted in the spring. Herbaceous plants should also be planted in the spring. As the planting zones are excavated and finish grades established, additional erosion controls will need to be installed to prevent silt and sediment from accumulating in the specific zone. Sequencing and scheduling of excavation and planting will be up to the site contractor, however construction activities will incorporate the recommended planting windows as specified by NHDOT.

5.4 Construction Timing/Sequencing

As described above, the wetland mitigation will need to be completed in phases. A pre-construction conference will be held with the contractor, the NHDOT's site engineer, their wetlands consultant, and an Army Corps representative to ensure a thorough understanding of the construction plan. A wetland scientist shall be on-site to monitor construction of the wetland mitigation area to ensure compliance with the mitigation plan and to make adjustments when appropriate to meet mitigation goals.

An example of the proposed construction sequence follows but is ultimately the responsibility of the contractor performing the mitigation construction.

1. Contact nursery to order plant stock and schedule delivery window. Provide adequate time for site preparation prior to scheduled delivery of plant materials.
2. Install erosion control measures between areas to be disturbed and existing wetlands and/or waterbodies.
3. Establish sub-grade contours within mitigation sites. Construct temporary drainage/dewatering structures as required. Contact Army Corps for inspection.
4. Remove wetland topsoil from areas of large wetland impact and stockpile onsite. Inspect these areas for invasive plants before salvaging the wetland topsoil.
5. Spread and till topsoil mix within areas to be planted, seed and install erosion control measures as necessary.
6. Initiate planting schedule as seasonally appropriate.
7. Develop as-built plans if required and conduct onsite inspection with Army Corps for their sign-off.
8. Complete permanent seeding and landscaping. Install temporary irrigation system if specified.
9. Initiate monitoring program.
10. Remove temporary erosion control measures after vegetation is established and the soils are stabilized.
11. Remove temporary irrigation system, if applicable, after 2 years.
12. Take remedial actions annually as necessary.

6

Hydrology

6.1 Water Budget Analysis

The hydrologic support for the proposed wetlands will be primarily groundwater, with the addition of surface runoff during storm events. The mitigation site sits atop a stratified drift aquifer with a veritable unlimited supply of water to support created wetlands. In addition, there is evidence onsite of side-slope seepage of groundwater, which is expected to occur as excavation occurs into the slope on parcel R5/Lot 20. This groundwater can be expected to have a "head," which will readily seep from the slope when the overlying soils are removed; i.e., similar to the small, side-hill seep containing cattails (see Photo 10) just upslope and slightly to the north of the recently constructed detention basin.

6.2 Groundwater Monitoring

With the above site characteristics in mind, no formal monitoring of groundwater elevations was considered necessary. The Soil Survey (SCS 1994) and soil borings conducted by NHDOT in 2003 provide additional information on the expected elevations of the water table for various areas and soil types onsite.

Considering the goals of the mitigation and the little risk involved with the design, NHDOT does not propose to conduct any future groundwater monitoring.

Site Design - Overview

7.1 Grading Plan

The grading plan for the mitigation site is shown on **Sheet 6** of the Construction Plan Set. Excavation of the wetland and upland/wetland transition zones will be one-foot lower than finish grades to accommodate the placement of wetland topsoil. A typical section or profile through the site is shown on **Sheet 5** of the Construction Plan Set.

The proposed design calls for the construction of a mound-and-pool microtopography starting at the toe of the existing fill embankment adjacent to the natural wetland (at elevation 134.5) on the western side of the site. The topography then transitions into a gradual slope proceeding east towards NH 125. This proposed geomorphology is illustrated in **Appendix A**.

Excavation for the forested wetland zone will result in approximately 6.5 acre-feet of additional flood storage on the mitigation site.¹²

7.2 Soils Plan

The soils plan for the mitigation site is shown on **Sheet 7** of the Construction Plan Set.

7.2.1 Requirements

The current Army Corps guidelines for wetland topsoil that require a 4-12 percent minimum organic content (9-21 percent organic matter) will be followed. A minimum of 12 inches will be applied in all wetland zones.

¹² Flood elevations for the Sullivan properties are not available from the standard sources like FEMA. For simplicity it was assumed that all of the soil volume excavated for the forested wetland zone provides additional flood storage if needed.

7.2.2 Proposed Source

Soils salvaged from wetlands impacted by the project and free of invasive species will be used to provide topsoil for the constructed wetlands. Should there be an insufficient quantity available, a commercial supplier capable of manufacturing topsoil to the required specifications from clean leaf compost will be used. See additional discussion in Section 6.7 below.

7.3 Planting Plan

The planting plan for the mitigation site is shown on Sheet 8 of the Construction Plan Set.

7.3.1 Description of Community Types

The following elevations, along with the resulting acreages, were assumed for the respective zones within the mitigation site:

<u>Wetland Class/Habitat</u>	<u>Elevation (feet)</u>	<u>Acres Created</u>
Shrub/Forested Wetland	132.5-137.0	1.31
Upland/Wetland Transition	137.0-147.5	0.67
Upland Shrub/Forest	>147.5	0.88
Turtle Nesting Habitat		<u>0.07</u>
	Total	2.93

With the exception of the detention basin that has become a shallow marsh (see Photos 8-9), wetter habitat zones including open water and scrub-shrub were not designed as they would have necessitated deeper excavation with unavoidable steep side slopes. Because of the site's existing topography, a gradual transition into existing slopes would have been impossible with a deeper basin.

7.3.2 Species Lists by Types

The planting plan will give preference to native plant species already found in wetlands onsite. Included in the list below is *Alnus rugosa* (speckled alder). It is important to note that nonnative and invasive *A. glutinosa* has been found mislabeled as native *A. incana*, *A. rugosa*, and *A. serrulata*, and planted in several mitigation sites in New England, so care should be taken to ensure that the correct species is planted. See Table 4-2 for a listing of species compiled in the spring of 2006.

Table 7-2 provides a more complete list of species suitable for the various proposed vegetation zones that can be used to supplement the local list. The practicability of salvaging sod or root mats from wetlands that will be impacted by the highway

construction (in addition to simply salvaging soils, see Section 7.2.2 above) will also be evaluated.

**Table 7-1
Proposed Plantings for the Various Zones Within the Mitigation Site**

Name	Indicator Status	Type/Size	Planting Density
Shrub/Forested Swamp			
Arrowwood (<i>Viburnum dentatum</i>)	FAC	container/2'-3'	6' o.c.
Winterberry Holly (<i>Ilex verticillata</i>)	FACW+	container/2'-3'	6' o.c.
Pussy Willow (<i>Salix discolor</i>)	FACW	container/2'-3'	6' o.c.
Silky Dogwood (<i>Cornus amomum</i>)	FACW	container/2'-3'	6' o.c.
Highbush Blueberry (<i>Vaccinium corymbosum</i>)	FACW	container/2'-3'	6' o.c.
Speckled Alder (<i>Alnus rugosa</i>) ²	FACW+	container/2'-3'	6' o.c.
Red Maple (<i>Acer rubrum</i>)	FAC	container/4'	9' o.c.
Swamp White Oak (<i>Quercus bicolor</i>)	FACW+	container/4'	9' o.c.
Green Ash (<i>Fraxinus pennsylvanica</i>)	FACW	container/4'	9' o.c.
Gray Birch (<i>Betula populifolia</i>)	FAC	container/4'	9' o.c.
Northern Arrowwood (<i>Viburnum recognitum</i>)	FACW-	container/2'-3'	6' o.c.
Steeple-bush (<i>Spiraea tomentosa</i>)	FACW	container/2'-3'	6' o.c.
Upland/Wetland Transition			
American Cranberry (<i>Viburnum trilobum</i>) ¹	FACW	container/2'-3'	6' o.c.
Eastern Hemlock (<i>Tsuga canadensis</i>)	FACU	ball & burlap/5'	9' o.c.
Red-osier Dogwood (<i>Cornus sericea</i>)	FACW+	container/2'-3'	6' o.c.
Gray Dogwood (<i>Cornus racemosa</i>)	FAC	container/2'-3'	6' o.c.
Broad-leaved Meadow Sweet (<i>Spiraea latifolia</i>)	FAC	container/2'-3'	6' o.c.
Eastern White Pine (<i>Pinus strobus</i>)	FACU	ball & burlap/3'	6' o.c.
Eastern White Pine (<i>Pinus strobus</i>)	FACU	3 gallon container/3'	6' o.c.
Nannyberry (<i>Viburnum lentago</i>)	FAC	container/2'-3'	6' o.c.
Witch Hazel (<i>Hamamelis virginiana</i>)	FAC-	container/2'-3'	6' o.c.
Red Maple (<i>Acer rubrum</i>)	FAC	container/4'	9' o.c.
Quaking Aspen (<i>Populus tremula</i>)	FACU	container/4'	6' o.c.
American Hazelnut (<i>Corylus americana</i>) ¹	FACU-	container/2'-3'	6' o.c.
Red Oak (<i>Quercus rubra</i>)	FACU-	bare root/ 2-1 trans.	9' o.c.
Chokecherry (<i>Prunus virginiana</i>)	FACU	container/2'-3'	6' o.c.
Grey Birch (<i>Betula populifolia</i>)	FAC	container/2'-3'	6' o.c.
River Bank Grape (<i>Vitis riparia</i>)	FACW	container/2'-3'	6' o.c.
Oblong-Leaf Service Berry (<i>Amelanchier canadensis</i>)	FAC	container/2'-3'	6' o.c.
Silky Dogwood (<i>Cornus amomum</i>)	FACW	container/2'-3'	6' o.c.



Black Chokeberry (*Aronia melanocarpa*) FAC container/2'-3' 6' o.c.

Upland Restoration/Enhancement

Crab Apple (*Malus* cultivars- Indian Summer, Manchurian, Snowdrift, Profusion, or Golden Homet)¹ UPL ball & burlap/3' 9' o.c.

Name	Indicator Status	Type/Size	Planting Density
Eastern Burning Bush (<i>Euonymus atropurpureus</i>)	FACU	ball & burlap/3'	6' o.c.
White Oak (<i>Quercus alba</i>) ¹	FACU-	ball & burlap/3'	9' o.c.
Eastern White Pine (<i>Pinus strobus</i>)	FACU	ball & burlap/3'	6' o.c.
Eastern White Pine (<i>Pinus strobus</i>)	FACU	3 gallon container/3'	6' o.c.
American Hazelnut (<i>Corylus americana</i>) ¹	FACU-	container/2'-3'	6' o.c.
Alternate-leaved Dogwood (<i>Cornus alterniflora</i>) ¹	UPL	container/2'-3'	6' o.c.
Red Oak (<i>Quercus rubra</i>) ¹	FACU-	container/2'-3'	9' o.c.
Shagbark Hickory (<i>Carya ovata</i>) ¹	FACU-	ball & burlap/3'	9' o.c.
Black Cherry (<i>Prunus serotina</i>) ¹	FACU	container/2'-3'	6' o.c.
Nannyberry (<i>Viburnum lentago</i>)	FAC	container/2'-3'	6' o.c.
Northern Bayberry (<i>Myrica pensylvanica</i>) ^{1,2}	FAC	container/2'-3'	6' o.c.
Cockspur Hawthorn (<i>Crataegus crus-galli</i>) ¹	FACU	container/2'-3'	6' o.c.
Sweet Fern (<i>Comptonia peregrina</i>) ²	UPL	1 gallon container	3' o.c.

1 Wildlife habitat improvement species.
2 Nitrogen fixing species.

During construction, seeding will take place immediately after the application of topsoil to ensure rapid coverage for the site. The seed bank within the transplanted soils will also contribute to this initial flush of vegetation. The Shrub/Forest Swamp Seed Mix (Table 7-2) will be applied to the wooded wetland zone and the lower portion of the upland/wetland transition zone. The Upland Zone Seed Mix (Table 7-3) will be applied to all re-graded upland areas. See details on Construction Plan Sheet 7.

**Table 7-2
Shrub/Forest Swamp Seed Mix**

Botanical Name	Common Name	Lbs/Acre
<i>Panicum virgatum</i>	Switch Grass	6.0
<i>Agrostis alba</i>	Redtop Grass	4.0
<i>Bidens frondosa</i>	Beggars Tick	1.0
<i>Leersia oryzoides</i>	Rice Cut Grass	0.75
<i>Eupatorium macculatum</i>	Joe-Pye-Weed	0.75
<i>Eupatorium perfoliatum</i>	Boneset	0.75
Total lbs/acre		13.25*

*Seeding Rate = 13.25 lbs. (Pure Live Seed)/Acre

**Table 7-3
Upland Zone Seed Mix**

Botanical Name	Common Name	Lbs/Acre
<i>Chrysanthemum leucanthemum</i>	Ox Eye Daisy	3.50
<i>Coreopsis lanceolata</i>	Lanceleaf Coreopsis	4.25
<i>Cichorium intybus</i>	Chicory	1.50
<i>Oenothera lamarckiana</i>	Evening Primrose	1.50
<i>Festuca rubra</i>	Creeping Red Fescue	8.00
<i>Giillardia pulchella</i>	Indian Blanket	3.75
<i>Hesperis matronalis</i>	Dames' Rocket	1.50
<i>Polygonum pensylvanicum</i>	Knotweed	1.50
<i>Rudbeckia hirta</i>	Black-eyed Susan	3.00
Total lbs/acre		28.50*

*Seeding Rate = 28.50 lbs (Pure Live Seed)/ Acre

Both of the above seed mixes contain only native species, are appropriate for erosion control, and provide wildlife habitat value.

7.4 Irrigation and Special Requirements (Mulch)

Irrigation or regular watering for no longer than two years will be required to ensure high survival of the planted material. The bases of all woody stock will also be surrounded by mulch to preserve moisture.

7.5 Coarse Woody Debris and Rocks

During the salvage of wetland soils from impacted wetlands, every attempt will be made to also retrieve coarse woody debris like stumps with roots attached, fallen trees, etc. The goal will be to have at least 4 percent of the ground at the mitigation site covered with this woody debris. Since extensive open water and other very wet zones will not be present, a very limited number of boulders or large rocks will be collected and placed within the site.

7.6 Erosion Control

NHDOT's standards for erosion and sedimentation control will be followed during all phases of the wetland construction. Temporary devices and structures to control erosion and sedimentation in and around mitigation sites shall be properly maintained at all times. The devices and structures shall be disassembled and properly disposed of as soon as the site is stable, but no later than November 1, three full growing seasons after planting. Sediment collected by these devices will be removed and placed upland in a manner that prevents its erosion and transport to a waterway or wetland. Erosion control details can be found on Sheet 12 of the construction plan set.

7.7 Invasive and Noxious Species

All the proposed plant stocks, including the seed mixes, are native or indigenous species. None of the species is found on the Army Corps' list of invasive species. In addition, all locations along the highway corridor that are identified for possible salvaging of wetland soil will be inspected by a wetland scientist to determine if they are free of invasives. Should invasive species be present, the site will be rejected and alternative locations sought.

Should insufficient topsoil be available, a commercial source such as Agresource Inc. (Amesbury, MA) will be sought. Suitable topsoil of a specified organic content can be manufactured from leaf compost that is typically available from municipalities during the fall season. Leaf compost has the advantage in that it is relatively "clean" or free from weed seeds that might include invasive species.

After construction, the wetland will be inspected twice per year for five years (see Section 7.0). If invasives are found they will be removed at the appropriate time in the growing season to prevent further propagation. Recommended protocols for removal published by NHDES and similar agencies will be followed.

7.8 Limitations on Off-Road Vehicle Use

The mitigation site will be signed to indicate that motorized vehicles are not allowed. A fence will also be installed on the northern and eastern boundaries to prevent unauthorized entry as these are the areas that would most likely provide an opportunity for access.

7.9 Preservation including Buffers

The current design ensures that a sufficient upland buffer to adjacent properties and the highway will exist on the southern and eastern sides of the site. The western side is contiguous with the extensive wooded wetland surrounding Bayberry Pond which provides a very effective buffer. On the northern side, mature trees will be preserved wherever practical to provide a screen and buffer to the adjacent business.

After construction of the wetlands, the entire mitigation site, including all unimpacted wetlands and upland, will be preserved in perpetuity. As required by the Corps *Guidance* document, the permittee (NH DOT) shall execute and record the preservation document with the Registry of Deeds for the Town of Kingston and the State of New Hampshire. A copy of the executed and recorded document will then be sent to the Corps of Engineers within 90 days of the date it was recorded.

NH DOT intends to ultimately transfer ownership of the parcels to the Town of Kingston with the appropriate deed restriction and conservation easement to ensure the entire 14.7-acre site remains protected.

8

Monitoring

During the first full growing season after construction, and for four subsequent years, the mitigation site will be evaluated at least once in the late spring/early summer and again in late summer/early fall. The observations will be compared to the Performance Standards referenced in the *Mitigation Monitoring Regulatory Guidance Letter* (USACOE September 29, 2006). A formal post-construction assessment will also be performed after the fifth growing season.

As required by the Corps *Guidance* document, the following text, updated to comply with Regulatory Guidance Letter 06-03, is included herein.

8.1 Monitoring Plan Guidance

Within 60 days of completing mitigation measures involving restoration, creation, and/or enhancement, a signed letter will be submitted to the Corps, Policy Analysis and Technical Support Branch, specifying the date of completion of the mitigation work.

If mitigation construction is initiated in, or continues throughout the year, but is not completed by December 31 of any given year, the permittee (NHDOT) will provide the Corps, Policy Analysis and Technical Support Branch, a letter providing the date mitigation work began and the work completed as of December 31. The letter should be sent no later than January 31 of the next year. The letter must include the Corps permit number.

For each of the first five full growing seasons following construction of the mitigation site, the site shall be monitored. Observations will occur at least two times during the growing season - in late spring/early summer and again in late summer/early fall. Each annual monitoring report shall be submitted to the Corps, Regulatory Division, Policy Analysis and Technical Support Branch, no later than December 15 of the year being monitored. Failure to perform the monitoring and submit monitoring reports constitutes permit non-compliance. A self-certification form will be completed, and signed as the transmittal coversheet for each annual monitoring report and will indicate the permit number and the report number (Monitoring

Report 1 of 5, for example). The reports will answer the following success-standards in the summary data section and will address the additional items noted in the monitoring report requirements, in the appropriate section. The reports will also include the monitoring-report appendices listed below. The first year of monitoring will be the first year that the site has been through a full growing season after completion of construction and planting. For these special conditions, a growing season starts no later than May 31. However, if there are problems that will need to be addressed and if the measures to correct them require prior approval from the Corps, the permittee shall contact the Corps by phone, email, or letter as soon as the need for corrective action is discovered.

Remedial measures shall be implemented - at least two years prior to the completion of the monitoring period - to attain the success standards described below within five growing seasons after completion of construction of the mitigation site. Should measures be required within two years of the end of the monitoring period, the monitoring period will be extended to ensure two years of monitoring after the remedial work is completed. Measures requiring earth movement or changes in hydrology will not be implemented without written approval from the Corps.

At least one reference site adjacent to or near each mitigation site will be described and shown on a locus map.

8.2 Performance Standards

The Performance Standards as listed in the *Guidance* are described below and summarized in Table 8-1. These standards will be implemented by NHDOT for the Sullivan site as appropriate.

- 1) The site has the hydrology, as demonstrated with well data collected at least weekly from March through June or other substantial evidence, to support the designated wetland type.

Is the proposed hydrology met at the site?

What percentage of the site is meeting projected hydrology levels?

Areas that are too wet or too dry should be identified along with suggested corrective measures.

- 2) The proposed vegetation diversity and/or density goals for woody plants from the plan are met.

Unless otherwise specified in the mitigation plans, this should be at least 500 trees and shrubs per acre, of which at least 350 per acre are trees for proposed forested cover types, that are healthy and vigorous and are at least 18" tall in 75% of each planned woody zone AND at least the following number of exotic species

including planted and volunteer species. Volunteer species should support functions consistent with the design goals. To count a species, it should be well represented on the site (e.g., at least 50 individuals of that species per acre).

<u># Species planted</u>	<u>Minimum # species required (volunteer and planted)</u>
2	2
3	3
4	3
5	4
6	4
7	5
8	5
9 or more	6

Vegetative zones consist of areas proposed for various types of wetlands (shrub swamp, forested swamp, etc.). The performance standards for density can be assessed using either total inventory or quadrat sampling methods, depending upon the size and complexity of the site.

- 3) a. Each mitigation site has at least 80% areal cover, excluding planned open water areas or planned bare soil areas (such as for turtle nesting), by noninvasive species.
- b. Planned emergent areas on each mitigation site have at least 80% cover by noninvasive hydrophytes.
- c. Planned scrub-shrub and forested cover types have at least 60% cover by noninvasive hydrophytes, of which at least 15% are woody species.

For the purpose of this success standard, invasive species of hydrophytes are:

Cattails - *Typha latifolia*, *Typha angustifolia*, *Typha glauca*;
 Common Reed - *Phragmites australis*;
 Purple Loosestrife - *Lythrum salicaria*;
 Reed canary Grass - *Phalaris arundinacea*; and
 Buckthorn - *Rhamnus frangula*

- 4) Common reed (*Phragmites australis*), Purple loosestrife (*Lythrum salicaria*), Russian and Autumn Olive (*Elaeagnus* spp.), Buckthorn (*Rhamnus* spp.), Japanese knotweed (*Polygonum cuspidatum*), and/or Multiflora rose (*Rosa multiflora*) plants at the mitigation site are being controlled.

For this standard, small patches must be eliminated during the entire monitoring period. Large patches must be aggressively treated and the treatment documented.

- 5) Are all slopes, soils, substrates, and constructed features within and adjacent to the mitigation site are stable.

**Table 8-1
Performance Standards and Criteria for the Mitigation Site.**

Performance Standard	Criteria
1. Hydrology is met to support designed wetland type. Percentage of site meeting projected hydrology levels.	Must be demonstrated with well data collected at least weekly from March through June or other substantial evidence.
2. 500 trees and shrubs per acre, and the minimum number of total species (planted and volunteer) as specified in the <i>Guidance</i> (2004)	At least 350 stems are species originally proposed for the forested zones, that are healthy and vigorous and ≥ 18 in. tall. Also, total number of species shall meet the requirements as listed in the <i>Guidance</i> .
3. 80% areal cover of the entire site by non-invasives (excluding open water or special bare soil areas, i.e., turtle nesting areas)	80% areal cover by non-invasives in emergent zones and 60% cover (of which 15% are woody species) in scrub-shrub and forested zones.
4. Common reed, purple loosestrife, Russian and autumn olive, and/or multiflora rose are controlled.	Absence of stems of these species on the site.
5. All slopes, soils, substrates and constructed features are stabilized	No evidence of sedimentation in runoff from the site during storms and all erosion control measures are in good condition.

8.3 Monitoring Report Narrative Requirements

The Annual Monitoring Reports content and format will be consistent with the requirements and guidelines included in the Regulatory Guidance Letter No. 06-03. The following list specific items to be included:

Project Overview

- Highlighted summary of problems which need immediate attention (e.g., problem with hydrology, severe invasives problem, serious erosion, major losses from herbivory, etc.). This should be at the beginning of the report and highlighted in the project overview and in the self-certification form.

Requirements

- A copy of this permit's mitigation special conditions and summary of the mitigation goals.

Summary Data

- Address success standards achievement and/or measures to attain the standards.
- Describe the monitoring inspections, and provide their dates, that occurred since the last report.
- Soils data, commensurate with the requirements of the soils portion of the 1987 Corps Wetland Delineation Manual (Technical Report Y-87-1 and approved regional supplements) New England District data form, should be collected after construction and every alternate year throughout the monitoring period. If monitoring wells or gauges were installed as part of the project, this hydrology data should be submitted annually.
- Concisely describe remedial actions done during the monitoring year to meet the five success standards – actions such as removing debris, replanting controlling invasive plant species (with biological, herbicidal, or mechanical methods), regarding the site, applying additional topsoil or soil amendments, adjusting site hydrology, etc. Also describe any other remedial actions done at each site.
- Report the status of all erosion control measures on the compensation site. Are they in place and functioning? If temporary measures are no longer needed, have they been removed?
- Give visual estimates of (1) percent vegetative cover for each mitigation site and (2) percent cover of the invasive species listed under Success Standard No. 3, above, in each mitigation site.
- What fish and wildlife use the site and what do they use it for (nesting, feeding, shelter, etc.)?
- By species planted, describe the general health and vigor of the surviving plants, the prognosis for their future survival and a diagnosis of the cause(s) of morbidity or mortality.

Conclusions

- What remedial measures are recommended to achieve or maintain achievement of the five success standards and otherwise improve the extent to which the mitigation site replaces the functions and values lost because of project impacts?

Monitoring Report Appendices

Appendix A – An as-built plan showing topography to 1-foot contours, any inlet/outlet structures and the location and extent of the designed plant community types (e.g., shrub swamp). Within each community type the plan shall show the species planted – but it is not necessary to illustrate the precise location of each individual plant. There should also be a soil profile description and the actual measured organic content of the topsoil. This should be included in the first monitoring report unless there are grading modifications or additional plantings of different species in subsequent years.

Appendix B – A vegetative species list of volunteer species in each plant community type. The volunteer species list should, at a minimum, include those that cover at least 5% of their vegetative layer.

Appendix D – Representative photos of each mitigation site taken from the same locations for each monitoring event. Photos should be dated and clearly labeled with the direction from which the photo was taken. The photo sites must also be identified on the appropriate maps.

8.4 Post-Construction Assessment

As required by the Corps *Guidance* document, the following commitment is included herein:

A post construction assessment of the condition of the mitigation site shall be performed following the fifth growing season after completion of the mitigation site construction. "Growing season" in this context begins no later than May 31st. To ensure objectivity, the person(s) who prepared the annual monitoring reports shall not perform this assessment without written approval from the Corps. The assessment report shall be submitted to the Corps by December 15 of the year the assessment is conducted; this will coincide with the year of the final monitoring report, so it is acceptable to include both the final monitoring report and assessment in the same document.

The post-construction assessment shall include the four assessment appendices listed below and shall:

- Summarize the original or modified mitigation goals and discuss the level of attainment of these goals at each mitigation site (include vernal pool creation if that is a component of the mitigation).
- Describe significant problems and solutions during construction and maintenance (monitoring) of the mitigation sites(s).
- Identify agency procedures or policies that encumbered implementation of the mitigation plan. Specifically note procedures or policies that contributed to less success or less effectiveness than anticipated in the mitigation plan.
- Recommend measures to improve the efficiency, reduce cost, or improve the effectiveness of similar projects in the future.

Assessment Appendices

Appendix A - Summary of the results of a functions and values assessment of the mitigation site, using the same methodology used to determine the functions and values of the impacted wetlands.

Appendix B - Calculation of the area of wetlands in each mitigation site using the 1987 Corps Wetland Delineation Manual. Supporting documents shall include (1) a scaled drawing showing the wetland boundaries and representative transects and (2) data sheets for corresponding data points along each transect.

Appendix C - Comparison of the area and extent of delineated constructed wetlands (from Appendix B) with the area and extent of created wetlands proposed in the mitigation plan. This comparison shall be made on a scaled drawing or as an overly on the as-built plan. This plan shall also show the major vegetation community types.

Appendix D - Photos of each mitigation site taken from the same locations as the monitoring photos, including photos of vernal pools, if applicable.

8.5 Contingency Plans (Remedial Actions)

Careful mitigation planning coupled with accurate implementation is the key to mitigation success. However, unforeseen problems can arise. In order to ensure mitigation success, problems will have to be addressed and rectified as they arise. A contingency plan involves developing a list of proposed remedial measures (Table 7-2, adapted from NAI 1992).

Mitigation effectiveness can often be substantially improved through very simple measures. A list of potential problems can be developed based on the performance

standards set forth in Section 7.2. In its simplest terms, remediation will take place if standards are not met. However, the decision to invoke a contingency plan must be carefully evaluated. For example, it may not be practical to rectify a minor problem that could impair other functioning elements of the system. The performance standards may also prove to be unreasonable. Therefore decisions on remediation, if necessary, will be made on a case-by-case basis after consultation with the Army Corps.

**Table 8-2
Summary of Remedial Measures for Mitigation Deficiencies¹**

Deficiency	Remedial Measures
Final elevations not as planned	Regrade
Inadequate soil saturation/inundation after at least 1 full growing season	Regrade only if there is not a predominance of OBL, FACW, and FAC species
<50% hydrophytes	Supplement seeding/planting
Inadequate species composition	Supplement seeding/planting
Inadequate plant density	Fertilize, supplement seeding
Significant erosion	Install erosion control blankets or similar materials
<80% areal cover by non-invasives	Replant as necessary
Marginal tree/shrub vigor	Fertilize
Substantial human disturbance	Fencing, legal remedies
Significant wildlife depredation/damage	Trapping/relocation, netting
Presence of invasive plant species	Biocontrol, manual removal, systemic herbicide control (e.g., Rodeo)
Presence of archaeological resources	Notify SHPO and contract with an archaeological consultant to conduct investigation
Presence of hazardous waste	Notify NHDES and contract with a hazardous waste firm to determine extent of contamination

¹ Partially adapted from Normandeau Associates Inc. 1992. Wetland Mitigation Technical Report, Epping-Hampton, NHDOT Project 11324, F018-2(72). Bedford, NH. 72 pp.



9

Summary

The Sullivan Properties are one of the three components of the mitigation package described in the FEA for the Plaistow-Kingston Project. The goal of this package is to provide compensation for the unavoidable wetland impacts associated with the project, specifically the wetland functions and values that may be lost due to the proposed widening and other improvements along NH 125. The principal functions and values of the impacted wetlands are: groundwater recharge/discharge; floodflow alteration; sediment and toxicant retention; nutrient removal; and wildlife habitat.

The Sullivan Properties total 14.7 acres, of which approximately 12 acres will be left undisturbed by the proposed wetland creation and habitat restoration. Approximately 1.31 acres will be used for forested wetland creation, with an additional 0.67 acres for a transition zone from wetland to upland. A turtle nesting island (0.07 acres) with a "sandy beach" area will be constructed in the created wetland to further enhance wildlife habitat value. Selected upland areas (0.88 acres) will also be restored by regrading the site's existing steep slopes and replanting them, as well as other currently barren areas, with plant species of high wildlife value for food or cover. As recommended by the Corps, the proposed design attempts to preserve to the greatest extent practicable the mature trees presently growing on the site.

The stormwater detention basin, whose construction was completed in 2005, has also developed into an emergent marsh of approximately 0.24 acres. Although not its primary intent, this area provides additional habitat diversity on the mitigation site.

Hydrological support for the created wetlands will be provided primarily by groundwater inflow, with additional surface-water input during major storm events. The additional flood storage provided by the excavated wetlands is approximately 6.5 acre-feet.

The mitigation site will be monitored for five years with reports submitted annually to the Army Corps. Appropriate remedial actions, including the removal of invasive species, will be taken to correct deficiencies as they occur. Off-road vehicle access will be restricted through both signage and fencing.

Photos





Sullivan Properties, Kingston, NH – July 2006

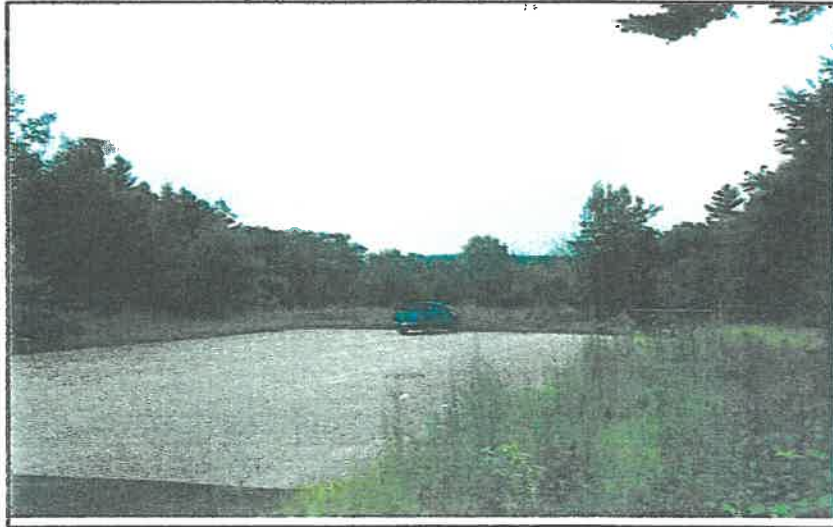


Photo 1. Upper portion of parcel R5/Lot 20, looking west from the edge of NH 125 showing the former paved parking area.



Photo 2. View back towards NH 125 looking east showing the existing driveway into the site.

Sullivan Properties, Kingston, NH – July 2006



Photo 3. Lower portion of parcel R5/Lot 20 looking west showing unpaved area formerly used for outdoor storage of construction materials.



Photo 4. Lower portion of R5/Lot 20 looking southeast. Abandoned propane tank in background.

Sullivan Properties, Kingston, NH – July 2006



Photo 7. Another view of the interior of the forested wetland.



Photo 8. Wet detention basin constructed on parcel R5/Lot 20 looking east towards NH 125 and Landscapers Depot.

Sullivan Properties, Kingston, NH – July 2006



Photo 5. Lower portion of parcel R5/Lot 20 looking south with natural wetland to right.



Photo 6. View of forested wetland bordering the disturbed area of previous photo.

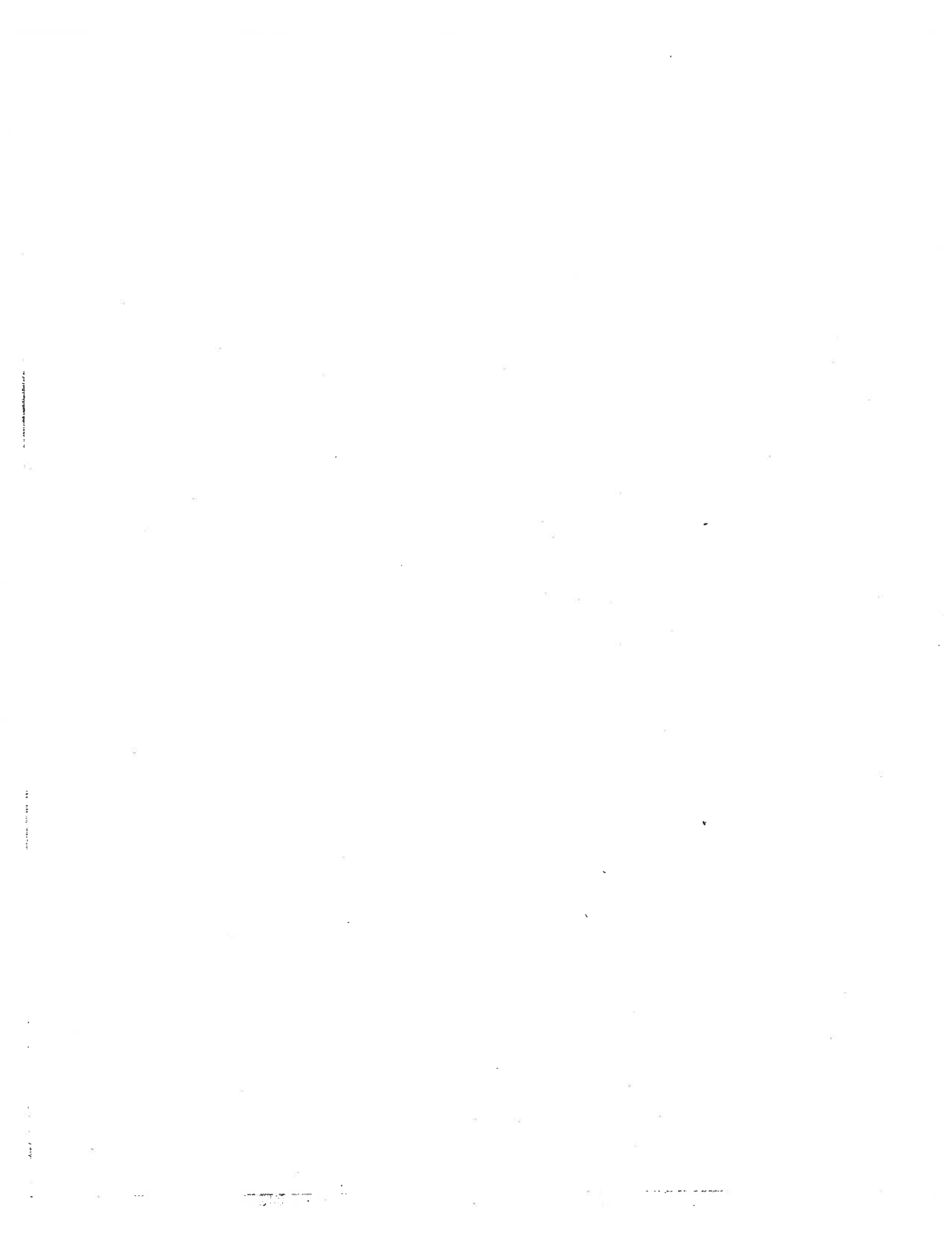
Sullivan Properties, Kingston, NH – July 2006



Photo 9. Headwall and overflow outlet pipes from wet detention basin. A second drain (to left of headwall) is set at a lower elevation and provides a continual flow through the basin.



Photo 10. Side-hill seep located just to the north of the wet detention basin.





Appendices

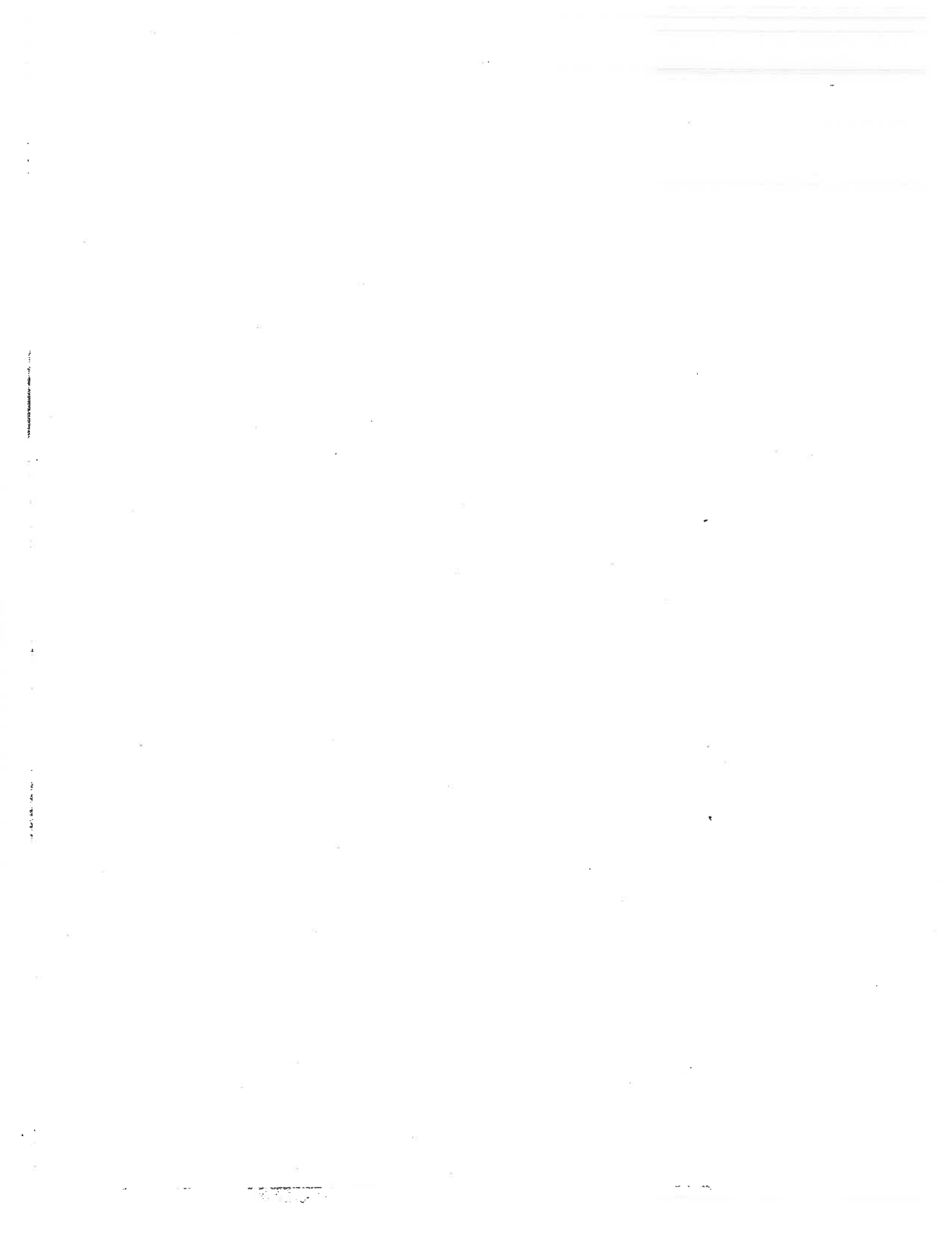
-
- ™ Appendix A – Conceptual Mitigation Design, Sullivan Properties
 - ™ Appendix B – Soil Boring Logs
 - ™ Appendix C – NEWILD Species Lists
 - ™ Appendix D – USFWS and NHDH Correspondence; Rare, Threatened, and Endangered Species
 - ™ Appendix E – Construction Plan Set

Figures



■

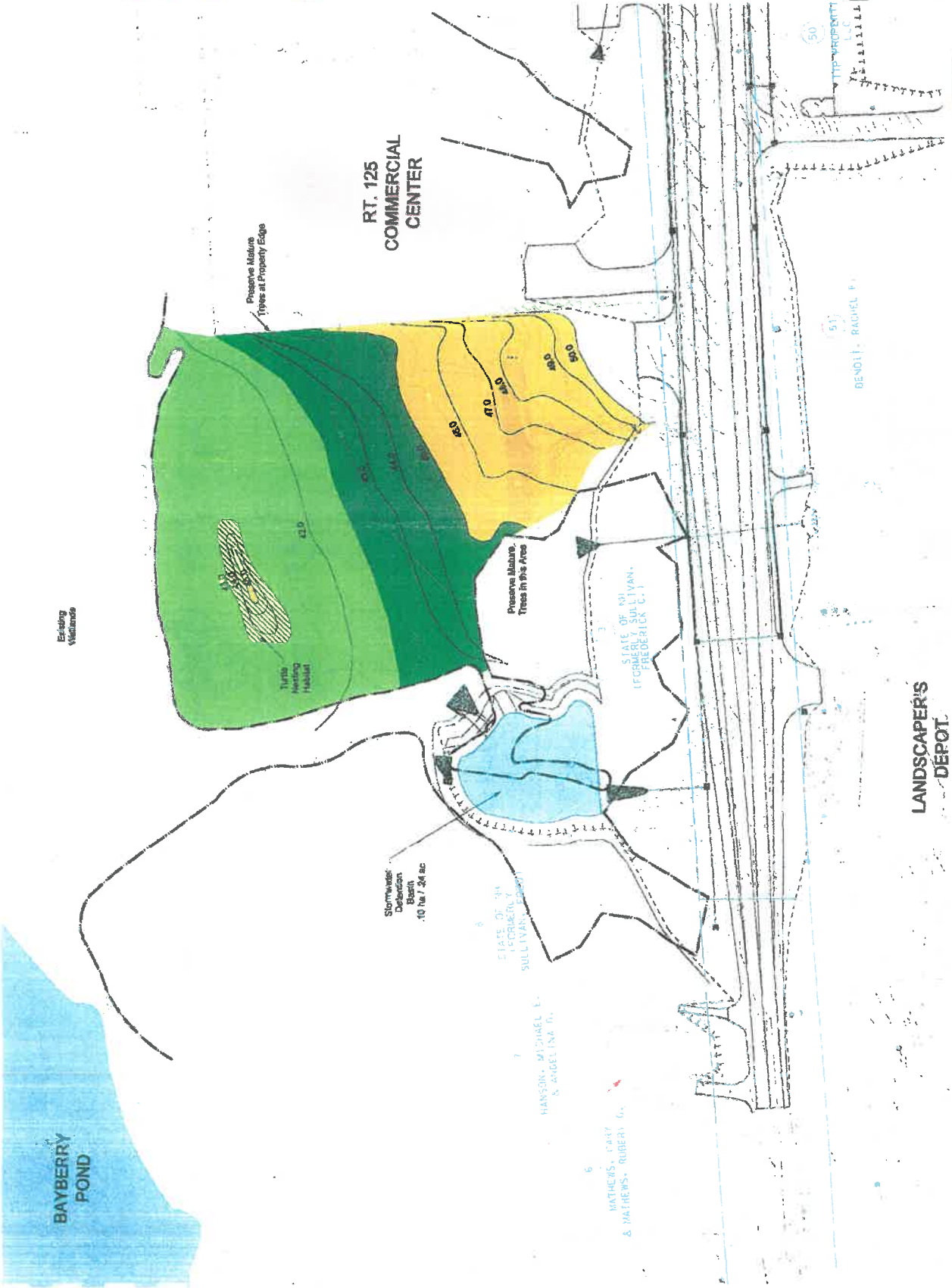
Appendix A – Conceptual Mitigation Design, Sullivan Properties



Legend:

Forest Wetland	41.00 - 42.50
Upland / Wetland Transition	42.50 - 45.00
Upland Scrub / Forest	45.00 - 47.50
Turtle Nesting Habitat	47.50 - 50.00
Existing Wetland Boundary	50.00 - 52.50
Open Water	52.50 - 55.00

Existing Wetlands





Appendix B – Soil Boring Logs

Geotechnical Report
Route 125 at Hunt and Newton Junction Roads
Kingston 10044-C

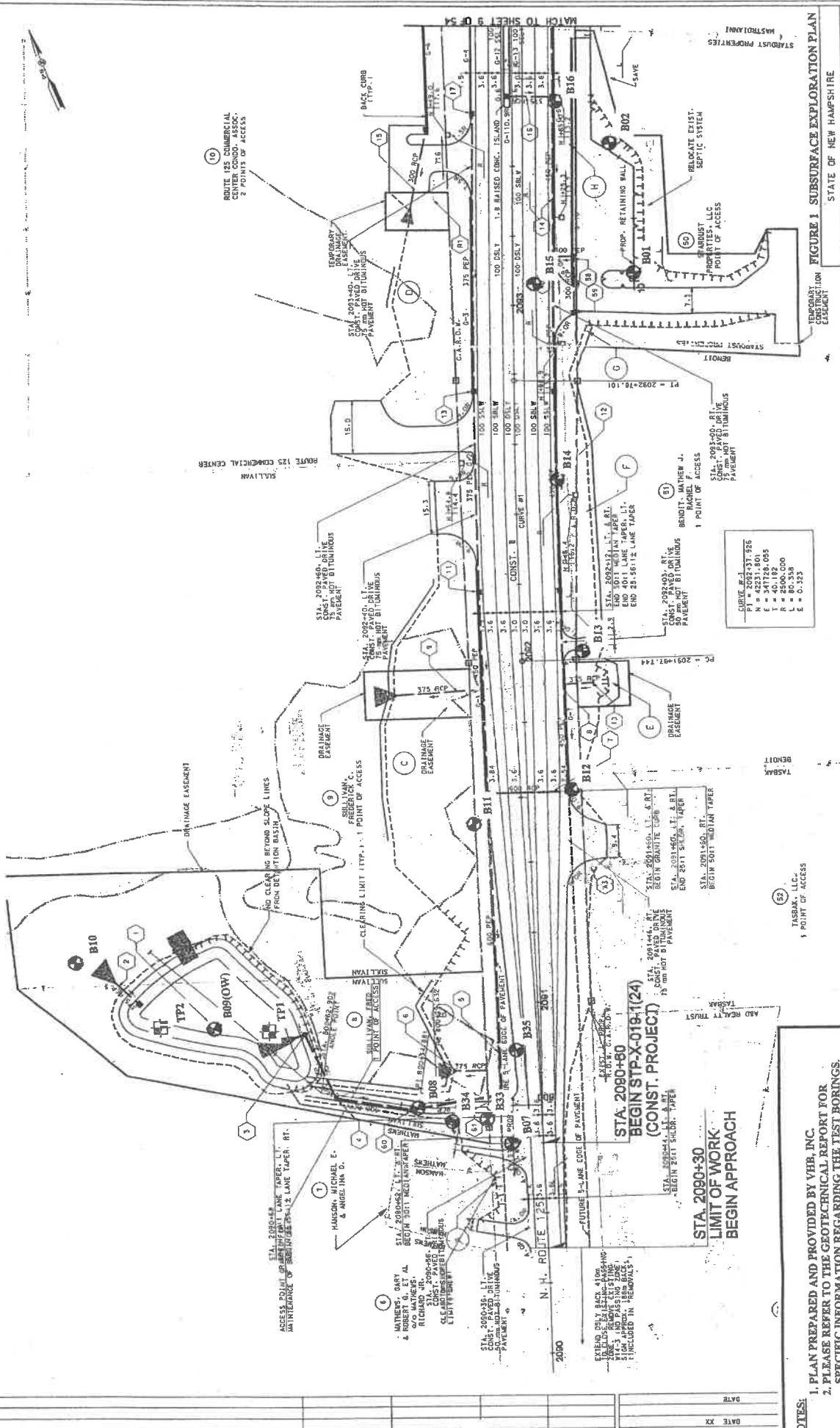


FIGURE 1 SUBSURFACE EXPLORATION PLAN

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

**N.H. ROUTE 125
GENERAL PLANS**

DRAWN BY: 10044601
PROJECT NO.: 10044601
SHEET NO.: 8
TOTAL SHEETS: 54

VHB Vanasse Hangen Brustlin, Inc.

METRIC

CURVE # 1
N = 42231.801
E = 347728.095
R = 2500.000
L = 80.358
E = 0.353

GRAPHIC SCALE
0 10 20 30 M

NOTES:

1. PLAN PREPARED AND PROVIDED BY VHB, INC.
2. PLEASE REFER TO THE GEOTECHNICAL REPORT FOR SPECIFIC INFORMATION REGARDING THE TEST BORINGS.

END:

LOCATION OF TEST BORING PERFORMED BY NHDOT DRILL CREWS IN MARCH AND APRIL 2003.

LOCATION OF TEST PIT PERFORMED BY NHDOT CREWS IN MARCH 2003.

DATE	DESCRIPTION

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
 MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION
 PROJECT **KINGSTON 10044-C** BRIDGE NO. _____
 DESCRIPTION NH Route 125 at Hunt Road and Newton Junction Road



BORING NO. B08
 SHEET NO. 1 OF 1
 STA. 2090+71.1 OFF. Lt 35.11
 BASELINE Rt. 125
 ELEVATION (m) 48.71
 START/END 3/17/03 / 3/17/03
 DRILLER Jeff Kibbee
 INSPECTOR Richard Mechaber
 CLASSIFIER RAM
 NORTH/EAST 42088 / 347637

GROUNDWATER						EQUIPMENT	SAMPLER	CASING	CORE	FIELD CLASSIFICATION AND REMARKS	STRATA SYMBOL
DATE	TIME	DEPTH (m)	ELEVATION (m)	BOTTOM OF CASING	BOTTOM OF HOLE	TYPE:	S	NW	NX		
						SIZE I.D. (mm):	34.9	76.2	47.5		
						HAMMER WT. (kg):	53.5	DRILL RIG			
						HAMMER FALL (m):	0.76	CME 45-C Track rig			
						HAMMER TYPE:	Automatic				
0.0				1						Topsoil. (Cobble fragment recovered in spoon tip)	
				2	S1	0.06 [10]				-TOPSOIL-	
	0.61	48.10		3						-PROBABLE GLACIAL OUTWASH-	
1.5	1.52	47.19		7	C1	NR []	1.52			Advanced core barrel through probable boulder from 1.5-1.8m.	
				16			1.83			Dense, medium brown, FINE to MEDIUM SAND, some gravel/cobble fragments/coarse sand, some silt.	
				21	S2	0.34 [55]				Water return lost at 2.9m (spin casing) Roller bit advanced rapidly from 2.59-2.74m Drill rig shook at 2.74m.	
				71			2.44			-GLACIAL TILL-	
3.0				20			3.05			Cobble fragments.	
				30	S3	0.37 [60]					
				23							
				26			3.85				
	4.08	44.63					4.11			-APPROXIMATE BEDROCK SURFACE-	
4.5					C2	1.37 [94]				Fine to medium grained biotite GRANITE. Massive, relatively unfractured (2 horizontal fractures and 1 vertical fracture in lower 1/3 of run). RQD=1.38/1.47=94%.	
							5.59			Bottom of Exploration @ 5.58 m (EL. 43.13 m)	
Notes: "NR []" denotes not recorded.											

TB-02 S:\GINT\WP\PROJECTS\K10044\TB.GPJ BORING.GDT 8/26/2003 4:30:38 PM

Sampler	Identification	COHESIVE SOILS		NON-COHESIVE SOILS		Soil Descriptions Capitalized Soil Name Lower Case Adjective Some Little Trace	Proportion Major Component 35% - 50% 20% - 35% 10% - 20% 1% - 10%
		Blows/0.30m	Consistency	Blows/0.30m	Density		
S	Split Spoon	0 - 1	Very Soft	0 - 4	Very Loose		
T	Thin Wall Tube	2 - 4	Soft	5 - 10	Loose		
U	Undisturbed Piston	5 - 8	Medium Stiff	11 - 24	Medium Dense		
O	Open End Rod	9 - 15	Stiff	25 - 50	Dense		
A	Auger Flight	16 - 30	Very Stiff	> 50	Very Dense		
C	Core Barrel	31 - 60	Hard				
		> 60	Very Hard				

**WOR - Weight of Rod
WOH - Weight of Hammer**

METRIC

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
 MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION
 PROJECT **KINGSTON 10044-C** BRIDGE NO. _____
 DESCRIPTION NH Route 125 at Hunt Road and Newton Junction Road



BORING NO. B09(OW)
 SHEET NO. 1 OF 1
 STA. 2090+95 OFF. Lt 92
 BASELINE Rt. 125
 ELEVATION (m) 45.94
 START/END 3/12/03 / 3/13/03
 DRILLER Jeff Kibbee
 INSPECTOR Richard Mechaber
 CLASSIFIER RAM
 NORTH/EAST 42,130 / 347,592

GROUNDWATER						EQUIPMENT	SAMPLER	CASING	CORE
DATE	TIME	DEPTH (m)	ELEVATION (m)	BOTTOM OF CASING	BOTTOM OF HOLE	TYPE:	S	NW	NX
3/13	0930	2.53	43.41	na	8.23	SIZE I.D. (mm):	34.9	76.2	47.6
						HAMMER WT. (kg):	63.5	DRILL RIG	
						HAMMER FALL (m):	0.76	CME 45-C Track rig	
						HAMMER TYPE:	Automatic		

DEPTH (m)	STRATA CHANGE (m)	BOUNDARY ELEVATION (m)	BLOWS PER 0.15 m	SAMPLE NUMBER	SAMPLER RECOVERY (m) [%]	DEPTH RANGE (m)	FIELD CLASSIFICATION AND REMARKS	STRATA SYMBOL
0.0	0.15	45.78	4	2	S1	0.40 [65]	S-1B: V. loose, light brown, FINE SAND, trace medium to coarse sand. S-1A: V. loose, dark brown, organic FINE SAND and SILT (Topsoil). (0.15m) Casing advanced harder at 0.61m, much harder at 1.37m. Gravel and cobbles noted at 0.76m. -GLACIAL OUTWASH-	
1.5	1.58	44.35	11	21	S2	0.40 [65]	Dense, rusty to medium brown, FINE to COARSE SAND, little angular gravel, little silt.	
3.0			15	16	S3	0.46 [75]	Dense, light to medium brown, FINE to MEDIUM SAND, some silt, trace coarse sand and fine gravel.	
4.5			22	57	C1	0.30 [67]	Advanced core barrel through probable boulder from 4.11-4.57m.	
6.0			90/0.09	105	S4	0.49 [89]	Very dense, medium brown and rust-colored, FINE to COARSE SAND, little silt, little fine gravel.	
7.5	6.55	39.38			C2	1.31 [90]	-APPROXIMATE BEDROCK SURFACE- Fine grained biotite SCHIST, moderately fractured (0.08-0.38m fracture spacing), fracture planes dipping approx. 20 degrees, fracture surfaces rusty. RQD=1.07/1.47=73%	
8.0	8.02	37.92					Notes: 1. Please refer to observation well log for details regarding the well installation. Bottom of Exploration @ 8.08 m (EL. 37.86 m) 2. Please refer to Table 2 for groundwater level reading information.	

TB-02 S:\GINT\WP\PROJECTS\K10044\TB.GPJ BORING.GDT 7/11/2003 2:22:45 PM

Sampler	Identification	COHESIVE SOILS		NON-COHESIVE SOILS		Soil Descriptions Capitalized Soil Name Lower Case Adjective	Proportion Major Component 35% - 50% 20% - 35% 10% - 20% 1% - 10%
		Blows/0.30m	Consistency	Blows/0.30m	Density		
S	Split Spoon	0 - 1	Very Soft	0 - 4	Very Loose		
T	Thin Wall Tube	2 - 4	Soft	5 - 10	Loose		
U	Undisturbed Piston	5 - 8	Medium Stiff	11 - 24	Medium Dense		
O	Open End Rod	9 - 15	Stiff	25 - 50	Dense		
A	Auger Flight	16 - 30	Very Stiff	> 50	Very Dense		
C	Core Barrel	31 - 60	Hard				
		> 60	Very Hard				

METRIC

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
 MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION
 PROJECT KINGSTON 10044-C BRIDGE NO. _____
 DESCRIPTION NH Route 125 at Hunt Road and Newton Junction Road



BORING NO. B10
 SHEET NO. 1 OF 1
 STA. 2091+15 OFF. Lt 130
 BASELINE Rt. 125
 ELEVATION (m) 43.39
 START/END 3/13/03 / 3/14/03
 DRILLER Jeff Kibbee
 INSPECTOR Richard Mechaber
 CLASSIFIER RAM
 NORTH/EAST 42162 / 347563

GROUNDWATER						EQUIPMENT	SAMPLER	CASING	CORE
DATE	TIME	DEPTH (m)	ELEVATION (m)	BOTTOM OF CASING	BOTTOM OF HOLE	TYPE:	S	NW	NX
3/14	1000	1.40	41.99	4.57	4.57	SIZE I.D. (mm):	34.9	76.2	47.6
						HAMMER WT. (kg):	63.5	DRILL RIG	
						HAMMER FALL (m):	0.76	CME 45-C Track rig	
						HAMMER TYPE:	Automatic		

DEPTH (m)	STRATA CHANGE (m)	BOUNDARY ELEVATION (m)	BLOWS PER 0.15 m	SAMPLE NUMBER	SAMPLER RECOVERY (m) [%]	DEPTH RANGE (m)	FIELD CLASSIFICATION AND REMARKS	STRATA SYMBOL
0.0	0.12	43.27	1			0.00	S-1A: Topsoil (0.12m)	
			2	S1	0.27 [45]		S-1B: Loose, light brown, silty FINE SAND.	
			1			0.61	-GLACIAL OUTWASH-	
							Difficult drilling at 1.13m	
1.5	1.13	42.26	9			1.52	Dense, tan to rusty brown, FINE SAND, little gravel, little silt.	
			13	S2	0.43 [70]			
			12			2.13		
3.0			7			3.05	Similar to S2, except medium dense.	
			7	S3	0.46 [75]			
			8					
			15			3.65	-GLACIAL TILL-	
4.5			29			4.57	Very dense, grey-green, FINE to MEDIUM SAND, some silt, some gravel and cobble fragments.	
			37	S4	NR []			
			38					
			85			5.18		
6.0			41			6.10	Very dense, grey-brown, FINE to MEDIUM SAND, some silt, trace gravel/cobble fragments.	
			57	S5	0.49 [80]			
			58					
			60			6.71		
7.5			37			7.62	Tan, silty FINE SAND, little gravel. Spoon refusal on probable bedrock/boulder.	
			62	S6	NR []			
			150/0.12			8.05	Bottom of Exploration @ 8.05 m (EL. 35.34)	

Notes:
 "NR []" denotes not recorded.

TB-02 8:\GINTWP\PROJECTS\K10044\TB.GPJ BORING.GDT 6/23/2003 9:25:22 AM

Sampler	Identification	COHESIVE SOILS		NON-COHESIVE SOILS		Soil Descriptions Capitalized Soil Name Lower Case Adjective Some Little Trace	Proportion Major Component 35% - 50% 20% - 35% 10% - 20% 1% - 10%
		Blows/0.30m	Consistency	Blows/0.30m	Density		
S	Split Spoon	0 - 1	Very Soft	0 - 4	Very Loose		
T	Thin Wall Tube	2 - 4	Soft	5 - 10	Loose		
U	Undisturbed Piston	5 - 8	Medium Stiff	11 - 24	Medium Dense		
O	Open End Rod	9 - 15	Stiff	25 - 50	Dense		
A	Auger Flight	16 - 30	Very Stiff	> 50	Very Dense		
C	Core Barrel	31 - 60	Hard	WOR - Weight of Rod WOH - Weight of Hammer			
		> 60	Very Hard				

METRIC

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
 MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION
 PROJECT **KINGSTON 10044-C** BRIDGE NO. _____
 DESCRIPTION NH Route 125 at Hunt Road and Newton Junction Road



BORING NO. B11
SHEET NO. 1 OF 1
STA. 2091+51.43 **OFF.** Lt 15.53
BASELINE Rt. 125
ELEVATION (m) 46.47
START/END 3/18/03 / 3/19/03
DRILLER Jeff Kibbee
INSPECTOR Richard Mechaber
CLASSIFIER RAM
NORTH/EAST 42156 / 347683

GROUNDWATER						EQUIPMENT	SAMPLER	CASING	CORE
DATE	TIME	DEPTH (m)	ELEVATION (m)	BOTTOM OF CASING	BOTTOM OF HOLE	TYPE:	S	NW	NX
						SIZE I.D. (mm):	34.9	76.2	47.6
						HAMMER WT. (kg):	63.5	DRILL RIG	
						HAMMER FALL (m):	0.76	CME 45-C Track rig	
						HAMMER TYPE:	Automatic		

DEPTH (m)	STRATA CHANGE (m)	BOUNDARY ELEVATION (m)	BLOWS PER 0.15 m	SAMPLE NUMBER	SAMPLER RECOVERY (m) [%]	DEPTH RANGE (m)	FIELD CLASSIFICATION AND REMARKS	STRATA SYMBOL
0.0			WOH			0.00	Topsoil	
			1	S1	0.15 [25]		-TOPSOIL-	
	0.91	45.56	2			0.61	Encountered probable boulder at 0.91m± depth.	
1.5			10			1.52	Medium dense, light brown, FINE to MEDIUM SAND, some silt, little gravel.	
			7	S2	0.43 [70]		-POSSIBLE WEATHERED GLACIAL TILL-	
			7			2.13		
3.0			6			3.05	Medium dense, medium brown, FINE to MEDIUM SAND, little gravel, little silt.	
	3.66	42.82	9	S3	NR []			
			18			3.65		
4.5			34			4.57	Very dense, medium brown and rusty colored, FINE to COARSE SAND, some angular gravel, little silt.	
			30	S4	0.34 [55]		-GLACIAL TILL-	
			21			5.18		
6.0	5.91	40.56				5.91	-APPROXIMATE BEDROCK SURFACE-	
				C1	1.46 [107]		Very fine grained GRANODIORITE. Upper 0.61m extremely fractured to gravel size pieces, with heavy rusting on fracture surfaces. Lower 0.91m± with 10± fractures, most chloritized, several with slickensides. RQD=0.55/1.46=38%	
						7.28	Bottom of Exploration @ 7.28 m (EL. 39.19)	
							Notes:	
							"NR []" denotes not recorded.	

TB-02 S:\GINT\PROJECTS\K10044\TB.GPJ BORING.GDT 6/23/2003 9:25:26 AM

Sample#	Identification	COHESIVE SOILS		NON-COHESIVE SOILS		Soil Descriptions Capitalized Soil Name Lower Case Adjective	Proportion Major Component
		Blows/0.30m	Consistency	Blows/0.30m	Density		
S	Split Spoon	0 - 1	Very Soft	0 - 4	Very Loose		35% - 50%
T	Thin Wall Tube	2 - 4	Soft	5 - 10	Loose		20% - 35%
U	Undisturbed Piston	5 - 8	Medium Stiff	11 - 24	Medium Dense		10% - 20%
O	Open End Rod	9 - 15	Stiff	25 - 50	Dense		1% - 10%
A	Auger Flight	16 - 30	Very Stiff	> 50	Very Dense		
C	Core Barrel	31 - 60	Hard	WOR - Weight of Rod			
		> 60	Very Hard	WOH - Weight of Hammer			

METRIC

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION

PROJECT **KINGSTON 10044-C** BRIDGE NO. _____
DESCRIPTION NH Route 125 at Hunt Road and Newton Junction Road



BORING NO. B33
SHEET NO. 1 OF 1
STA. 2090+67.29 OFF. Lt 15.6
BASELINE Rt. 125
ELEVATION (m) 48.84
START/END 3/27/03 / 3/27/03
DRILLER Jeff Kibbee
INSPECTOR Richard Mechaber
CLASSIFIER RAM
NORTH/EAST 42077 / 347654

GROUNDWATER						EQUIPMENT SAMPLER CASING CORE			
DATE	TIME	DEPTH (m)	ELEVATION (m)	BOTTOM OF CASING	BOTTOM OF HOLE	TYPE:	S	NW	NX
						SIZE LD. (mm):	34.9	76.2	47.6
						HAMMER WT. (kg):	63.5	DRILL RIG	
						HAMMER FALL (m):	0.76	CME 45-C Track rig	
						HAMMER TYPE:	Automatic		

DEPTH (m)	STRATA CHANGE (m)	BOUNDARY ELEVATION (m)	BLOWS PER 0.15 m	SAMPLE NUMBER	SAMPLER RECOVERY (m) [%]	DEPTH RANGE (m)	FIELD CLASSIFICATION AND REMARKS	STRATA SYMBOL
0.0	0.09	48.74	1 2 18 20/0.12	S1	0.24 [42]	0.00 0.58	S-1A: Topsoil (0.09m) S-1B: Dark brown silty SAND, some gravel, trace organics. -GLACIAL TILL- Possible boulder at approximately 0.61m. Roller bit hard to 0.85m, then drill string dropped 0.01m± twice at 0.85m.	
1.5	0.85	47.98		C1	0.64 [88]	0.85 1.58	-APPROXIMATE BEDROCK SURFACE- C-1: Medium grained, light gray biotite GRANITE, slight horizontal fabric, moderately fractured (every 0.09m±) at dips from 0 to 45±°, with one high angle, rusted fracture at 1.28m±. RQD=0.37/0.73=50%. Water return lost at 1.31m, return sporadic until 1.58m, at which point rock became harder.	
				C2	0.85 [108]	1.58 2.38	C-2: Medium grained, light gray biotite GRANITE with pink potassium feldspars; 3 to 4 fracture zones in upper 0.37m of recovery, then sound for next 0.30m, then severely fractured and rust-colored in bottom 0.18m. RQD=0.37/0.80=46% Bottom of Exploration @ 2.38 m (EL. 46.46)	
							Notes: Boring backfilled with bentonite chips from 2.26m (caved beneath) to 1.68m.	

TB-02 S:\GIN\TWP\PROJECTS\K10044\TB-GP-1 BORING.GDT 6/23/2003 9:25:56 AM

Sampler	Identification	COHESIVE SOILS		NON-COHESIVE SOILS		Soil Descriptions	Proportion
		Blows/0.30m	Consistency	Blows/0.30m	Density		
S	Split Spoon	0 - 1	Very Soft	0 - 4	Very Loose	Capitalized Soil Name	Major Component
T	Thin Wall Tube	2 - 4	Soft	5 - 10	Loose	Lower Case Adjective	35% - 50%
U	Undisturbed Piston	5 - 8	Medium Stiff	11 - 24	Medium Dense	Some	20% - 35%
O	Open End Rod	9 - 15	Stiff	25 - 50	Dense	Little	10% - 20%
A	Auger Flight	16 - 30	Very Stiff	> 50	Very Dense	Trace	1% - 10%
C	Core Barrel	31 - 60	Hard	WOR - Weight of Rod		METRIC	
		> 60	Very Hard	WOH - Weight of Hammer			

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
 MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION
 PROJECT **KINGSTON 10044-C** BRIDGE NO. _____
 DESCRIPTION **NH Route 125 at Hunt Road and Newton Junction Road**



BORING NO. B34
 SHEET NO. 1 OF 1
 STA. **2090+66.88** OFF. Lt 25.51
 BASELINE Rt. 125
 ELEVATION (m) 48.54
 START/END 3/27/03 / 3/27/03
 DRILLER Jeff Kibbee
 INSPECTOR Richard Mechaber
 CLASSIFIER RAM
 NORTH/EAST 42081 / 347644

GROUNDWATER						EQUIPMENT	SAMPLER	CASING	CORE
DATE	TIME	DEPTH (m)	ELEVATION (m)	BOTTOM OF CASING	BOTTOM OF HOLE	TYPE:	S	NW	NX
3/28	0645	1.98	46.56	N/A	3.05	SIZE I.D. (mm):	34.9	76.2	47.6
						HAMMER WT. (kg):	63.5		
						HAMMER FALL (m):	0.75		
						HAMMER TYPE:	Automatic		
						DRILL RIG			
						CME 45-C Track rig			

DEPTH (m)	STRATA CHANGE (m)	BOUNDARY ELEVATION (m)	BLOWS PER 0.15 m	SAMPLE NUMBER	SAMPLER RECOVERY (m) [%]	DEPTH RANGE (m)	FIELD CLASSIFICATION AND REMARKS	STRAT. SYMB
0.0	0.12	48.41	2 4	S1	NR []	0.00 0.61	S-1A: Topsoil (0.12m) S-1B: Black silty gravelly SAND, with organics. -POSSIBLE GLACIAL OUTWASH-	
1.5	1.37	47.16				1.37	Begin NX core at 1.37m. NX barrel dropped in 0.01m± increments to 2.07m depth, then steady advance. Top 0.30m: Gravel/cobble fragments of various lithologies. (probable cobbles/boulders)	
	2.07	46.46		C1	0.73 [50]		-APPROXIMATE BEDROCK SURFACE- Bottom 0.43m: Medium grey, medium-grained biotite QUARTZITE, unfractured. RQD=0.42/1.46=29% (calculated on entire core run) Core barrel advanced rapidly 60mm at 2.59m+/-	
3.0	2.83	45.70		C2	0.43 [70]	2.83 3.44	Medium grey, medium grained biotite muscovite GRANITE, moderately fractured, containing both angled and vertical fractures weathered rusty-colored. RQD=0.12/0.61=20%. Bottom of Exploration @ 3.44 m (EL. 45.09)	
							Notes: 1. "NR []" denotes not recorded. 2. Borehole backfilled with bentonite chips from 3.05m to 1.37m.	

Sampler	Identification	COHESIVE SOILS		NON-COHESIVE SOILS		Soil Descriptions	Proportion
		Blows/0.30m	Consistency	Blows/0.30m	Density		
S	Split Spoon	0 - 1	Very Soft	0 - 4	Very Loose	Capitalized Soil Name	Major Component
T	Thin Wall Tube	2 - 4	Soft	5 - 10	Loose	Lower Case Adjective	35% - 50%
U	Undisturbed Piston	5 - 8	Medium Stiff	11 - 24	Medium Dense	Some	20% - 35%
O	Open End Rod	9 - 15	Stiff	25 - 50	Dense	Little	10% - 20%
A	Auger Flight	16 - 30	Very Stiff	> 50	Very Dense	Trace	1% - 10%
C	Core Barrel	31 - 60	Hard			METRIC	
		> 60	Very Hard				

**Appendix C – NEWILD Species
Lists**

Appendix D – USFWS and NHNHB Correspondence; Rare, Threatened, and Endangered Species

■

Appendix E – Construction Plan Set

**WETLAND MITIGATION
(SULLIVAN PROPERTIES)**
THIS INFORMATION IS FOR BIDDING PURPOSES ONLY

CONFORMING TO ITEM NUMBERS	BOTANICAL NAME	COMMON NAME	STOCK SIZE	UNIT	QUANTITY
651.66	PINUS STROBUS	EASTERN WHITE PINE	BAB 3'	EA	234
651.66	TSUGA CANADENSIS	EASTERN HEMLOCK	BAB 3'	EA	110
651.06	ACER RUBRUM	RED MAPLE	PC 4'	EA	185
652.1	BETULA PUPULIFOLIA	SUGARBARK HICKORY	BAB 3'	EA	100
652.37	CARYA OVATA	GREEN OAK	PC 4'	EA	70
652.65	FRAXINUS TENNESSEANICA	SWAMP WHITE OAK	PC 4'	EA	32
652.65	QUERCUS BICOLOR	WHITE OAK	BAB 3'	EA	45
652.69	QUERCUS RUBRA	RED OAK	PC 3'	EA	66
653.4	MALUS CULTIVARS	CRABAPPLE	BAB 3'	EA	20
653.85	FRAXINUS VIRGINIANA	CHOKE CHERRY	BAB 3'	EA	40
655.10	SHRUBS				
655.20	ALNUS RUGOSA	SPECIRED ALDER	PC 2'-3'	EA	142
655.27	AMELANCHIER CANADENSIS	ORION-LEAF SERVICEBERRY	PC 2'-3'	EA	170
655.29	COMPTONIA PERENNA	SWEET FERN	PC 2'-3'	EA	100
655.32	CORNUS PENNSYLVANICA	ALTERNATE-LEAVED DOGWOOD	PC 1' 00"	EA	45
655.32	CORNUS FLORIDA	ALTERNATE-LEAVED DOGWOOD	PC 2'-3'	EA	89
655.38	CORNUS AMOMUM	SILKY DOGWOOD	PC 2'-3'	EA	72
655.40	CORNUS SERICEA	RED-OSIER DOGWOOD	PC 2'-3'	EA	70
655.50	CORNUS AMERICANA	AMERICAN HAZLENU	PC 2'-3'	EA	50
655.67	ILEX VERTICILLATA	COMMON WINTERBERRY HOLLY	PC 2'-3'	EA	70
655.67	SPIREA LATIFOLIA	MEADOW SWEET	PC 2'-3'	EA	100
655.73	VACCINIUM CORYMBOSUM	HIGH BUSH BLUEBERRY	PC 2'-3'	EA	140
655.82	VIBURNUM DENTATUM	NORTHERN ARROWWOOD	PC 2'-3'	EA	70
655.86	VIBURNUM LENTAGO	NANTBERRY	PC 2'-3'	EA	118

PLANT NOTES

SUBSTITUTIONS:
DUE TO THE IMPORTANCE OF ESTABLISHING THE NATIVE SPECIES' PLANT COMMUNITIES SHOWN ON THE PLANS, SUBSTITUTION IN QUANTITIES, SIZE, KIND OR QUALITY OF PLANTS FROM THESE SPECIFICATIONS WILL BE PERMITTED ONLY BY APPROVAL OF THE WETLAND SCIENTIST.

LEGEND

P.C. POTTED CONTAINER
B.R. BARE ROOT
BAB BALLED AND BURLAP
CUT CUTTING
R.S. ROOT STOCK

DATE	DESCRIPTION	DATE	DESCRIPTION
10/09	50% PROCESSED	10/09	DATE
10/09	REVISIONS AFTER PROPOSAL	10/09	NUMBER
10/09	DATE	10/09	DATE
10/09	DATE	10/09	DATE

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY
201.1	CLEARING AND GRUBBING (F)	A	0.07
201.822	INVASIVE SPECIES CONTROL, TYPE 1	SY	1066.8
203.1	COMMON EXCAVATION	CY	10659
203.6	EMBANKMENT-IN-PLACE (F)	CY	570
304.1	SAND (F)	CY	70
304.1	TEMPORARY CRUSHED GRAVEL	CY	25
304.45	CRUSHED STONE CLASS # 57 FOR DRIVES	CY	240
304.45	CRUSHED STONE CLASS # 57	CY	12
304.45	CRUSHED STONE CLASS # 57	CY	170
304.45	CRUSHED STONE CLASS # 57	CY	513
307.2	GEOTEXTILE - FARM CONTROL, CLASS 2, NON-WOVEN	EA	1
307.14	WOVEN WIRE FENCE, 4 FEET HIGH	EA	1
607.2012	12 FT. WOVEN WIRE FENCE	EA	1
607.41	POST ASSEMBLIES FOR WOVEN WIRE FENCE	TON	5.5
642.	LIMESTONE	TON	30
644.22	SHRUB/FORREST SWAMP SEED MIX	LB	40
644.70	UPLAND SEED MIX (1:1:1) (DECIDUOUS TREE/GRASS SEED)	LB	50
644.74	WILDOVERN UPLAND SEED MIX	A	2.8
645.12	EMERSON STONE	TON	800
645.51	EMERSON STONE	EA	660
645.531	HAY BALS FOR TEMPORARY EROSION CONTROL	LF	1650
645.531	SILT FENCE	HR	30
647.1	MONITORING SWPPP AND EROSION AND SEDIMENT CONTROLS	CY	1344.5
647.29	HUMUS	CY	1350
1008.5	WETLAND HUMUS	\$	5000

ALTERNATIONS AND ADDITIONS AS NEEDED - ROUND AND POOL MICROTOPOGRAPHY

*** SUBTOTAL INCLUDED IN TEMPORARY EROSION CONTROL SUMMARY TABLE

**** SUBTOTAL INCLUDED IN EARTHWORK SUMMARY TABLE

***** SUBTOTAL INCLUDED IN SURFACING MATERIALS SUMMARY TABLE

***** SUBTOTAL INCLUDED IN CLEARING & GRUBBING SUMMARY TABLE

***** SUBTOTAL INCLUDED IN DRAINAGE SUMMARY TABLE

***** SUBTOTAL INCLUDED IN LANDSCAPING AND SLOPE PROTECTION SUMMARY TABLE

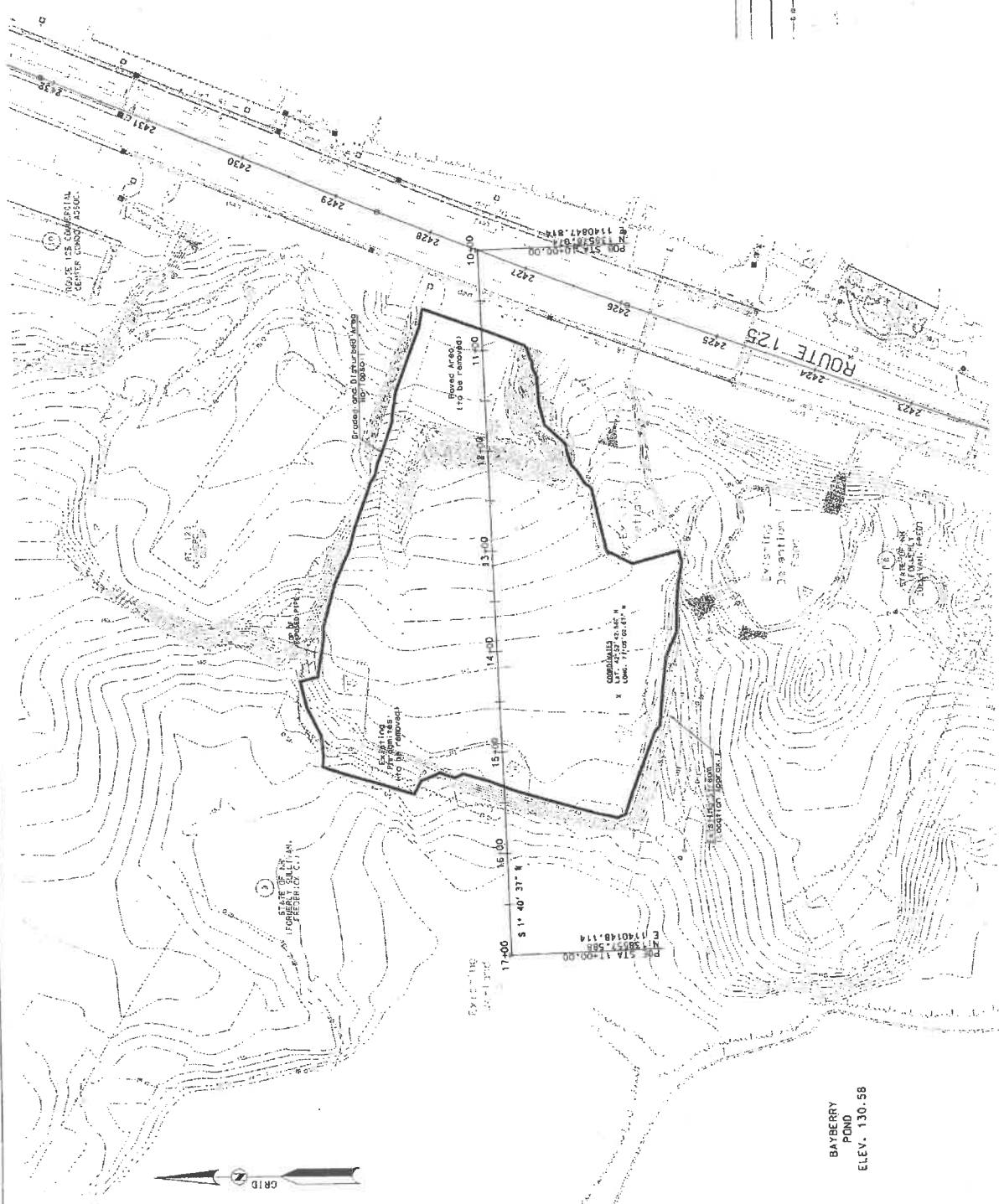
***** SUBTOTAL INCLUDED IN INCIDENTAL ITEMS TABLE

STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
100448wetSUM	31	231

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION • BUREAU OF ENVIRONMENT

DATE PLOTTED 7/9/2010
VHB PROJECT NO. 51272.D1
VHB Vanasse Hangen Brustlin, Inc.

SUMMARY OF QUANTITIES



BAYBERRY POND
ELEV. 130.58

KEY

- EXISTING CONTOURS
- PROPOSED CONTOURS
- DELINEATED WETLAND
- TREE LINE
- EXISTING WETLAND
- EXIST. CONIFEROUS/DECIDUOUS TREE
- EXIST. RIP-RAP

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION • BUREAU OF ENVIRONMENT

**WETLAND MITIGATION
EXISTING CONDITIONS**

DATE PREPARED	DATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
7/9/2010	5172-01	115	231

VHB Vanasse Hangen Brustlin, Inc.

DATE	DESCRIPTION	STATION	NUMBER	DATE	BY	DATE	BY
	AS BUILT DETAILS						
	SHEET CHECKED						
	DATE						
	DATE						
	DATE						
	DATE						

FORESTED WETLAND WITH MOUND AND POOL
MATCH TO STA. 14+00 BELOW



CONSTRUCTION BASELINE
SEE WETLAND MITIGATION GRADING PLAN



CONSTRUCTION BASELINE
SEE WETLAND MITIGATION GRADING PLAN

EST. SEASONAL HIGH WATER ELEVATION = 135.00

EST. SEASONAL LOW WATER ELEVATION = 131.00

SCALE:
1" = 20' HORIZ.
1" = 20' VERT.

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION - BUREAU OF ENVIRONMENT
WETLAND MITIGATION
PROFILE

VHB Vanasse Hangen Brustlin, Inc.

DATE: 10/20/09
DRAWN BY: J. B. BROWN
CHECKED BY: J. B. BROWN
SCALE: 1" = 20'

MONITORING: USE POOL MICROTOPOGRAPHY
MONITOR CONTAINER GROWN OR BALLED
PLANTS AND BURLAP SPRINGS ON MOUND AND
SLOPES. MONITOR MOUND AND SLOPE
SHALLERS (SEE WETLAND MITIGATION
GRADING PLAN, SHEET 117, NOTE 2 AND THE
PLANTING DETAILS, SHEET 122)

REVISIONS AFTER PROPOSAL	STATION	DESCRIPTION

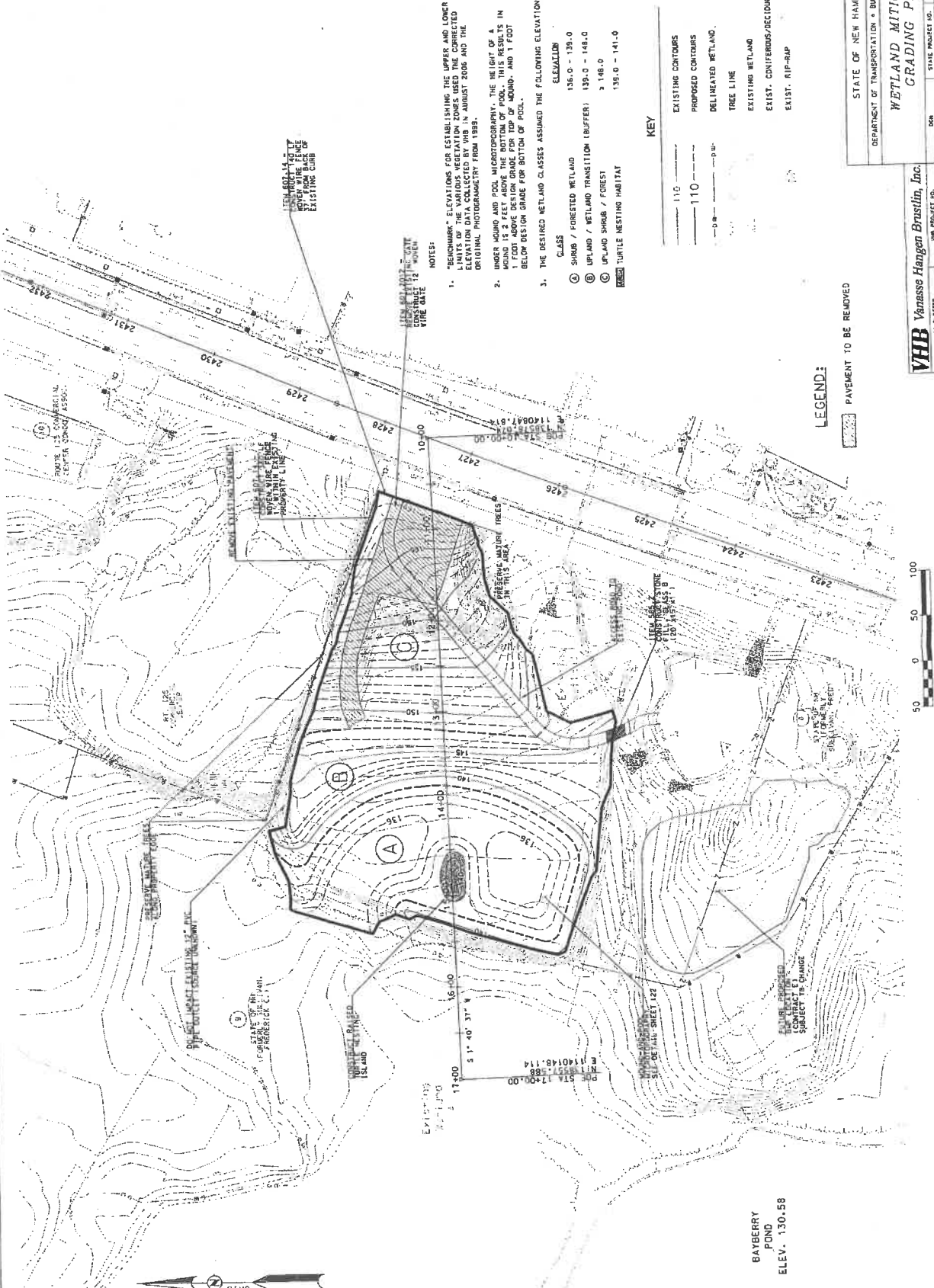
DATE	NUMBER	DATE	NUMBER

DATE	DESCRIPTION	DATE	DESCRIPTION

AS BUILT DETAILS
DATE
SHEET CHECKED BY: B. ANGLERI
DATE: 10/09
NEW DESIGN DATE: 10/03

PROCESSED BY: DATE: 10/03

PROJECT NO.: 100418WETYP
SHEET NO.: 116
TOTAL SHEETS: 231



- NOTES:
- "BENCHMARK" ELEVATIONS FOR ESTABLISHING THE UPPER AND LOWER LIMITS OF THE VARIOUS VEGETATION ZONES USED THE CORRECTED ELEVATION DATA COLLECTED BY VHB IN AUGUST 2006 AND THE ORIGINAL PHOTOGRAMMETRY FROM 1993.
 - UNDER WOUND AND POOL MICROTOPOGRAPHY, THE HEIGHT OF A WOUND IS 2 FEET ABOVE THE BOTTOM OF POOL. THIS RESULT IS 1 FOOT ABOVE DESIGN GRADE. WOUND - AND 1 FOOT BELOW DESIGN GRADE FOR BOTTOM OF POOL.
 - THE DESIRED WETLAND CLASSES ASSUMED THE FOLLOWING ELEVATIONS:

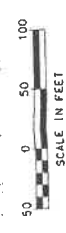
CLASS	ELEVATION	ACRES
① SHRUB / FORESTED WETLAND	136.0 - 139.0	0.83
② UPLAND / WETLAND TRANSITION (BUFFER)	139.0 - 148.0	0.81
③ UPLAND SHRUB / FOREST	148.0	1.06
④ TURTLE NESTING HABITAT	139.0 - 141.0	0.03

KEY

---	EXISTING CONTOURS
---	PROPOSED CONTOURS
---	DELIMITED WETLAND
---	TREE LINE
---	EXISTING WETLAND
---	EXIST. CONIFERUS/DECIDUOUS TREE
---	EXIST. RIP-RAP

LEGEND:

 PAVEMENT TO BE REMOVED



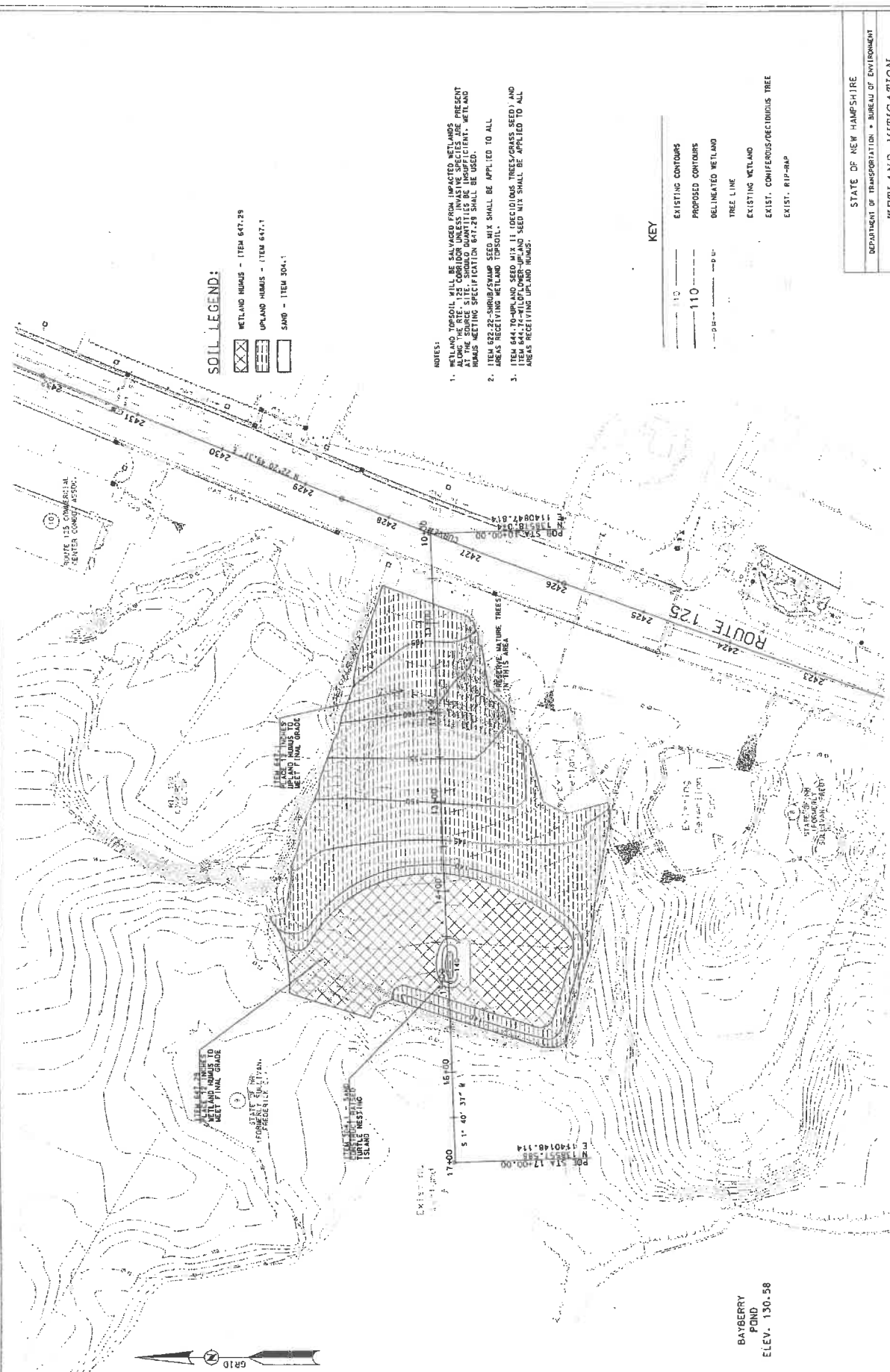
BAYBERRY POND
 ELEV. 130.58

DATE	DESCRIPTION	DATE	STATION	NUMBER	DATE	DATE

STATE OF NEW HAMPSHIRE
 DEPARTMENT OF TRANSPORTATION & BUREAU OF ENVIRONMENT
WETLAND MITIGATION GRADING PLAN

VHB Vanasse Hangen Brustlin, Inc.
 VHB PROJECT NO. 51277.01
 DATE PLOTTED 1/9/2010

STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
100-4896-TRD	117	231



SOIL LEGEND:

- WETLAND HUMUS - ITEM 647.29
- UPLAND HUMUS - ITEM 647.1
- SAND - ITEM 604.1

NOTES:

1. WETLAND TOPSOIL WILL BE SALVAGED FROM IMPACTED WETLANDS ALONG THE RTE. 125 CORRIDOR UNLESS INVASIVE SPECIES ARE PRESENT AT THE EXISTING SPECIFICATION. THE EXISTING WETLAND HUMUS SPECIFICATION, ERT 28 SHALL BE USED.
2. NEW RECEIVE WETLAND TOPSOIL SHALL BE APPLIED TO ALL AREAS RECEIVING WETLAND TOPSOIL.
3. ITEM 644, 74-UPLAND SEED MIX 11, DECIDUOUS TREES/GRASS SEED, AND ITEM 644, 74-MIXED UPLAND SEED MIX SHALL BE APPLIED TO ALL AREAS RECEIVING UPLAND HUMUS.

KEY

- EXISTING CONTOURS
- PROPOSED CONTOURS
- DELINEATED WETLAND
- TREE LINE
- EXISTING WETLAND
- EXIST. CONIFERUS/DECIDUOUS TREE
- EXIST. RIP-RAP

STATE OF NEW HAMPSHIRE
 DEPARTMENT OF TRANSPORTATION • BUREAU OF ENVIRONMENT
WETLAND MITIGATION
SOIL PLAN

VHB Vannasse Hangen Brustlin, Inc.
 DATE PLOTTED 7/9/2010
 JOB PRODUCT NO. 51272.01
 SHEET NO. 118
 TOTAL SHEETS 231

SCALE IN FEET
 0 50 100



BAYBERRY POND
 ELEV. 130.58

DATE	DESCRIPTION	STATION	NUMBER	DATE	DATE
10/09	REV DESIGN			10/09	
10/09	CHK'D BY ARCHTRK			10/09	
10/09	CHK'D BY ARCHTRK			10/09	
10/09	CHK'D BY ARCHTRK			10/09	

45 BUILT DETAILS

PLANTING LEGEND:

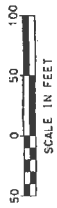
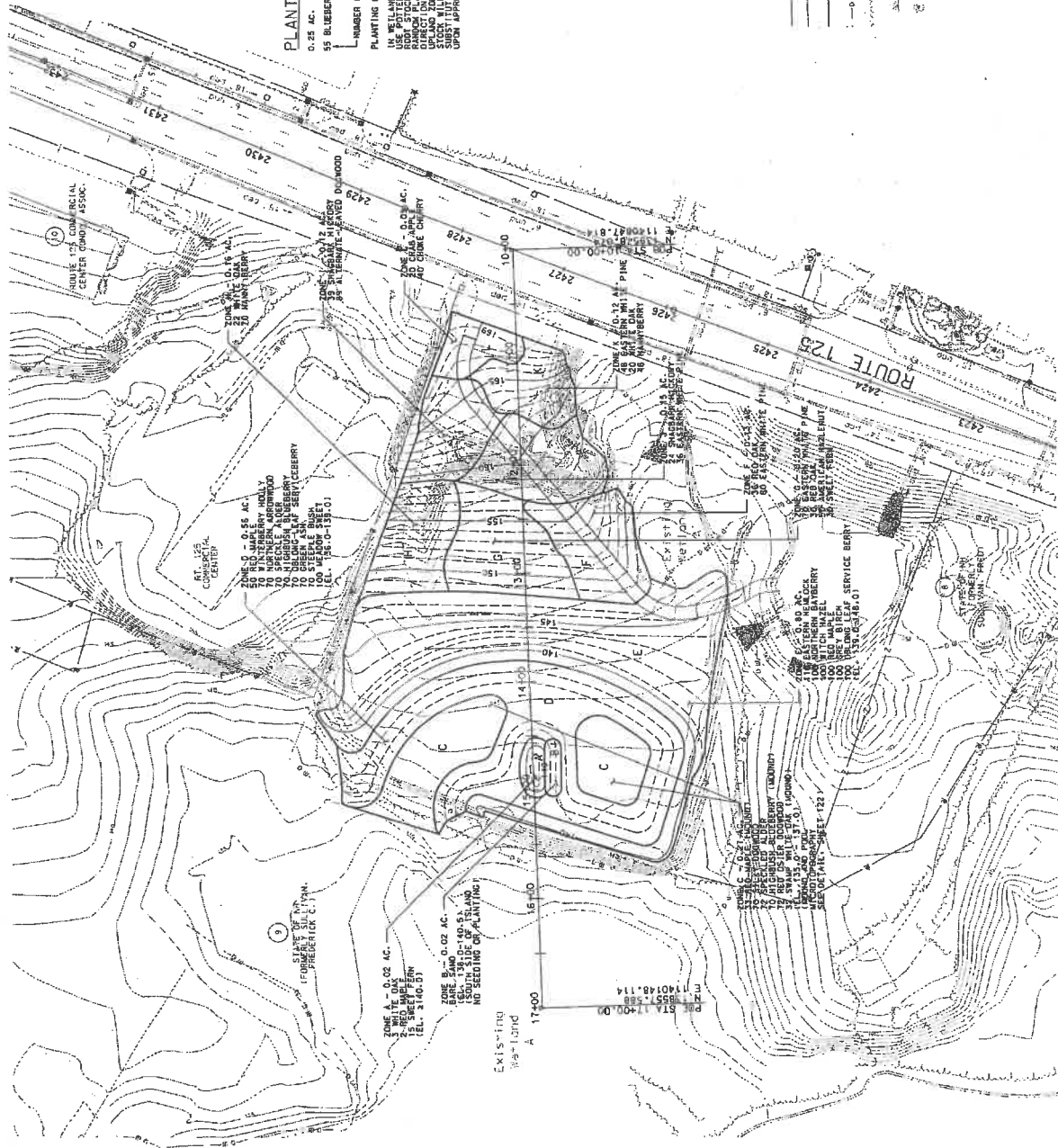
- 0.25 AC. ACREAGE WITHIN PLANTING AREA.
- 55 BLUEBERRY CONTAINER GROWING ON BAYBERRY POND. PLANTS ON ADJACENT UNPLANTED WETLAND ZONE.
- NUMBER OF PLANTS REQUIRED

PLANTING NOTES:

IN WETLAND ZONES WITH MOUND AND POOL TOPOGRAPHY, USE POTTED CONTAINER PLANTS AND SHEET 123.6 TO UTILIZE RANDOM PLACEMENT OF SPECIES IN RELUSTERS UNDER THE UPLAND ZONES. SPACING AND LOCATION OF ALL PLANT STOCK WILL USE 2.5' BAYBERRY STOCK. PLANTS WILL BE BASED UPON APPROVAL OF THE WETLAND SCIENTIST.

KEY

- 110 EXISTING CONTOURS
- 110 PROPOSED CONTOURS
- DELIMITED WETLAND
- 0-0-0 TREE LINE
- EXISTING WETLAND
- EXIST. CONIFEROUS/DECIDUOUS TREE
- EXIST. RIP-RAP



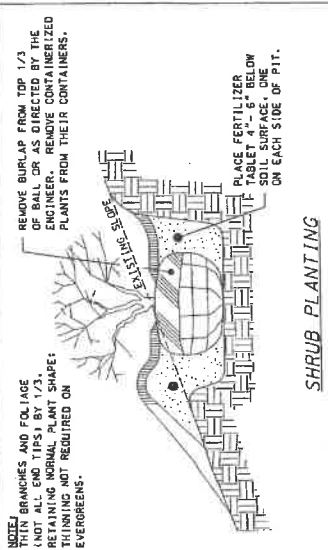
VHB Vanasse Hangen Brustlin, Inc.
 DATE: 7/9/2010
 VBA PROJECT NO.: 10044-B
 SHEET NO.: 119
 TOTAL SHEETS: 231

STATE OF NEW HAMPSHIRE
 DEPARTMENT OF TRANSPORTATION - BUREAU OF ENVIRONMENT
**WETLAND MITIGATION
 PLANTING PLAN**

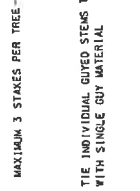
DATE	DESCRIPTION	BY	DATE	BY
DATE	DESCRIPTION	BY	DATE	BY
DATE	DESCRIPTION	BY	DATE	BY

58 BUILT DETAILS
 SHEET CHECKED BY: ARCHER
 DATE: 10/09
 NEW DESIGN BY: INTES
 DATE: 10/09
 SDR PROCESSED

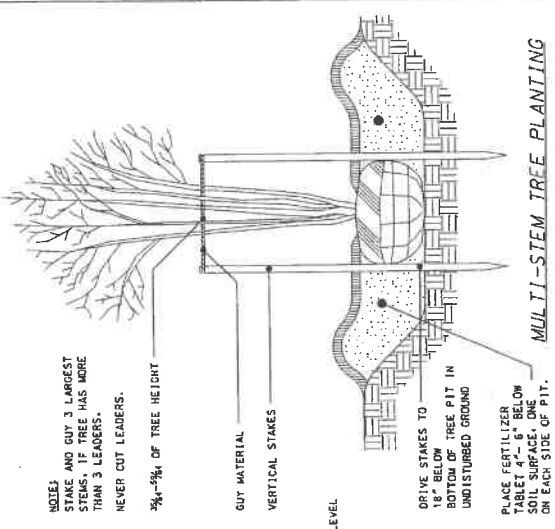
BAYBERRY POND
 ELEV. 130.58



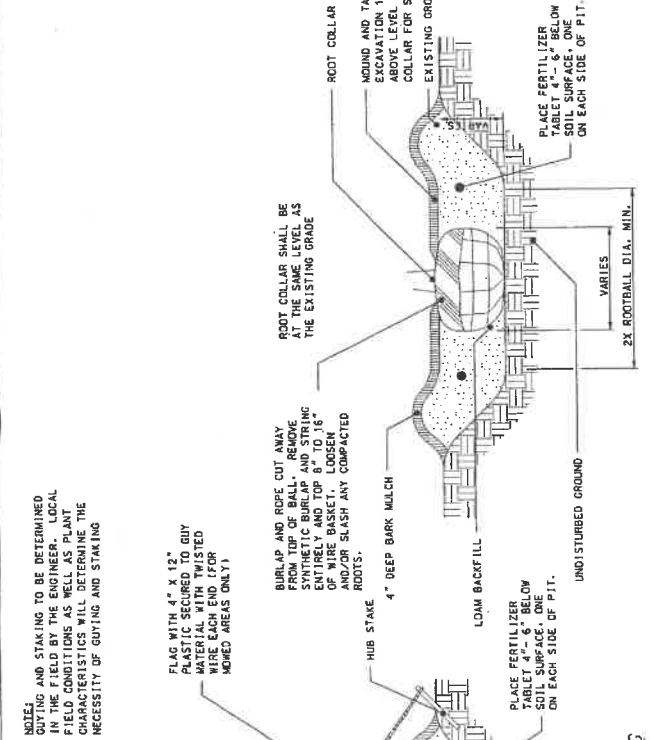
SHRUB PLANTING



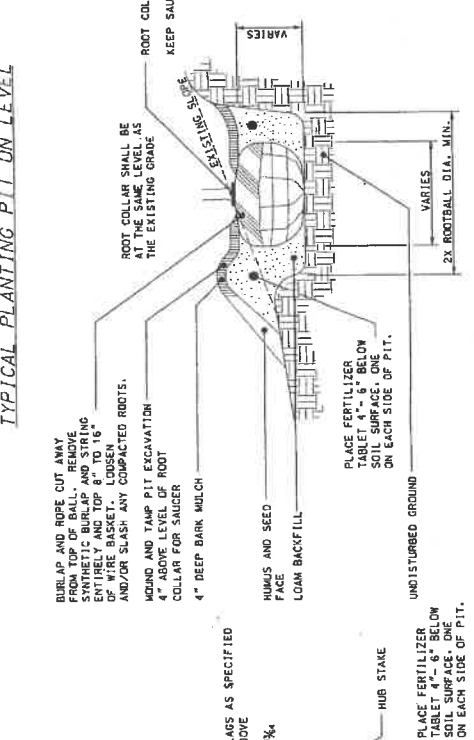
MAXIMUM 3 STAKES PER TREE
TIE INDIVIDUAL GUYED STEMS TOGETHER WITH SINGLE GUY MATERIAL



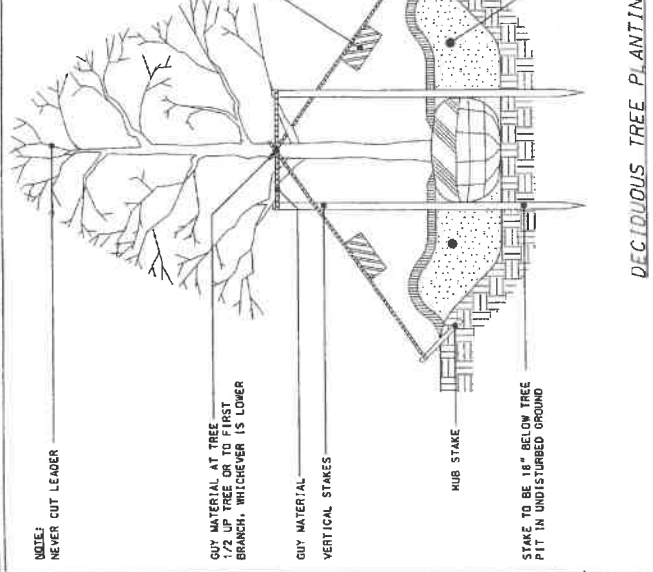
MULTI-STEM TREE PLANTING



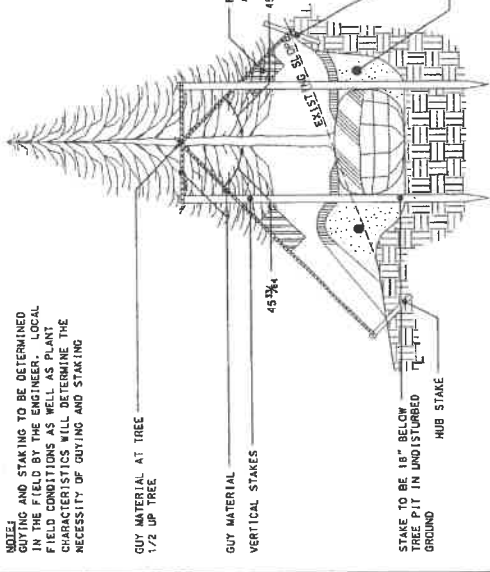
TYPICAL PLANTING PIT ON LEVEL



TYPICAL PLANTING PIT ON SLOPE 4:1 OR GREATER



DECIDUOUS TREE PLANTING



EVERGREEN TREE PLANTING

NOTE:
GUYING AND STAKING TO BE DETERMINED BY THE ENGINEER. LOCAL FIELD CONDITIONS AS WELL AS PLANT CHARACTERISTICS WILL DETERMINE THE NECESSITY OF GUYING AND STAKING.

FLAG WITH 4" X 12" PLASTIC SECURED TO GUY MATERIAL AT EACH END (IF REMOVED AREAS ONLY)

BURLAP AND ROPE CUT AWAY FROM TOP OF BALL. REMOVE SYNTHETIC BURLAP AND STRING ENTIRELY AND TOP 8" TO 16" OF WIRE BASKET. LOOSEN AND/OR SLASH ANY COMPACTED ROOTS.

4" DEEP BARK MULCH

HUB STAKE

LOAM BACKFILL

PLACE FERTILIZER TABLET 4" - 6" BELOW SOIL SURFACE, ONE ON EACH SIDE OF PIT.

UNDISTURBED GROUND

VARIES

2X ROOTBALL DIA., MIN.

NOTE:
GUYING AND STAKING TO BE DETERMINED IN THE FIELD BY THE ENGINEER. LOCAL FIELD CONDITIONS AS WELL AS PLANT CHARACTERISTICS WILL DETERMINE THE NECESSITY OF GUYING AND STAKING.

GUY MATERIAL AT TREE 1/2 UP TREE

GUY MATERIAL

VERTICAL STAKES

STAKE TO BE 18" BELOW TREE PIT IN UNDISTURBED GROUND

HUB STAKE

FLAGS AS SPECIFIED ABOVE

45%³/₄

45%³/₄

BURLAP AND ROPE CUT AWAY FROM TOP OF BALL. REMOVE SYNTHETIC BURLAP AND STRING ENTIRELY AND TOP 8" TO 16" OF WIRE BASKET. LOOSEN AND/OR SLASH ANY COMPACTED ROOTS.

MOUND AND TAMP PIT EXCAVATION 4" ABOVE LEVEL OF ROOT COLLAR FOR SAUCER

4" DEEP BARK MULCH

HUMUS AND SEED

LOAM BACKFILL

UNDISTURBED GROUND

VARIES

2X ROOTBALL DIA., MIN.

TYPICAL PLANTING PIT ON SLOPE 4:1 OR GREATER

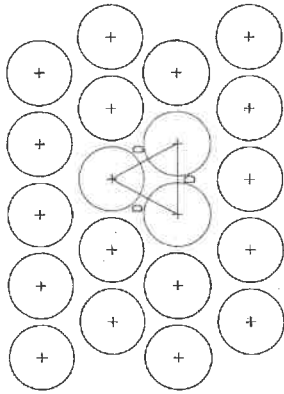
STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION • BUREAU OF ENVIRONMENT

WETLAND MITIGATION PLANTING DETAILS

VHB Vannasse Hangen Brustlin, Inc.
DATE PLOTTED: 7/9/2010
SHEET NO.: 100465W01DET
TOTAL SHEETS: 231

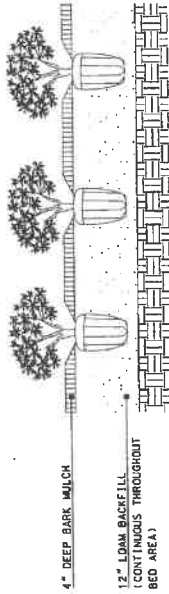
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DATE	DATE	NUMBER	
10/09	10/09		
10/09	10/09		
10/09	10/09		

DATE	DESCRIPTION	STATION	REVISIONS AFTER PROPOSAL
DATE	DATE	NUMBER	
10/09	10/09		
10/09	10/09		
10/09	10/09		



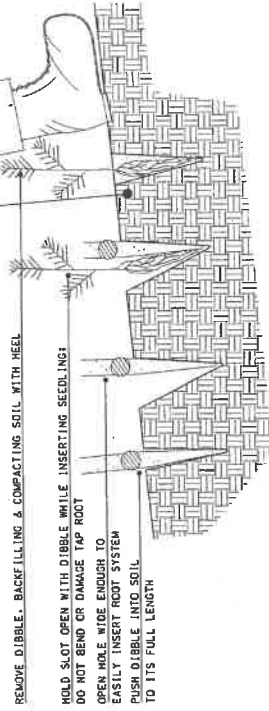
NOTES:
D = DIMENSION OF PLANT
SPACING (SHRUB OR
GROUND COVER AS
INDICATED ON PLANS)

TYPICAL BED PLANT SPACING



GROUNDCOVER BED PLANTING

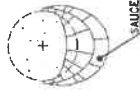
NOTES:
LOCATION, SIZE AND SPACING
OF PLANTS AND PLANT PLUGS
ARE AS INDICATED ON PLAN SHEETS



REMOVE DIBBLE, BACKFILLING & COMPACTING SOIL WITH HEEL

HOLD SLOT OPEN WITH DIBBLE WHILE INSERTING SEEDLING;
DO NOT BEND OR DAMAGE TAP ROOT
OPEN HOLE WIDE ENOUGH TO
EASILY INSERT ROOT SYSTEM
PUSH DIBBLE INTO SOIL
TO ITS FULL LENGTH

PLACE FERTILIZER
TABLET 4" - 6" BELOW
SOIL SURFACE - ONE
ON EACH SIDE OF PIT.



REMOVE APPROXIMATELY 1/2 OF
EACH LATERAL BRANCH PRUNE
1/2" ABOVE BUDS

SET ROOT COLLAR AT FINAL GRADE

4" DEEP BARK MULCH

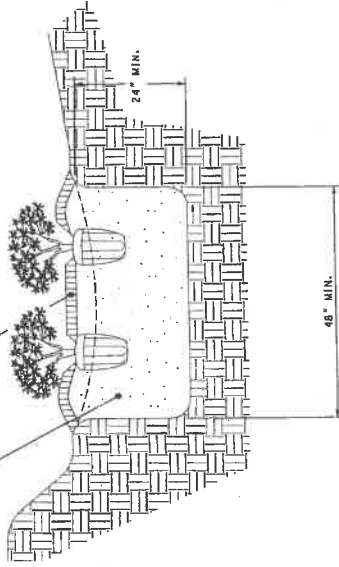
SAUCER OF EXCAVATED SOIL

LOAM BACKFILL

NOTE: REMOVE PLANT FROM
CONTAINER.

4" DEEP BARK MULCH

LOAM BACKFILL



TRENCH NARROW MEDIAN PLANTING

3. HUB STAKES AND GUYS FOR
DECIDUOUS TREES OVER 4"
CAL. AND EVERGREEN TREES OVER
9" (TWO UPHILL ON SLOPE)

2. VERTICAL STAKES AND GUYS FOR
DECIDUOUS TREES UP TO 4" CAL.
AND EVERGREENS 3" - 9"

STAKING AND GUYING PLAN SCHEMATIC



GUY MATERIAL SECURED
TO STAKES

GUY MATERIAL SECURED
LOOPS ABOVE
BRANCHES -
KEEP THESE
LOOPS TIGHT
TO PREVENT
EXPANSION

GUYING MATERIAL SECURED
TO STAKES 12 OR 3 AS
REQUIRED BY STAKING
AND GUYING SCHEMATIC(C)

GUY MATERIAL LOOSELY
SECURED TO TREE

NOTE:
USE CHAIN LOCK HANDSCAPE
PLASTIC AND SUITABLE STRENGTH
FOR GUYING TREES) OR EQUIVALENT
GUYING MATERIAL

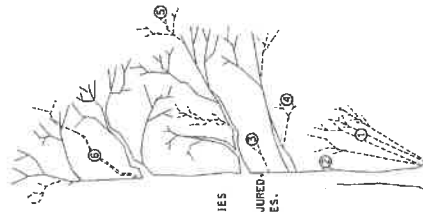
GUYING DETAILS

TREE STAKING AND GUYING

NOTE:
① REMOVE SUCKER SHOOT
AT BASE OF TREE.
② MAKE CLEAN CUTS ON OLD
STUBS, IF PRESENT.
③ REMOVE ENTIRE SUPPLY OF
TWIGS AND BUDS ON TRUNK.
④ REMOVE LOWER BRANCH WHERE
AN OVERLYING BRANCH OCCUPIES
ABOUT THE SAME AREA.
⑤ SHAPE TREE BY REMOVING INJURED,
DEAD AND MISSHAPED BRANCHES.
⑥ REMOVE CROSS BRANCHES AND
THOSE DEVELOPING INTO
SECONDARY LEADERS.

NOTE:
BRANCHES IN DOTTED
LINES INDICATE THOSE
TO BE REMOVED.

TREE PRUNING



STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION • BUREAU OF ENVIRONMENT

WETLAND MITIGATION
PLANTING DETAILS

VHB Vanasse Hangen Brustlin, Inc.

DATE PLOTTED: 7/9/2010
VHB PROJECT NO.: 51272-01
LOGIC # 6

SHEET NO.: 231
TOTAL SHEETS: 231

SEEDLINGS OR WETLAND PLUG PLACEMENT

DATE	DESCRIPTION	BY	DATE	DESCRIPTION	BY
10/09	REVISIONS AFTER PROPOSAL	K. MOYERS	10/09	REVISIONS AFTER PROPOSAL	B. ARCHENT

AS BUILT DETAILS

SHEET CHECKED

DATE

DATE

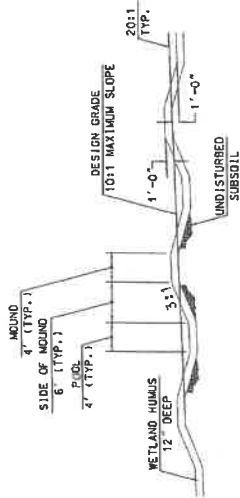
DATE

DATE

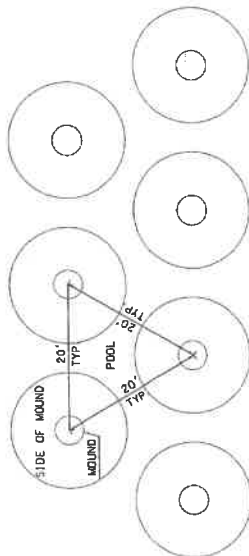
PLANTING NOTES:

SHRUB/FOREST AND UPLANDS

- WOODY PLANTS SHALL BE KEPT MOIST AND COOL WHILE ON SITE.
- IF WATER TRUCK ACCESS IS LIMITED, OTHER MEANS FOR PLANT WATERING WILL BE REQUIRED.
- PLANT SPACING IS VARIABLE DEPENDING UPON SPECIFIC SITE CONDITIONS. ON AVERAGE SHRUBS WILL BE PLANTED APPROXIMATELY 8 FT. ON CENTER, TREES WILL BE PLANTED 11 FT. ON CENTER.
- PLANTING CENTERS FOR WOODY VEGETATION SHOULD FOLLOW AN ARC WITH SUCCESSIVELY INCREASING RADIUS BASED UPON THE SPECIFIC PLANT SPACING TO ENHANCE THE RANDOM APPEARANCE OF PLANTINGS.
- AT THE DISCRETION OF THE WETLAND SCIENTIST, SOG AND ROOT MASSES DURING EARLY SPRING AND/OR FALL; BARE ROOT SEEDLINGS WILL BE PLANTED AT THE DISCRETION OF THE WETLAND SCIENTIST. SOG AND ROOT MASSES DURING EARLY SPRING OR WHEN SITE CONDITIONS PERMIT.
- AT THE DISCRETION OF THE WETLAND SCIENTIST, SOG AND ROOT MASSES FROM IMPACTED WETLANDS MAY BE SUBSTITUTED FOR THE PLANTING STOCK SHOWN.



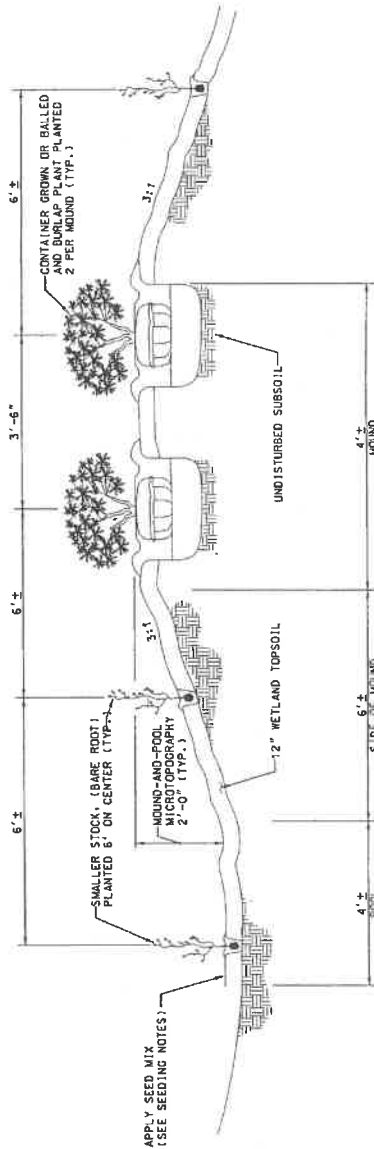
ELEVATION



PLAN

TYPICAL MOUND AND POOL DETAIL

NOT TO SCALE



TYPICAL MOUND AND POOL PLANTING DETAIL

NOT TO SCALE

ITEM 644.74 - WILDFLOWER - UPLAND SEED MIX

SEE SHEET 118 FOR SEED PLACEMENT

BOTANICAL NAME	COMMON NAME	LBS/ACRE
CENTAUREA CYANUS	CORNFLOWER	2.0
CHRYSANTHEMUM LELUCANTHEMUM	OX-EYE DAISY	2.0
COREOPSIS CANADENSIS	LANCELEAF COREOPSIS	4.0
COREOPSIS TINCTORIA	PLAINS COREOPSIS	2.0
COSMOS BIPINNATUS	COSMOS	2.0
ECHINACEA PURPUREA	PURPLE CONEFLOWER	2.0
ESCHSCHOLZIA LUTIFORMLIA	ORANGE POPPY	2.0
GALLIARDA PULCHRELLA	INDIAN BLANKET	4.0
GYPHOSPHILLA ELEGANS	BABY'S BREATH	2.0
HESPERIS MATRONIUS	DAME'S ROCKET	2.0
LINACEAE	SCARLET FLAX	4.0
LUPINUS PERENNIS	WILD LUPINE	4.0
PAPAVERACAL	CORN POPPY	2.0
RUBICHAETUS	GLORIOSA DAISY	2.0
RUBICHAETUS	BLACK-EYED SUSAN	2.0
PAPAVER RHOEAS	RED POPPY	2.0
TOTAL SEEDING RATE 48 LBS PURE LIVE SEED/ACRE		48.0

ITEM 644.22 - SHRUB/FOREST SWAMP SEED MIX

SEE SHEET 118 FOR SEED PLACEMENT

BOTANICAL NAME	COMMON NAME	LBS/ACRE
PANICUM VIRGATUM	SWITCH GRASS	8.0
ADROSTIS ALBA	REDTOP GRASS	4.0
BIDENS FRONDOSA	BECKMANS TICK	1.0
LEERSIA ORYZOIDES	RICE CUT GRASS	0.75
EUPATORIUM PERFOLIATUM	WEE WEE	0.75
EUPATORIUM PERFOLIATUM	BURROCKET	0.75
TOTAL SEEDING RATE 13.25 LBS PURE LIVE SEED/ACRE		13.25

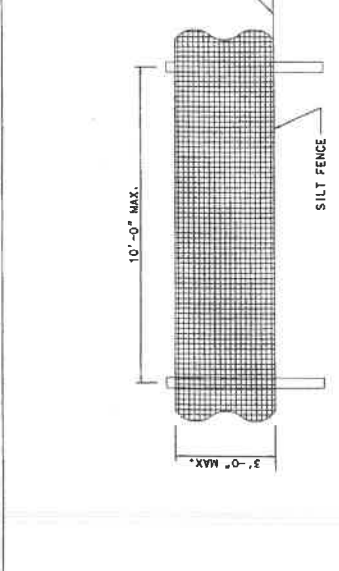
VHB Vanasse Hangen Brustlin, Inc.

DATE PLOTTED: 7/9/2010
 VHB PROJECT NO.: 51772.01
 SHEET NO.: 122
 TOTAL SHEETS: 231

STATE OF NEW HAMPSHIRE
 DEPARTMENT OF TRANSPORTATION - BUREAU OF ENVIRONMENT
 WETLAND MITIGATION
 PLANTING DETAILS

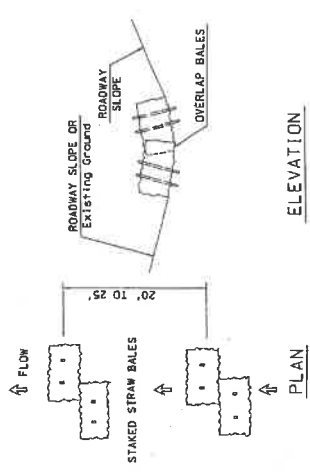
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DATE	DATE	DATE	DATE	DATE	DATE

DATE	DESCRIPTION
7/9/2010	FOR PRELIMINARY DESIGN
7/9/2010	FOR PRELIMINARY DESIGN
7/9/2010	FOR PRELIMINARY DESIGN
7/9/2010	FOR PRELIMINARY DESIGN
7/9/2010	FOR PRELIMINARY DESIGN
7/9/2010	FOR PRELIMINARY DESIGN



ELEVATION

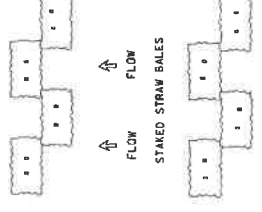
SILT FENCE
(ITEM 645.531 OR 645.532)



ELEVATION

NOTE: USE IN NARROW DITCH SECTION.

EROSION PROTECTION TYPE C



ELEVATION

NOTE: USE IN WIDE DITCH SECTION.

EROSION PROTECTION TYPE D

GENERAL NOTES

1. ALL WORK ASSOCIATED WITH TEMPORARY EROSION CONTROL, EXCEPT THAT DESCRIBED IN 689.5.2 AND IN NOTES NO. 2 & 5 (BELOW), WILL BE PAID FOR UNDER ITEM 699. - TEMPORARY PROJECT WATER POLLUTION CONTROL.
2. BALED STRAW WILL BE PAID FOR UNDER ITEM 645.51. STAKES TO HOLD BALES SHALL BE 1"x1" OR EQUIVALENT SAPPLINGS, AND SHALL BE LONG ENOUGH TO EXTEND 1 FOOT MINIMUM INTO THE GROUND. STAKES WILL BE SUBSIDIARY TO ITEM 645.51.
3. BALES SHALL BE SET 3 INCHES +/- BELOW THE GROUND SURFACE OR AS ORDERED. ANY REQUIRED EXCAVATION TO SET BALES WILL BE SUBSIDIARY.
4. STRAW BALES WILL BE ALLOWED TO ROT IN PLACE EXCEPT IN HIGHLY VISIBLE AREAS WHERE THE WETLAND SCIENTIST MAY ORDER REMOVAL. (SUBSIDIARY)
5. SILT FENCE SHALL CONSIST OF AN APPROVED PREFABRICATED SILT FENCE WITH FABRIC ATTACHED TO POSTS AND SHALL BE ASSEMBLED IN THE FIELD ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS. WIRE MESH REINFORCEMENT AND/OR CLOSER POST SPACING MAY BE ORDERED BY THE WETLAND SCIENTIST IN AREAS WHERE HIGH RUNOFF VOLUMES ARE ANTICIPATED, OR IN LOW SPOTS WHERE SEDIMENT WILL BE COLLECTED. SILT FENCE WILL BE PAID FOR UNDER ITEM 645.531 - SILT FENCE OR ITEM 645.532 - SILT FENCE WITH SUPPORT FENCE.
6. PRIOR TO BEGINNING EARTHWORK OPERATIONS AT LOCATIONS DIRECTED BY THE WETLAND SCIENTIST, SILT FENCE SHALL BE CONSTRUCTED ALONG THE TOE OF PROPOSED EMBANKMENT SLOPES AND AT THE LIMITS OF CLEARING.

7. ALL WORK ON THIS PROJECT, UNLESS OTHERWISE SHOWN ON THE PLANS OR ORDERED, SHALL BE CONSTRUCTED WITHIN THE LIMITS OF THE PARCEL (TAX MAP R5, LOT 19, 20, & 1B) OWNED BY THE STATE OF NEW HAMPSHIRE.
8. EXCAVATION CALLED FOR BY THE PLANS SHALL TAKE PLACE DURING THE DRY SEASON (JULY-OCTOBER) TO MINIMIZE POTENTIAL PROBLEMS WITH PALMS THROUGHOUT THE WINTER. SIMILARLY EFFECTIVE DEVICES FOR THE REMOVAL OF SUSPENDED SOLIDS BEFORE ANY DIRECT DISCHARGE TO THE ADJACENT (BAYBERRY) POND, WETLANDS, OR SURFACE WATERS.
9. ACCESS TO THE SITE SHALL BE FROM THE EXISTING PARKING AREA ADJACENT TO NH ROUTE 125.

VHB Vanasse Hangen Brustlin, Inc.

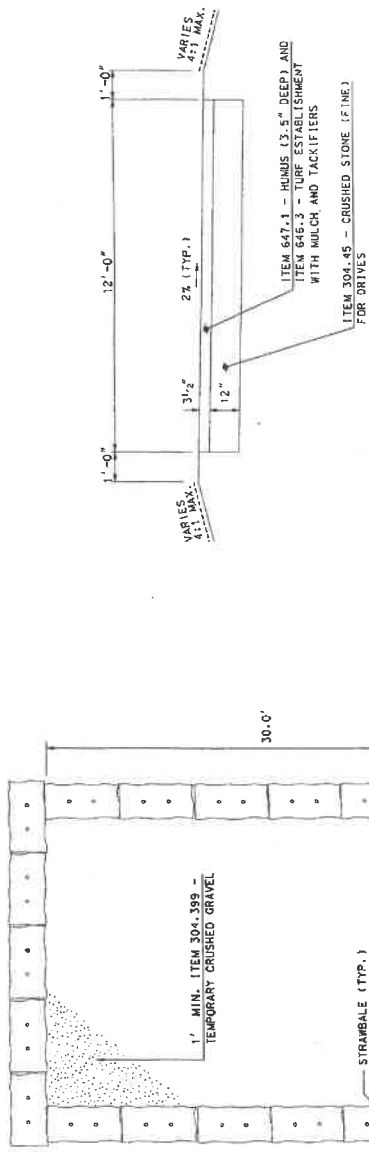
DATE REVISED	7/9/2010	VBP PROJECT NO.	51272.01
DRAWN BY	...	STATE PROJECT NO.	10044-B
CHECKED BY	...	SHEET NO.	123
DESIGNED BY	...	TOTAL SHEETS	231

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION • BUREAU OF ENVIRONMENT

WETLAND MITIGATION
EROSION CONTROL DETAILS

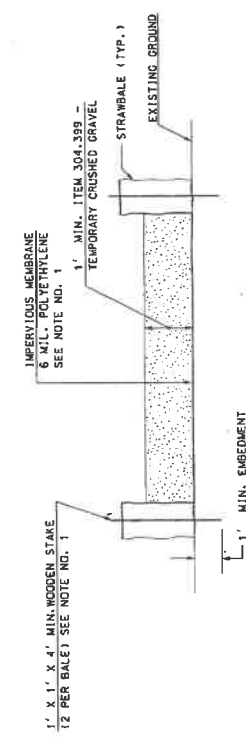
REFUELING SITE NOTES:

1. CONSTRUCTION AND REMOVAL OF THE REFUELING SITE SHALL BE SUBSIDIARY TO TEMPORARY CRUSHED GRAVEL (ITEM #304.399)
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE STRAWBALES, IMPERVIOUS MEMBRANE, AND TEMP CRUSHED GRAVEL. AT COMPLETION OF CONTRACT, THE BALES, IMPERVIOUS MEMBRANE, AND TEMP. CRUSHED GRAVEL SHALL BE REMOVED AND DISPOSED OF BY THE CONTRACTOR. THE COST OF THIS MATERIAL (POSSIBLY CONTAMINATED) SHALL BE SUBSIDIARY TO ITEM # 304.399 TEMP. CRUSHED GRAVEL. ANY CONTAMINATION OF THE SOILS BELOW THE IMPERVIOUS MEMBRANE SHALL BE DISPOSED OF AT THE COST OF THE CONTRACTOR.
3. THE REFUELING SITE SHALL BE PLACED AT A LOCATION DIRECTED BY THE CONTRACT ADMINISTRATOR.
4. THE IMPERVIOUS MEMBRANE SHALL OVERLAP THE TOP OF THE BALES AND BE SECURED BY WOODEN STAKES.
5. A 12" MINIMUM LAYER OF THE TEMP. CRUSHED GRAVEL SHALL BE PLACED ON TOP OF THE IMPERVIOUS MEMBRANE. WHEN PLACING THE TEMP. CRUSHED GRAVEL CARE SHALL BE TAKEN AS NOT TO TEAR THE IMPERVIOUS MEMBRANE. THE TEMP. CRUSHED SHALL BE MONITORED SO IT DOES NOT MEASURE LESS THAN 12" THICK AT ANY TIME.
6. STAKES TO SECURE STRAW BALES AND IMPERVIOUS MEMBRANE SHALL BE 1" X 1" OR EQUIVALENT SAPLINGS.
7. BALES SHALL BE SET 3" BELOW THE EXISTING GROUND OR AS DIRECTED BY THE CONTRACT ADMINISTRATOR. ANY REQUIRED EXCAVATION TO SET BALES SHALL BE SUBSIDIARY.
8. AREA SHALL BE LOADED, SEEDED AND MULCHED UPON REMOVAL OF THE REFUELING SITE. USE THE APPROPRIATE SEED MIX.



WETLAND MITIGATION ACCESS ROAD
TYPICAL SECTION
NOT TO SCALE

PLAN
NOT TO SCALE



ELEVATION
NOT TO SCALE

NO.	REVISIONS AFTER PROPOSAL	DATE	DESCRIPTION

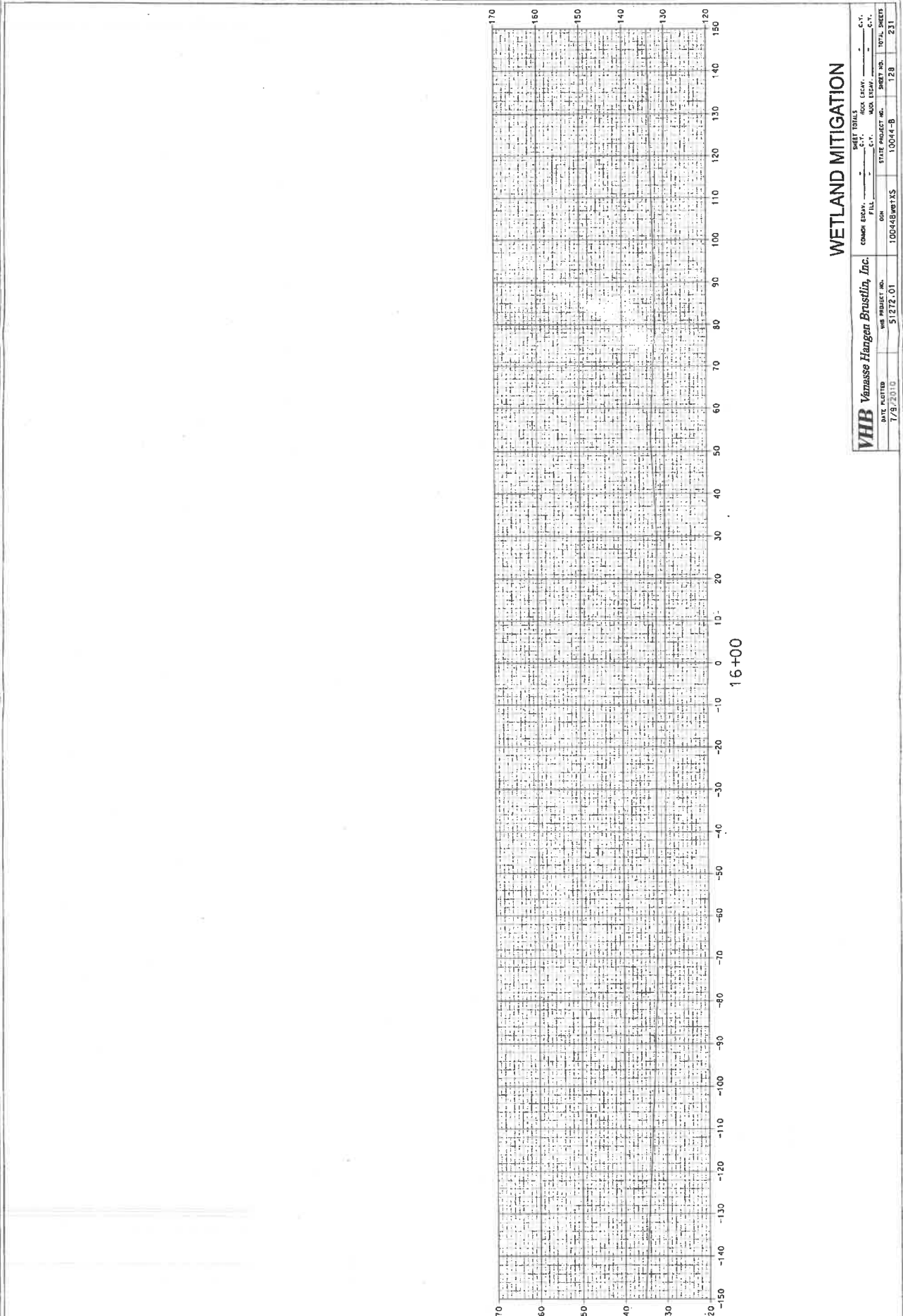
DATE	BY	NOTES

DATE	BY	NOTES

WETLAND MITIGATION

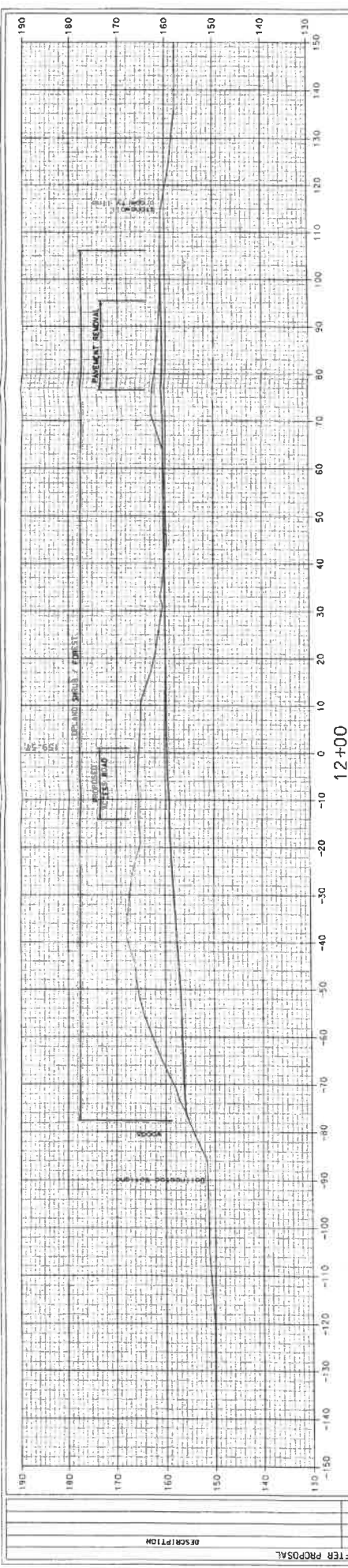
VHB Vanasse Hangen Brustlin, Inc.		SHEET TOTALS	
DATE PLOTTED	COMMON ESTATE	BOOK DRAWN	SHEET NO.
7/9/2010			128
	STATE PROJECT NO.	STATE PROJECT NO.	WPA SHEETS
	5 272.01	100-04-B	231

DATE	NUMBER	STATION	STATION	DESCRIPTION

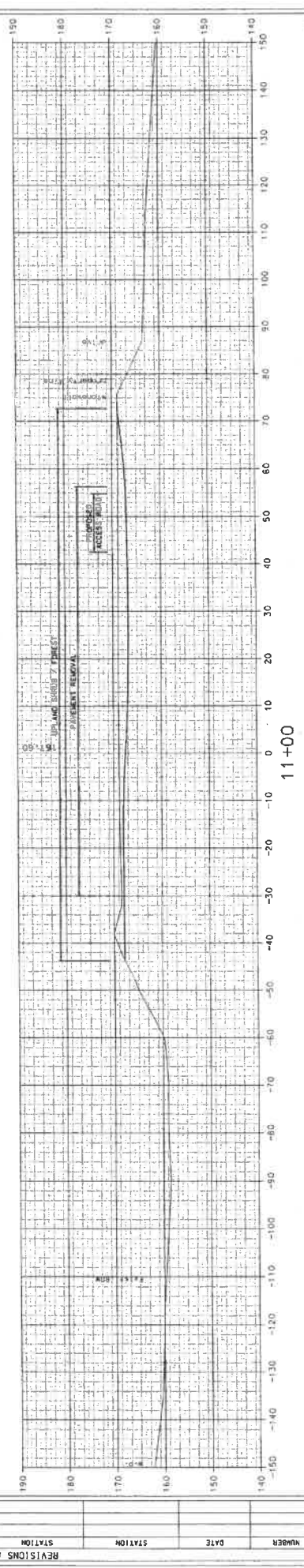


16+00

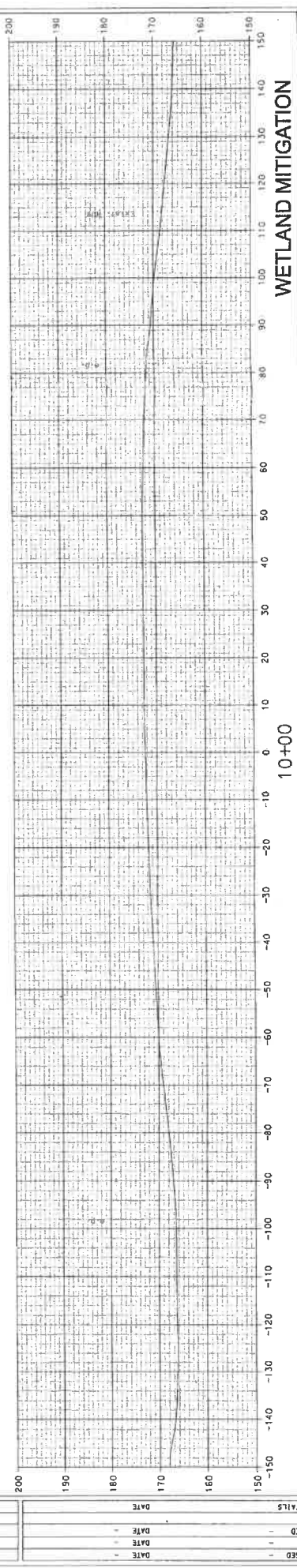
DATE	NUMBER	STATION	STATION	DESCRIPTION



12+00



11+00



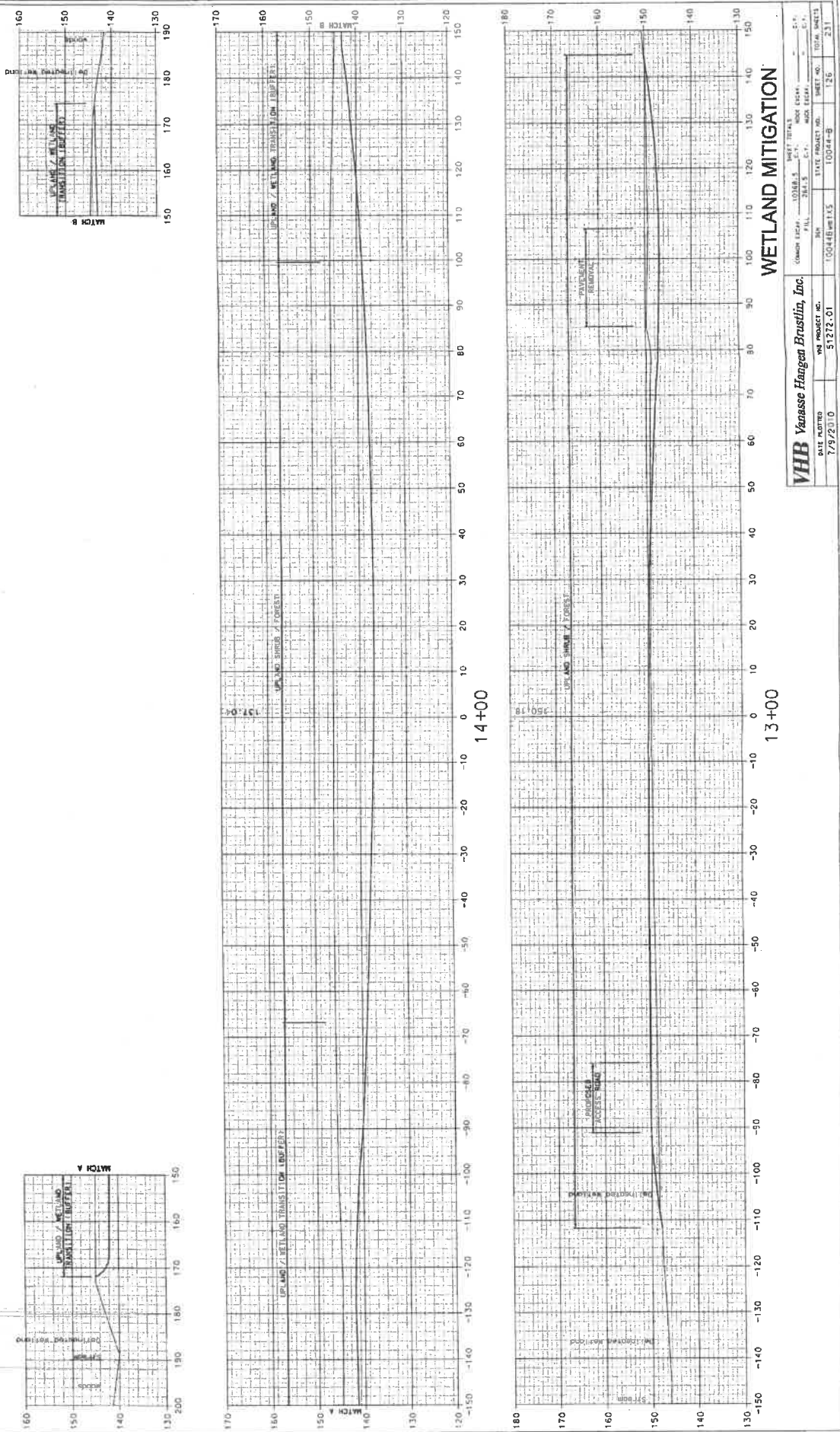
10+00

WETLAND MITIGATION

VHB Vansasse Haugen Brustlin, Inc.		DATE	7/9/2010	PROJECT NO.	51272.01	SCALE	100' = 1" H.S.
DATE	7/9/2010	PROJECT NO.	51272.01	SCALE	100' = 1" H.S.	SHEET NO. 125 OF 231	
DATE	7/9/2010	PROJECT NO.	51272.01	SCALE	100' = 1" H.S.	SHEET NO. 125 OF 231	

NO.	DATE	DESCRIPTION

NO.	DATE	DESCRIPTION

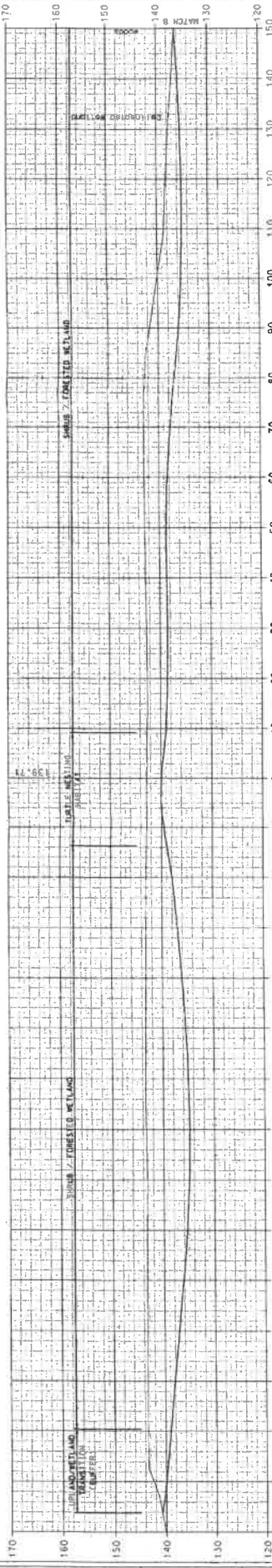
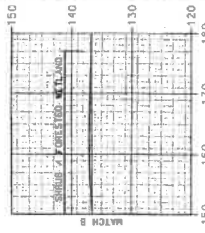


WETLAND MITIGATION

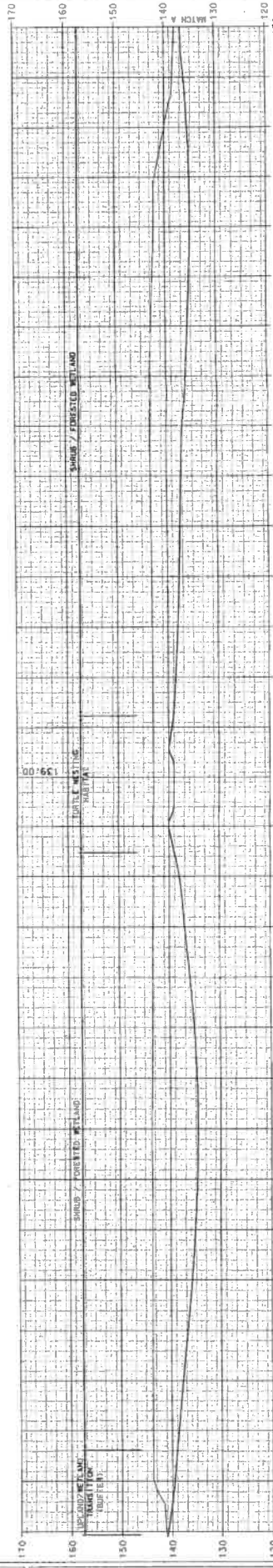
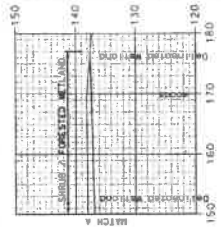
VHB	Vanasse Hangen Brustlin, Inc.
DATE PLOTTED: 7/9/2010	PROJECT NO.: 51272.01
DATE REVISION:	STATE PROJECT NO.: 1004846115
	CONTRACT NO.: 10048-B
	CONTRACT DISTRICT: 126
	CONTRACT SHEET NO.: 231

14+00

13+00



15+00



14+88

WETLAND MITIGATION

VHB Vanasse Hangen Brustlin, Inc.		SHEET TOTALS	
DATE PLOTTED	STATE PROJECT NO.	DATE EXAM.	SHEET NO.
7/9/2010	100048WBFXS	3/22/10	127
DATE	STATE PROJECT NO.	DATE EXAM.	SHEET NO.
7/9/2010	100048WBFXS	3/22/10	127
TOTAL SHEETS		231	

NUMBER	DATE	STATION	DESCRIPTION

DATE	DATE	DATE	DATE

Addendum to: Final Environmental Assessment & Section 4(f) Evaluation

***Plaistow-Kingston,
Reconstruction of NH 125
MGS-STP-T-X-5375 (010),
10044B***

Plaistow and Kingston,
New Hampshire

**New Hampshire Department of Transportation and Federal
Highway Administration**



March 2006 Revisions


 Gray Shading throughout this Addendum indicates changes made to the Final EA dated October 2005.

Table of Contents

4.3 Wetlands	
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4.8 Wildlife and Fisheries Resources	
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6.1 Natural Resource Agency Reviews	10
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E Floodplains.....	11

4.3.4 Mitigation

A sequential approach to mitigation, including avoidance, minimization, and compensation, was taken during planning for this project. Avoidance of impacts to wetlands was the first priority and was accomplished during macro-scale screening of the four original widening alternatives using a wetlands constraints map. Measures taken to minimize impacts during preliminary design include realigning and scaling back the connector roads and tightening slopes to avoid wetland impacts. The practicability of other measures to reduce impacts will be studied in final design and could include further steepening of side slopes where possible or using retaining walls.

4.3.4.1 Identification of Potential Compensatory Mitigation Opportunities

Compensatory mitigation measures including restoration, enhancement, creation and preservation were explored to offset the unavoidable loss of wetlands. To find potential mitigation opportunities, the NH Office of Energy and Planning (NHOEP), the NH Department of Environmental Services (NHDES) and the local conservation commissions were contacted to identify wetland creation, restoration or preservation sites within the project vicinity. In addition, several sites were identified during wetland delineation and evaluation field work during the 2001 and 2002 field seasons. A GIS evaluation of the Towns of Kingston and Plaistow was also used to assist in mitigation parcel identification. Furthermore, in December 2005, NHDES and The Nature Conservancy (TNC) proposed that the NH Department of Transportation (NHDOT) consider participating in the fee simple acquisition of a property along the Powwow River in Kingston as part of the mitigation for the project.

Creation/Restoration Parcels

Potential creation and restoration areas were identified primarily through consultations with natural resource scientists familiar with the area as well during wetland field work. During review of potential mitigation sites, wetland scientists visited two potential wetland creation/restoration areas in Kingston as well as one site in Plaistow. The following criteria were used to evaluate the suitability of creation/restoration areas:

- The site must have a suitable geomorphic setting;
- Restoration sites are preferred to creation sites; and
- The site should be related to the wetland systems impacted by the project.

Based on these criteria, restoration of wetlands at the former Sullivan parcel in Kingston is recommended as further discussed below.

Preservation Parcels

Potential preservation parcels within Plaistow and Kingston were identified in consultation with local and state resource agencies and by using GIS analysis. To identify candidate preservation parcels, published information was reviewed, including aerial photographs, USGS mapping, NWI mapping and the location of existing conservation areas. Combining these sources, priority mitigation parcels were selected using the following criteria:

- The parcels should be between 10.1 and 30.4 hectares (25 and 75 acres) in size;
- Parcels should have at least 10 percent NWI wetland;

- Parcels must abut existing conservation lands; and
- The lots should be largely undisturbed/undeveloped. (The evaluation was based on 1998 aerials.)

Using these selection criteria, 10 potential preservation parcels were identified in Plaistow and Kingston. Each of these sites was visited by a wetland scientist to review their condition and assess their ecological value. This review quickly pointed to the Kelly Brook watershed as a priority conservation area. The Kelly Brook watershed was also recommended as a preferable location by resource agencies during a field review of potential mitigation properties.

Development of the Mitigation Package

Kingston Mitigation

Wetland impacts in Kingston are estimated to be approximately 1.67 hectares (4.14 acres) in total, including impacts associated with the Hunt Road/Newton Junction Road project constructed in 2004, and the Old Coach Road/New Boston Road project previously constructed in 2000. The Former Sullivan Properties have been acquired for mitigation and will provide a combination of wetland creation/preservation as described below. **Figure 4.3-2** shows the approximate boundaries for each of the Sullivan properties.

Former Sullivan Properties (Map R-5/Lot 20, R-5/19, and R-5/1B)

Within Kingston, the site known as the Sullivan Properties would provide areas of creation/restoration and preservation. The three Sullivan parcels, which comprise about 5.9 hectares (14.7 acres) of contiguous area, are located west of NH 125, adjacent to Bayberry Pond. Portions of each parcel lie within the 76.2 meters (250-feet) protected shoreland zone associated with the pond. Additionally, Map R-5/Lot 1B lies almost entirely within an aquifer protection zone (APZ) that encompasses Bayberry Pond and surrounding areas. A portion of Map R-5/Lot 20 is also located within the APZ. Specific attributes of each parcel and their contribution to the mitigation strategy are described below.

Map R-5/Lot 20

- 2.2 hectares (5.4 acres) – largely disturbed/alterd by filling and grading.
- Consists of approximately 20 percent wetland and 80 percent upland.
- Excellent candidate for creation and/or restoration based on landscape position and past wetland impact.
- Estimate that approximately 0.4 hectare (1.0 acre) of storm water treatment would be provided.
- Estimate that approximately 0.8 hectare (2.0 acres*) could be created/restored on the parcel.
- Restored wetlands would tie into existing wetlands on the parcel providing additional wetland buffer to the pond and aquifer.

* The actual amount of wetland restoration will be determined during final design of the restoration. This estimate is based on a field review of existing site conditions.

Map R-5/Lot 19

- 0.5 hectares (1.3 acres) – consists of nearly 100 percent undisturbed forested upland.
- Preservation of parcel would maintain natural buffer to Bayberry Pond.
- Resource agencies expressed a preference for maintaining integrity of this lot rather than locating a proposed stormwater detention basin within the forested upland buffer to Bayberry Pond during the August 2003 field meeting.

Map R-5/Lot 1B

- 3.2 hectares (8.0 acres) – undisturbed forested, scrub-shrub, and emergent wetland and deciduous forested upland.
- Consists of approximately 75 percent wetland and 25 percent upland.
- Preservation of parcel would maintain natural forested upland and emergent marsh buffer to pond, preserving notable wildlife habitat and a small stand of *Chamaecyparis thyoides* (Atlantic white cedar).
- Lies almost entirely within an Aquifer Protection Zone (APZ) that encompasses Bayberry Pond.

Bayberry Pond Preservation Properties (Map R-5/Lot 1C, and R-2/Lot 11)

During the field visit on August 7, 2003, resource agencies recommended consideration of acquisition of lands adjacent to Bayberry Pond in addition to the Sullivan properties. It was determined that NHDOT would investigate acquisition of a portion of one of these lots for preservation as described below and depicted on **Figure 4.3-2**.

Map R-5/Lot 1C

- Approximately 28.3 hectares (70 acres) in total – herbaceous emergent and forested wetlands and forested upland.
- Total lot consists of approximately 55 percent wetland and 45 percent upland.
- Parcel lies to the west of the Sullivan Properties and to the north and west of Bayberry Pond.
- Preservation of entire parcel (or portion thereof) would provide protected buffer of up to 30 percent of shoreline of Bayberry Pond.
- Parcel almost entirely located within Aquifer Protection Zone.
- Borders existing town-owned conservation land (Dorre Road Town Forest) located to the west of the parcel.
- Identified by NHDES staff member as an integral component of a protection strategy for the pond.
- Subdivision of this lot, from the corner of Lot R-5/Lot 1C westerly in a line parallel to Hunt Road, would create a preservation parcel of approximately 16.2 hectares (40 acres) (75 percent wetland/25 percent upland).

Map R-2/Lot 11

- Approximately 40 hectares (84 acres) in total – mostly forested wetland and forested upland.
- Total lot consists of approximately 85 percent wetland and 15 percent upland.
- Parcel directly abuts Bayberry Pond
- Preservation of entire parcel (or portion of) would provide protected buffer of up to 20 percent of shoreline of Bayberry Pond.
- Portion of parcel lies within Aquifer Protection Zone.
- Borders existing town-owned conservation land (Dorre Road Town Forest) located to the west of the parcel.
- Identified by NHDES staff member as an integral component of a protection strategy for the pond.
- Subdivision of this lot could create a preservation parcel of approximately 12.1 hectares (30 acres) (85 percent wetland/15 percent upland).

Neither of these Bayberry Pond parcels will be pursued at this time, but they would be further considered if the NHDOT is unable to participate in the acquisition of the preferred parcel described below.

Nichols Preservation Property (Map R-15/Lot 15)

In December 2005, NHDES and TNC proposed that the NHDOT consider participating in the simple acquisition of a 9 hectare (22.3 acre) property along the Powwow River as part of mitigation for the project. The parcel is described below and depicted on **Figure 4.3-2A** and **Figure 4.3-2B**. This parcel is the NHDOT's preferred preservation site in Kingston.

Map R-15/Lot 15

- Approximately 9.0 hectares (22.3-acres) in total - according to the National Wetlands Inventory mapping, the tract includes 1.7 hectares (4.2 acres) of Palustrine Scrub-Shrub/Emergent and 0.6 hectares (1.4 acres) of Palustrine Forested wetlands
- The parcel has exceptional natural resource values for fish and wildlife, including portions of two exemplary Atlantic white cedar swamps, streamside fens and important upland buffers with mature Hemlock-Oak-Pine forest.
- The property is an integral part of the Powwow River ecosystem between Powwow and Country Ponds, and is currently threatened by subdivision and development.
- The Nichols tract has approximately 150 meters (500 feet) of frontage and riparian habitat along the east side of the Powwow River, including a part of a streamside fen system.
- The parcel directly abuts 31.6 hectares (78 acres) of existing conservation land on which the Town of Kingston has an LCIP easement.
- The property could provide public access to the Powwow River for fishing and waterfowl hunting via the Class VI portion of Country Pond Drive. Additional recreational opportunities include hiking and upland game hunting.
- Suggested by NHDES staff member as an integral component of the protection strategy for the Powwow River Conservation Area.
- Located within a potential 405 hectare (1,000 acre) contiguous protected area being pursued by TNC, the NHF&GD, the Town of Kingston and other conservation groups,

providing a large block of wildlife habitat along one of Southeast New Hampshire's most ecologically significant river corridor.

- Concurred by resource agencies, at the December 14, 2005 natural resource coordination meeting, that this site be pursued due to its environmental benefits to the Powwow River ecosystem.

Plaistow Mitigation

Total wetland impacts in Plaistow are estimated to be approximately 1.29 hectares (3.20 acres) (including the previous Kingston Road Bridge project scheduled for completion in 2004). Upon review of mitigation opportunities, a strategy is recommended that would acquire conservation land within the Kelly Brook watershed in northwest Plaistow. Note that Kelly Brook crosses the NH 125 corridor lower in its watershed and is an important perennial tributary to the Little River. The Kelly Brook watershed has been and is currently under severe pressure from residential development. Despite this, the Towns of Plaistow, Hampstead and Atkinson have preserved portions of the watershed as town forests and other conservation lands totaling more than 202 hectares (500 acres). In addition to being favored by the Town, resource agencies favor protection of acreage in the vicinity of Kelly Brook. NHF&GD recommends land protection in this watershed, as Kelly Brook has a high quality fishery based on field surveys of the brook by NHF&GD.

Several parcels are undeveloped in the area which would add to an already large block of conservation land in this area of Plaistow and adjacent to Atkinson and Hampstead. Several potential parcels that, based on research to date, appear to be available and would be good candidates for conservation are discussed below. Several undisturbed "non-protected" parcels within the Kelly Brook watershed area (known locally as "Frog Pond Woods") have been identified for potential inclusion in the mitigation package (**Figure 4.3-3**). All of the available parcels in this area were reviewed to determine their suitability as conservation land. Parcels were excluded if they were already developed or if they were already under conservation. Based on their landscape position and the recommendation of the Town of Plaistow, the list was narrowed to five high priority parcels:

- Tax Map 6, Lot 15 (17.7 hectares [43.8 acres]),
- Tax Map 7, Lot 3 (8.5 hectares [21.0 acres]),
- Tax Map 6, Lot 7 (3.1 hectares [7.7 acres]),
- Tax Map 8, Lot 24 (2.4 hectares [6 acres]), and
- Tax Map 8, Lot 25 (2.4 hectares [6 acres]).

NHDOT's preferred site is a 17.7-hectare (43.8-acre) parcel (Map 6, Lot 15). The other parcels (not being pursued) are described below and will be considered further if the preferred parcel is either acquired by the Town for conservation or developed prior to NHDOT's ability to acquire right-of-way following the public hearing and approval by the Special Committee.

Map 6/Lot 15

- 17.7 hectares (43.8 acres) – mixed coniferous/deciduous forested upland and wetland bordering other conservation parcels.
- Consists of approximately 10 percent wetland and 90 percent upland.
- Access parcel from Carleton Path which extends from Lynwood Street.

- According to the Town, lot was recently purchased for development.
- Selective logging performed regularly from established dirt road and narrow trails through property.
- Property impacted by some ATV use and illegal dumping (junked automobiles and construction debris).
- Town favors placing conservation restriction or purchasing portion of lot not being developed.
- Would add considerable forested acreage to large unfragmented block and limit expansion of sub-division.
- Favored by the Town of Plaistow for conservation.

Map 7/Lot 3

- 8.5 hectares (21.0 acres) – largely undisturbed mixed coniferous and deciduous forested upland and wetland communities; noteworthy hemlock groves with considerable evidence of deer and moose activity (browsing, scat, tracks).
- Consists of approximately 15 percent wetland and 85 percent upland.
- Nearly surrounded by existing (or newly designated) conservation land.
- Lot contains a large vernal pool, with numerous juvenile and adult wood frogs observed.
- Large (>15 nests) Great Blue Heron (*Ardea herodias*) rookery observed northwest on adjacent Map 7 Lot 1.
- Would complete a large block of unfragmented conservation land providing varied habitat and plant communities.
- Favored by the Town of Plaistow for conservation.

Map 6/Lot 7

- 3.1 hectares (7.7 acres) – mixed coniferous and deciduous forested upland bordering existing conservation land in Plaistow and Atkinson.
- Consists of nearly 100 percent upland.
- Land sloping moderately toward Map 7/Lot 3 and 7/4 – adjacent to designated conservation land.
- Some clearing from logging, but areas re-vegetating quickly providing additional habitat variation; evidence of use by deer (browsing, scat).
- Would provide additional buffer to Kelly Brook from residential development located to the west in Atkinson and additional acreage to the unfragmented conservation block.
- Favored by the Town of Plaistow for conservation.

Map 8/Lot 24

- 2.4 hectares (6.0 acres) – undisturbed forested upland bordering existing conservation land.
- Consists of nearly 100 percent upland.
- Bottom of hill slope, with extensive hemlock stand directly bordering Kelly Brook makes this parcel attractive for preservation.
- Owner is not known; Town currently researching property history and may be purchasing or placing into conservation.

Map 8/Lot 25

- 2.4 hectares (6.0 acres) (approximately) – undisturbed forested upland and wetland bordering existing conservation land in Plaistow and Hampstead.
- Owner is not known; Town currently researching property history and may be purchasing or placing into conservation.
- Consists of about 5 percent wetland and 95 percent upland.
- Bottom of slope of hill, with extensive hemlock stand directly bordering Kelly Brook.

Final Mitigation Package

A field meeting with resource agencies was conducted on August 7, 2003 and with US Army Corps of Engineers (USACOE) representatives on April 12, 2005. The final mitigation package is based on the findings of these field reviews as well as consultation with the USACOE and other resource agencies at coordination meetings held on July 16, 2003, September 17, 2003, January 19, 2005, and December 14, 2005. Consultation on the final mitigation package were also conducted with town officials from both Plaistow and Kingston. The final mitigation package involves three main components:

- The already acquired Sullivan Properties in Kingston comprising the three parcels totaling 5.9 hectares (14.7 acres) . Wetland creation, habitat restoration, and preservation of a buffer around Bayberry Pond are the goals for this area. The conceptual design (see **Figure 4.3-4**) for the parcel identified as Map R-5/Lot 20 creates 0.5 hectares (1.23 acres) of forested wetlands, which transition into restored shrub and forested uplands as one approaches NH 125 to the east. This design is intended to maximize wildlife habitat value and includes an upland island that will provide sandy areas for turtle nesting. In addition, the mature trees that currently grow at the boundary of site and in an area close to NH 125 will be preserved to the greatest extent possible. A detention basin was also constructed on the western side of R-5, Lot 20 as part of the Hunt Road/Newton Junction Road project. This basin provides both flood storage and stormwater treatment. The remainder of the three Sullivan parcels, approximately 4.7 hectares (12 acres), will provide an important conservation buffer to Bayberry Pond.
- Participation in the fee simple acquisition of the Nichols property, identified as Map R-15/Lot 15 totaling approximately 9.0 hectares (22.3 acres), in the Powwow River watershed in Kingston. This property is an integral part of the Powwow and County Ponds ecosystem, and is currently threatened by subdivision and development. The preservation of this property will result in contiguous protected area of approximately 405 hectares (1,000 acres), providing a large block of wildlife habitat along one of southeast New Hampshire's most ecologically significant river corridors. Ownership is proposed to be by the Town of Kingston, subject to a conservation easement held by the NHF&GD or TNC. Alternatively, fee ownership by TNC or NHF&GD may be possible. NHDOT could hold an executory interest in any conservation easement, or some other legal interest mutually acceptable to all parties. The Town, NHF&GD, and TNC all own, steward and manage conservation land along this stretch of the Powwow River, and all are vested in ensuring that conservation lands are managed to sustain their natural resource values for the benefit of wildlife habitat and low impact public recreation.

- Acquisition of a conservation easement on the entire parcel identified as Map 6/Lot 15, totaling approximately 17.7 hectares (43.8 acres), in the Kelly Brook watershed in northwest Plaistow. This acreage will add to a block of approximately 202 hectares (500 acres) of existing conservation lands in that area.

The above described package complies with recent guidance on mitigation from USACOE (RGL 02-02). The mitigation contains a combined strategy of restoration and preservation of wetlands as well as upland buffer preservation and has a clear connection to the watersheds impacted by the proposed NH 125 project. The restoration portion of the package will mitigate for wildlife habitat and water quality functions lost due to the NH 125 project, while the preservation component will help to ensure the future integrity of the important Powwow River, Kelly Brook and their associated wetland systems. The proposed wetland restoration and preservation is in addition to the stormwater treatment measures that will be employed by the NHDOT to minimize potential permanent and temporary impacts on water quality due to the project (see Sections 4.4, 4.5, and 4.17).

4.8.2.3 Summary of Wildlife Impacts/ Mitigation

The project will have a minimal impact on wildlife habitat with the permanent loss of approximately 1.8 hectares (4.5 acres) of wetlands and an estimated 25.9 hectares (64 acres) of uplands, primarily within the State's existing right-of-way. All of these habitats, because of their proximity to the highway and disturbance, are of relatively low value.

Mitigation for wildlife impacts will include preservation of 32.7 hectares (80.8 acres) of mixed habitat types in both Plaistow and Kingston (see Sec 4.3.4). In addition, this includes 0.5 hectares (1.23 acres) of wetland creation and restoration of another 0.6 hectares (1.5 acres) of wetland transition/upland buffer, and upland habitat that will be accomplished on the Sullivan properties in Kingston with the goal of providing a replacement for the wildlife habitat values lost due to the project.* The final design of the new culvert at Kelly Brook will include a "wildlife shelf" to allow passage of wildlife under NH 125 so as to ensure the connectivity of the riparian travel corridor along the brook.

* This estimate is based on a preliminary concept design of the mitigation site. The actual amount of wetland creation/restoration and upland habitat restoration will be determined during final design.

6.1 Natural Resource Agency Reviews

The current project was reviewed with the Natural Resource Agencies at a number of regularly scheduled monthly meetings with the NHDOT. Typically present at these meetings were NHDOT, FHWA, NHDES (Wetlands Bureau), NHF&GD, USEPA, USACOE, USFWS and NHDHR. At each of these meetings, issues were presented and comments received. A field inspection was also made jointly with the resource agencies as noted. The dates and topics of these meetings were as follows:

<u>Date/Place</u>	<u>Topic</u>
October 18, 2000/NHDOT	Access Management
January 16, 2002/NHDOT	Hunt Rd./Newton Jct. Rd.
August 21, 2002/NHDOT	Project Overview
July 16, 2003/NHDOT	Wetland Impacts and Mitigation
August 7, 2003/Project Corridor Field	Review of Mitigation Sites
September 17, 2003/NHDOT	Mitigation
April 12, 2005/Project	Corridor Field Review of Mitigation Sites with USACOE
December 14, 2005/NHDOT	Review of Nichols Preservation Mitigation Site

Appendix G — Project Commitments

B. Wetlands

The final mitigation package as described in Section 4.3.4.2 will involve three components:

The already acquired 5.9-hectare (14.7-acre) Sullivan Properties (three parcels) in Kingston. Wetland creation, habitat restoration, and stormwater mitigation will occur on approximately 1.2 hectares (3 acres), with the remaining +/- 4.7 hectares (12 acres) providing a conservation buffer to Bayberry Pond.

Participation in the fee simple acquisition of the Nichols property identified as Map R 15/Lot 15 totaling approximately 9.0 hectares (22.3 acres), in the Powwow River watershed in Kingston. This property is an integral part of the Powwow and County Ponds ecosystem, and is currently threatened by subdivision and development. The preservation of this property will result in contiguous protected area of approximately 405 hectares (1,000 acres), providing a large block of wildlife habitat along one of Southeast New Hampshire's most ecologically significant river corridors.

Acquisition of a conservation easement on the entire parcel identified as Map 6/Lot 15, totaling approximately 17.7 hectares (43.8 acres), in the Kelly Brook watershed in northwest Plaistow. This acreage will add to a block of approximately 202 hectares (500 acres) of existing conservation lands in this area.

E. Floodplains

The existing culvert at Kelly Brook (a 72 inch RCP constructed in the 1950's) will be replaced with an 8 foot x 8 foot prefabricated concrete box culvert that will reduce existing backwater conditions at this location. Additional minimization of encroachment into the 100-year floodplain and floodway will be attempted if practicable during final design.

Loss of floodwater storage will be compensated for primarily at the proposed wetland restoration site in Kingston. In addition, preservation of 9 hectares (22.3 acres) of wetlands and uplands adjacent to the Powwow River in Kingston and 17.7 hectares (43.8 acres) in the watershed of Kelly Brook in Plaistow will permanently protect these areas from development and any consequent effects on flood flows and storage.

As required by FEMA, a Letter of Map Revision will also be prepared to reflect the reduced floodplain in the Kelly Brook area.

*Sullivan Properties (Map R5,
Lots 20, 19, and 1B), Kingston,
NH*

Plaistow to Kingston,
MGS-STP-T-X-5375(010),
10044-B
New Hampshire

Prepared for **New Hampshire Department of Transportation and
Federal Highway Administration**



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Introduction

The Sullivan Properties are one of the three components of the wetland mitigation package described in the Final Environmental Assessment (FEA) for the Plaistow-Kingston Project. This mitigation package is intended to fully compensate for the unavoidable wetland impacts of the project. The complete history and additional details of the site selection process and package components are provided in the FEA, Section 4.3.4.2 – *Development of the Mitigation Package* (VHB, October 2005).

The Sullivan Properties, which are the subject of this technical report, include three parcels (see Figure 1) totaling 14.7 acres that were acquired by NHDOT for the Hunt Road-Newton Junction Road Project (construction completed in 2005). The latter project was split out from the larger Plaistow-Kingston Project because of the pressing need for safety improvements at the Hunt Rd.-Newton Junction Rd. intersection with NH 125. Mitigation on the Sullivan Properties will include a mix of wetland restoration/creation, habitat restoration and land preservation – all occurring adjacent to the ecologically important Bayberry Pond in Kingston, NH.

The second component of the mitigation package originally proposed the acquisition of up to 40 acres of another parcel adjacent to Bayberry Pond. In 2006, after being contacted by the Nature Conservancy and with subsequent agency consultation and support, NHDOT instead agreed to contribute to the purchase of 22.3 acres of land (the Nichols' property) lying along the Powwow River about 2 miles north of the Bayberry Pond area, but also in the Town of Kingston. Ownership will be by the Town of Kingston, subject to a conservation easement held by The Nature Conservancy or the NH Fish and Game Department, with NHDOT holding an executory interest in the conservation easement.

The third component of the mitigation package is the purchase of a parcel in Plaistow ("Frog Pond Woods") totaling approximately 43.8 acres in the Kelly Brook watershed. The property will be transferred to the Town of Plaistow subject to the placement of a conservation easement held by NHDOT. Preservation of this parcel will add to a block of approximately 500 acres of existing conservation land in that community.

Sullivan Properties

The largest Sullivan property (Map R5/Lot 20) is approximately 5.4 acres. It has been heavily disturbed by filling and grading. The site's topographic characteristics suggest that some of the historical filling may have been in wetlands, presumably prior to current wetland regulations. Because of the parcel's altered state and its position next to an extensive wooded wetland surrounding Bayberry Pond, the site was considered an excellent candidate for wetland creation and habitat restoration. About 0.24 acres of the parcel have been used for the construction of a stormwater detention basin for the Hunt Road-Newton Junction Road project. The second Sullivan parcel (R5/Lot 19) is approximately 1.3 acres and located just south of the previous parcel. This parcel is comprised of nearly 100 percent undisturbed forest and per resource agency recommendations will be preserved intact. The third parcel (R5/Lot 1B) is 8.0 acres and is comprised of approximately 75 percent wetland and 25 percent upland. The latter parcel lies almost entirely within the Aquifer Protection Zone (APZ) for Bayberry Pond and will also be preserved intact.

The conceptual design for R5/Lot 20 contained in the FEA indicated that approximately 1.2 acres of forested wetlands could be created (see Appendix A, Figure A-1.) The design proposed a transition to restored upland shrub and forested habitat as one moves upslope towards NH 125 to the east. This design, which is the subject of this technical report, is intended to maximize wildlife habitat value and includes an upland island that will provide a sandy area for turtle nesting. The mature trees that currently grow along the boundary of much of the parcel, including close to NH 125, will also be preserved to the greatest extent possible. The detention basin constructed in 2004 provides both flood storage and stormwater treatment for the adjacent NH 125.

The remainder of all three Sullivan parcels, or approximately 12 acres, will remain undisturbed and will provide an important conservation buffer to Bayberry Pond.

The above described package complies with recent guidance on mitigation from USACOE (RGL 02-02). The mitigation contains a combined strategy of restoration and preservation of wetlands as well as upland buffer preservation and has a clear connection to the watersheds impacted by the NH 125 project. The restoration portion of the package will mitigate for wildlife habitat and water quality functions lost due to the NH 125 project, while the preservation component will help to ensure the future integrity of Bayberry Pond, Powwow River, and Kelly Brook, including their associated wetland systems. The proposed mitigation is in addition to a variety of stormwater treatment measures that will be employed by NHDOT to minimize both potential permanent and temporary impacts on water quality due to the project.

Project Impacts

2.1 Direct Impacts

Both the FEA and the Wetlands Permit Application for *Plaistow-Kingston, Reconstruction of NH 125, MGS-STP-T-X-5375 (010), 10044B* (VHB; April 2004) provide an extensive discussion and additional details of the potential wetland impacts of the NH 125 roadway improvement project. Maps showing the location of all impacted wetlands along the highway corridor were included in the permit application. A detailed database of wetland impacts by location and wetland type was also included in these two earlier documents.

The Plaistow-Kingston Project (10044B) will result in approximately 4.5 acres of permanent impacts to wetlands. In addition, the proposed mitigation package will compensate for approximately 1.2 acres associated with the earlier Hunt Road/Newton Junction Road intersection reconstruction (in Kingston) whose construction was completed in 2005 and the 1.0 acres of impact associated with recently completed Kingston Road Bridge replacement project in Plaistow. The package is also intended to compensate for 0.65 acres of impact associated with the reconstruction of the Old Coach Road and New Boston Road intersections completed in 2000. Combined, these three projects have approximately 7.34 acres of impact as summarized in Table 2-1.

All of the impacted wetlands lie within the Merrimack River watershed, Hydrologic Unit Code 01070002. A number of local, state and regional watershed councils and alliances have established long-term goals for this watershed - primarily water quality, recreation, and flood protection.

**Table 2-1
Summary of Permanent Wetland Impacts for Which Mitigation Is Proposed¹**

Town	Plaistow-Kingston #10044B) Hectares (Acres)	Hunt Rd/Newton Jct (Kingston #10044C) Hectares (Acres)	Kingston Rd. Bridge Replacement (Plaistow #10005) Hectares (Acres)	Old Coach/ New Boston Roads (Kingston #13012) Hectares (Acres)	Total Impacts (For Mitigation) Hectares (Acres)
Plaistow	2.20	0.0	1.0	0.0	3.20
Kingston	2.29	1.2 ²	0.0	0.65	4.14
Total	4.49	1.2	1.0	0.65	7.34

¹ Due to rounding, impact area measurements do not convert exactly between hectares and acres.

² Impact measurements are the amount of wetland impact stated in the NHDES Wetlands and Non-Site Specific Permit (#2003-01010) issued for NHDOT project # 10044C.

The majority of wetlands impacted by the project are palustrine forested wetlands (Table 2-2). Lesser amounts of emergent marsh, shrub-dominated wetlands, riverine habitat, and open water are affected. The scrub-shrub wetlands are generally found in the transition zone between wooded and herbaceous wetlands or as the margin to larger forested or emergent systems adjacent to the roadway. Small areas of highly disturbed scrub-shrub wetlands located adjacent to commercial properties are also affected. There are no tidal or prime wetlands located in the project study area and hence none is affected. While the initial study area contains some Atlantic white cedar swamps (*Chamaecyparis thyoides*), these areas are not impacted by the project, and are located far from proposed roadway improvements, including on the mitigation parcels (see Section 3.4).

**Table 2-2
Impacts by Wetland Type. Units in Acres**

Dominant Wetland Class ¹	Project Impacts ²
Palustrine Forested	2.85
Palustrine Emergent Marsh	0.67
Palustrine Scrub-Shrub	0.71
Palustrine Open Water	0.03
Riverine	0.23
Totals	4.49

¹ Wetland Class as defined by Cowardin et al. 1979.

² Impacts were calculated from the conceptual design and permit application wetland plans current as of April 15, 2005.

2.2 Functions and Values

Functions and values for the impacted wetlands were determined through field investigations conducted in 2002. *The Highway Methodology Workbook Supplement: Wetland Functions and Values – A Descriptive Approach* (USACOÉ 1999) was followed for this assessment. The results are summarized in Table 2-3.

Forested wetlands in the study corridor function principally as areas of flood protection, nutrient removal, and wildlife habitat. Most impacts to forested wetlands will be incremental in nature due to the already disturbed nature of the wetlands that extend to the bottom of the slopes along NH 125. A few small depressional, forested wetlands located adjacent to commercial or residential development will also be impacted. These wetlands function primarily for groundwater recharge/discharge and nutrient removal.

The principal functions of the emergent marshes include sediment and toxicant retention, groundwater recharge/discharge, nutrient removal, and wildlife habitat. Because the widening will occur adjacent to the existing highway, there is minimal impact on important wetland functions such as floodflow alteration or wildlife habitat that are better performed by larger wetlands and those further from the highway. Impacts to marshes within the study area are largely to those areas that have been altered by commercial development and illegal dumping, or are overrun by invasive species, such as purple loosestrife or common reed.

The shrub wetlands along the project corridor provide functions similar to the forested wetlands. Most of the impacts to shrub wetlands will occur in the vicinity of the new service road to be constructed just north of East Road in Plaistow. Much of the wetland landscape in this area has been altered by clearing, filling, and deposition of eroded materials from upgradient areas, and as such, natural wetland functions have already been negatively impacted.

Table 2-3
Summary of Wetland Functions and Values Assessment¹

Wetland ID ²	Functions and Values												
	Groundwater Recharge & Discharge	Floodflow Alteration	Fish & Shellfish Habitat	Sediment, Toxicant & Pathogen Retention	Nutrient Removal, Retention & Transformation	Production Export	Sediment & Shoreline Stabilization	Wildlife Habitat	Recreation	Educational & Scientific Value	Uniqueness & Heritage	Visual Quality & Aesthetics	Endangered Species & Habitat
Plaiscow													
K-E	✓	☑	✓	☑	☑	✓	✓	☑			✓	✓	
EEE-W	✓	☑		☑	☑	✓		✓					
FFF-W	✓	✓		☑	☑	✓		✓					
Kingston													
L-E		☑		☑	✓			✓					
V-E	✓	☑		☑	☑	✓	✓	☑					
PP-W	✓	☑		☑	☑	✓	✓	✓					
SS-W	☑	☑		✓	✓	✓		✓					
VV-W		✓		☑	☑	✓		☑					

1 Wetland functional assessments performed at representative impact locations only.
 2 Wetland IDs are indicated by one, two or three letter codes. Location is indicated by E (east) or W (west) and refers to landscape position relative to NH 125.
 ✓ Denotes that wetland has a particular function or value.
 ☑ Denotes a principal wetland function or value.

Description of Existing Conditions

3.1 Surrounding Land Use

A site location map for the Sullivan Properties is shown in **Figure 2**. The latitude and longitude for the center of parcel R5/Lot 20 (where wetland creation and restoration will take place) is 042°51'44.75"N, 071°05'4.62"W. The site's Hydrologic Unit Code is 01070002-310, representing its location in the Little River subwatershed of the greater Merrimack River Watershed.

The Sullivan Properties are bounded on the east by NH 125, the north by a commercial/industrial property, the south by a residential lot and driveway that extends to Bayberry Pond, and on the west by Bayberry Pond and its extensive bordering wetlands.

Before its purchase by NHDOT, parcel R5/Lot 20 was used for the storage of construction vehicles on a paved upper portion immediately adjacent to NH 125 (see **Photo 1**). The lower, flat portion of the lot was used for the storage of various construction materials including piles of fill (see **Photos 3-5**). A paved driveway with a gate connects the upper and lower portions of the site (see **Photo 2**). Prior to the State's purchase, all of the fill piles were removed.

3.2 Wildlife & Fisheries

The value of the existing habitat on the majority of the mitigation parcels has been reduced by their proximity to NH 125. Nonetheless there are a variety of species, especially song birds which will find the wooded habitats very suitable. The presence of both upland and wetland habitats along with substantial vertical diversity (herbaceous, shrub, and both sub-canopy and canopy tree layers) greatly increases the expected number of avian species. The mature trees, especially along the boundary of the central portion of the mitigation site also serve as ideal perching sites for raptors, like broad-winged hawks (*Buteo platypterus*) and barred owls (*Strix varia*). The juxtaposition of the site adjacent to Bayberry Pond also increases the opportunity for a variety of amphibians and reptiles, as well as mammals, to use the



enhanced habitats. The current mitigation design takes this into account and provides a soft, sandy substrate on an "upland island" for turtle nesting. Such areas are especially important for female snapping turtles (*Chelydra serpentina*), which will move considerable distances through upland habitats to find a suitable substrate to lay their eggs.

A complete list of vertebrate wildlife species potentially occurring on the mitigation site and preferring the habitats found there was generated using NEWILD¹ (see Appendix C).

Field observations suggest that the small, unnamed perennial stream that courses through the center of site does not support fish. Since it is presumed that this unnamed stream is primarily fed by groundwater, it would be expected to have a rich macroinvertebrate population, especially considering its rock and cobble substrate. Highway runoff reaching this stream, although now diverted to the nearby detention basin, would have historically impacted this stream's water quality and ultimately Bayberry Pond.

3.3 Soils

The *Soil Survey of Rockingham County, New Hampshire*² maps three soil types on the mitigation site:

- 43B – Canton gravelly fine sandy loam, 3 to 8% slopes, very stony
- 547B – Walpole very fine sandy loam, 3 to 8% slopes, very stony
- 295 - Greenwood mucky peat

The majority of parcel R5/Lot 20 is mapped as the Canton soil indicative of its side slope landscape position. Canton soils are well drained. In contrast, Parcel R5/Lot 1B, just to the west, is mapped as Greenwood mucky peat – a classic very poorly drained wetland soil. Parcel R5/Lot 19, to the south, is mapped as Walpole, a gently sloping soil found typically in drainageways. The current detention basin is located primarily in this latter soil type, which is characterized as poorly drained.

The Soil Survey (Table 16) indicates the following depths to the high-water table for the mapped soils:

▼
1 Thomasma, S.A., L.E. Thomasma, and M.J. Twery. 1998. NEWILD (version 1.0) User's Manual [Computer Program]. Gen. Tech. Rep. NE-242. USDA, Forest Service, NE Research Station. 28 pp. plus computer disk.
2 Soil Conservation Service. 1994. *Soil Survey of Rockingham County, New Hampshire*, Parts 1 and 2. U.S. Department of Agriculture.



<u>Soil Type</u>	<u>Depth to High Water Table (ft)</u>	<u>Months</u>
43B	> 6.0	-----
547B	0.0-1.0	Nov-May
295	+1-0.5	Jan-Dec

These typical depths to groundwater are consistent with the delineation of wetlands on the Sullivan Properties and where the soils lie on the current landscape. Soil borings conducted by NHDOT in March 2003 also bear this out as the depth to groundwater was recorded as ranging from 0.4 to 11.0 feet immediately adjacent to NH 125 in this area. Boring logs recorded in the vicinity of the Sullivan Properties are provided in Appendix B.

3.4 Wetlands

Wetlands exist on all three Sullivan Properties and are contiguous with the larger undisturbed wooded wetlands surrounding Bayberry Pond (see Figure 1). In general, the wetlands closest to NH 125 receive runoff during storm events from upslope areas, including the highway, while at other times they are fed primarily by groundwater seeping from the side slope. The forested and scrub-shrub wetlands immediately surrounding Bayberry Pond are believed to have formed on peatland that is fed primarily by groundwater in the underlying stratified drift aquifer. According to the USGS map (see Figure 2), a perennial stream exits Bayberry Pond in its southwest corner. The unnamed stream forms a headwaters' tributary to Little River south and east of the site.

The Cowardin and hydrogeomorphic classifications of the on-site wetlands are given in Table 3-1. Wetland A includes wetland areas immediately adjacent to NH 125, on parcels R5/Lots 19 and 20. Wetland A' includes the mixed scrub-shrub and forested wetland found on parcel R5/Lot 1B (see Photos 6-7). This latter wetland makes up a portion of the much larger wetland fringing Bayberry Pond. Although not physically a part of this mitigation site, NWI mapping indicates Bayberry Pond as L1UBH (Lacustrine, Limnetic, Unconsolidated Bottom, Permanently Flooded).

Wetlands on the three mitigation parcels total approximately 7.5 acres or about 51 percent of the entire 14.7-acre site. A list of plant species observed during field investigations conducted in 2006 is provided in Table 3-2.

Of special note is the presence of Atlantic White Cedar on Parcel R5/1B. This is a rare species and when more abundant forms a classic community type referred to as an "Atlantic White Cedar Basin Swamp. An example of this "exemplary natural community," as classified by the NH Natural Heritage Inventory, can be found just

north of the mitigation site along the Powwow River. NHDOT has contributed to the purchase of this latter area as another component of the mitigation package for this project (see Introduction – Section 1.0). Atlantic white cedar is particularly sensitive to changes in hydrology (e.g., flooding or drying) and increased nutrient levels. The permanent protection of the Sullivan Properties, including the presence of additional stormwater treatment in the created wetland, will contribute to this species' long term viability.

**Table 3-1
Cowardin1 and Hydrogeomorphic Classifications of On-Site Wetlands – Sullivan Properties, Kingston, NH**

Wetland ID	Cowardin Classification	Geomorphic Setting	Water Source	Hydrodynamics
A	PF01E	Depressional, Groundwater Slope	Surface Flow & Groundwater	Vertical Fluctuation & Unidirectional Flow
A'	PSS1/PF01/4E	Depressional	Surface Flow & Groundwater	Vertical Fluctuation & Unidirectional Flow

- 1 Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. Fish and Wildlife Service, U.S. Department of Interior. 131 pp.
- 2 Brinson, M.M. 1993. A Hydrogeomorphic Classification for Wetlands. U.S. Army Corps of Engineers, Waterways Experiment Station. 79 pp. plus appendices.

**Table 3-2
Plant Species List – Sullivan
Properties, Kingston, NH**

Common Name	Scientific Name	NWI Region 1 Indicator Status
<u>Area 1 - Disturbed Area</u>		
Alternatleaf dogwood	<i>Cornus alternifolia</i>	NI
American elm	<i>Ulmus americana</i>	FACW-
Annual ragweed	<i>Ambrosia artemisiifolia</i>	FACU
Big-tooth aspen	<i>Populus grandidentata</i>	FACU-
Birds-foot trefoil	<i>Lotus corniculatus</i>	FACU-
Black willow	<i>Salix nigra</i>	FACW+
Blackberry	<i>Rubus uvidus</i>	NI
Black-eyed susan	<i>Rudbeckia hirta</i>	FACU-
Bracken fern	<i>Pteridium aquilinum</i>	FACU
Bristley blackberry	<i>Rubus hispids</i>	FACW
Common boneset	<i>Eupatorium perfoliatum</i>	FACW+
Common juniper	<i>Juniperus communis</i>	NL
Common pokeweed	<i>Phytolacca americana</i>	FACU+
Common reed	<i>Phragmites australis</i>	FACW
Common winterberry	<i>Ilex verticillata</i>	FACW+
Cow vetch	<i>Vicia sp.</i>	-
Early goldenrod	<i>Solidago juncea</i>	NI
Eastern white pine	<i>Pinus strobus</i>	FACU
Grape	<i>Vitis sp.</i>	-
Grass	<i>Poa spp.</i>	-
Gray birch	<i>Betula populifolia</i>	FAC
Hay scented fern	<i>Dennstaedtia punctilobula</i>	NI
Honey-locust	<i>Gleditsia triacanthos</i>	FAC-
Japenese knotweed	<i>Polygonum cuspidatum</i>	FACU-
Milkweed	<i>Asclepias sp.</i>	-
Multiflora rose	<i>Rosa multiflora</i>	FACU
Northern red oak	<i>Quercus rubra</i>	FACU-
Oriental bitter-sweet	<i>Celastrus orbiculata</i>	UPL
Poison ivy	<i>Toxicodendron radicans</i>	FAC
Polytrichum moss	<i>Polytrichum sp.</i>	-
Purple loosestrife	<i>Lythrum salicaria</i>	FACW+
Quaking aspen	<i>Populus tremula</i>	FACU
Queen Anne's lace	<i>Daucus carota</i>	NL
Rabbitfoot clover	<i>Trifolium arvense</i>	NL
Red clover	<i>Trifolium pratense</i>	FACU-
Red maple	<i>Acer rubrum</i>	FAC
Red raspberry	<i>Rubus strigosus</i>	NI
Redtop	<i>Agrostis alba</i>	FACW
Rhubarb	<i>Rheum sp.</i>	-

**Table 3-2
Plant Species List – Sullivan
Properties, Kingston, NH**

Common Name	Scientific Name	NWI Region 1 Indicator Status
Russian olive	<i>Elaeagnus angustifolia</i>	FACU
Slender fragrant goldenrod	<i>Euthamia minor</i>	FACU
Smartweed	<i>Polygonum</i> sp.	-
Speckled alder	<i>Alnus rugosa</i>	FACW+
Spotted joe-pye-weed	<i>Eupatoriadelphus maculatus</i>	FACW
Spotted touch-me-not	<i>Impatiens capensis</i>	FACW
Staghorn sumac	<i>Rhus typhina</i>	NL
Sweet fern	<i>Comptonia peregrina</i>	NL
Virginia creeper	<i>Parthenocissus quinquefolia</i>	FACU
Virginia strawberry	<i>Fragaria virginiana</i>	FACU
White ash	<i>Fraxinus americana</i>	FACU
White birch	<i>Betula alba</i>	FAC+
Woodland horsetail	<i>Equisetum sylvaticum</i>	FACW

Area 2 - Natural Wetland Swale A

Alaska goldthread	<i>Coptis trifolia</i>	FACW
Alternatleaf dogwood	<i>Cornus alternifolia</i>	NI
American elder	<i>Sambucus canadensis</i>	FACW-
American elm	<i>Ulmus americana</i>	FACW-
Arrow-wood	<i>Viburnum dentatum</i>	FAC
Black cherry	<i>Prunus serotina</i>	FACU
Broad-leaf cattail	<i>Typha latifolia</i>	OBL
Broad-leaf meadow-sweet	<i>Spiraea latifolia</i>	FAC+
Carex spp.	Sedge	-
Cinnamon fern	<i>Osmunda cinnamomea</i>	FACW
Common boneset	<i>Eupatorium perfoliatum</i>	FACW+
Common buckthorn	<i>Rhamnus cathartica</i>	UPL
Common juniper	<i>Juniperus communis</i>	NL
Common winterberry	<i>Ilex verticillata</i>	FACW+
Corylus cornuta	Beaked hazel-nut	FACU-
Early meadow rue	<i>Thalictrum dioicum</i>	FAC
Eastern hemlock	<i>Tsuga canadensis</i>	FACU
Eastern white pine	<i>Pinus strobus</i>	FACU
Fringed sedge	<i>Carex crinita</i>	OBL
Grape	<i>Vitis</i> sp.	-
Gray birch	<i>Betula populifolia</i>	FAC
Green ash	<i>Fraxinus pennsylvanica</i>	FACW
Highbush blueberry	<i>Vaccinium amoenum</i>	FACW
Maleberry	<i>Lyonia ligustrina</i>	FACW
Multiflora rose	<i>Rosa multiflora</i>	FACU
New York fern	<i>Thelypteris noveboracensis</i>	FAC
Northern red oak	<i>Quercus rubra</i>	FACU-

**Table 3-2
Plant Species List – Sullivan
Properties, Kingston, NH**

Common Name	Scientific Name	NWI Region 1 Indicator Status
Partridge-berry	<i>Mitchella repens</i>	FACU
Poison ivy	<i>Toxicodendron radicans</i>	FAC
Purple loosestrife	<i>Lythrum salicaria</i>	FACW+
Red maple	<i>Acer rubrum</i>	FAC
Royal fern	<i>Osmunda regalis</i>	OBL
Sensitive fern	<i>Onoclea sensibilis</i>	FACW
Soft rush	<i>Juncus effusus</i>	FACW+
Speckled alder	<i>Alnus rugosa</i>	FACW+
Spotted joe-pye-weed	<i>Eupatoriadelphus maculatus</i>	FACW
Spotted touch-me-not	<i>Impatiens capensis</i>	FACW
Steeple-bush	<i>Spiraea tomentosa</i>	FACW
Subarctic lady fern	<i>Athyrium filix-femina</i>	FAC
Swamp jack in the pulpit	<i>Arisaema triphyllum</i>	FACW-
Sweet birch	<i>Betula lenta</i>	FACU
Virginia creeper	<i>Parthenocissus quinquefolia</i>	FACU
White birch	<i>Betula alba</i>	FAC+
White oak	<i>Quercus alba</i>	FACU-
Wild lily of the valley	<i>Maianthemum canadense</i>	FAC-
Woodland horsetail	<i>Equisetum sylvaticum</i>	FACW
Wool-grass	<i>Scirpus cyperinus</i>	FACW+

Area 3 - Detention Basin

Arrow arum	<i>Peltandra virginica</i>	OBL
Broad-leaf cattail	<i>Typha latifolia</i>	OBL
Hop sedge	<i>Carex lupulina</i>	OBL
Common boneset	<i>Eupatorium perfoliatum</i>	FACW+
Common pokeweed	<i>Phytolacca americana</i>	FACU+
Fringed sedge	<i>Carex crinita</i>	OBL
Nut sedge	<i>Cyperus esculentus</i>	NI
Purple loosestrife	<i>Lythrum salicaria</i>	FACW+
Redtop	<i>Agrostis alba</i>	FACW
Shallow sedge	<i>Carex lurida</i>	OBL
Soft rush	<i>Juncus effusus</i>	FACW+
Spikerush	<i>Eleocharis sp.</i>	-
Wool-grass	<i>Scirpus cyperinus</i>	FACW+

Area 4 - Detention Basin Outfall

Arrow-wood	<i>Viburnum dentatum</i>	FAC
Beggar-ticks	<i>Bidens sp.</i>	-
Birds-foot trefoil	<i>Lotus corniculatus</i>	FACU-
Blackberry	<i>Rubus uvidus</i>	NI

**Table 3-2
Plant Species List – Sullivan
Properties, Kingston, NH**

Common Name	Scientific Name	NWI Region 1 Indicator Status
Bracken fern	<i>Pteridium aquilinum</i>	FACU
Broad-leaf cattail	<i>Typha latifolia</i>	OBL
Cinnamon fern	<i>Osmunda cinnamomea</i>	FACW
Giant goldenrod	<i>Solidago gigantea</i>	FACW
Purple loosestrife	<i>Lythrum salicaria</i>	FACW+
Queen Anne's lace	<i>Daucus carota</i>	NL
Redtop	<i>Agrostis alba</i>	FACW
Royal fern	<i>Osmunda regalis</i>	OBL
Spotted touch-me-not	<i>Impatiens capensis</i>	FACW
White birch	<i>Betula alba</i>	FAC+
<u>Area 5 - Upland Community</u>		
American starflower	<i>Trientalis borealis</i>	FAC
American witch-hazel	<i>Hamamelis virginiana</i>	FAC-
Apple	<i>Malus sp.</i>	-
Black cherry	<i>Prunus serotina</i>	FACU
Bracken fern	<i>Pteridium aquilinum</i>	FACU
Eastern white pine	<i>Pinus strobus</i>	FACU
Lowbush blueberry	<i>Vaccinium angustifolium</i>	FACU-
Maleberry	<i>Lyonia ligustrina</i>	FACW
Maple-leaf viburnum	<i>Viburnum acerifolium</i>	UPL*
Nannyberry	<i>Viburnum lentago</i>	FAC
Northern red oak	<i>Quercus rubra</i>	FACU-
Tree clubmoss	<i>Lycopodium obscurum</i>	FACU
White ash	<i>Fraxinus americana</i>	FACU
White oak	<i>Quercus alba</i>	FACU-
Wild lily of the valley	<i>Maianthemum canadense</i>	FAC-
<u>Area 6 - Natural Wetland A</u>		
Alaska goldthread	<i>Coptis trifolia</i>	FACW
American elm	<i>Ulmus americana</i>	FACW-
American hornbeam	<i>Carpinus caroliniana</i>	FAC
Arrow-wood	<i>Viburnum dentatum</i>	FAC
Atlantic white cedar	<i>Chamaecyparis thyoides</i>	OBL
Blackberry	<i>Rubus uvidus</i>	NI
Broad-leaf cattail	<i>Typha latifolia</i>	OBL
Broad-leaf meadow-sweet	<i>Spiraea latifolia</i>	FAC+
Carex spp.	<i>Sedge</i>	-
Cinnamon fern	<i>Osmunda cinnamomea</i>	FACW
Common winterberry	<i>Ilex verticillata</i>	FACW+
Early meadow rue	<i>Thalictrum dioicum</i>	FAC



**Table 3-2
Plant Species List – Sullivan
Properties, Kingston, NH**

Common Name	Scientific Name	NWI Region 1 Indicator Status
Feather false-solomon's-seal	<i>Smilacina racemosa</i>	FACU-
Green ash	<i>Fraxinus pennsylvanica</i>	FACW
Green birch	<i>Smilax rotundifolia</i>	FAC
Highbush blueberry	<i>Vaccinium amoenum</i>	FACW
Japanese barberry	<i>Berberis thunbergii</i>	FACU
Multiflora rose	<i>Rosa multiflora</i>	FACU
Nannyberry	<i>Viburnum lentago</i>	FAC
Partridge-berry	<i>Mitchella repens</i>	FACU
Peat moss	<i>Sphagnum sp.</i>	-
Poison ivy	<i>Toxicodendron radicans</i>	FAC
Purple loosestrife	<i>Lythrum salicaria</i>	FACW+
Red maple	<i>Acer rubrum</i>	FAC
Royal fern	<i>Osmunda regalis</i>	OBL
Sensitive fern	<i>Onoclea sensibilis</i>	FACW
Silky dogwood	<i>Cornus amomum</i>	FACW
Speckled alder	<i>Alnus rugosa</i>	FACW+
Spotted joe-pye-weed	<i>Eupatoriadelphus maculatus</i>	FACW
Spotted touch-me-not	<i>Impatiens capensis</i>	FACW
Steeple-bush	<i>Spiraea tomentosa</i>	FACW
Swamp jack in the pulpit	<i>Arisaema triphyllum</i>	FACW-
Tussock sedge	<i>Carex stricta</i>	OBL
Virginia creeper	<i>Parthenocissus quinquefolia</i>	FACU
Wild sarsaparilla	<i>Aralia nudicaulis</i>	FACU
Woodland horsetail	<i>Equisetum sylvaticum</i>	FACW

Notes: NL = not listed on the National List since the species does not occur in wetlands in any region.
 NI = insufficient information to assign an indicator status by the USFWS Review Panel.
 Dash (-) = indicator status is indeterminate since species level identification was not possible.
 Asterisk (*) = tentative assignment of indicator status by USFWS.

The U.S. Fish and Wildlife Service (USFWS) has both reviewed the EA for the NH 125 Project and attended Natural Resource Agency Coordination Meetings in which details of the mitigation package were discussed. That agency has expressed approval of the package. In addition, the State Historic Preservation Office (SHPO) has provided the required approvals for the project and has determined that there are no cultural resource concerns at the project mitigation site.

Wetland Design & Construction

4.1 Design Elements Related to Principal Wetland Functions

The mitigation design described in this report is intended to provide replacement for the principal wetland functions and values impacted by the project, i.e., groundwater recharge/discharge, floodflow alteration, sediment/toxicant retention, nutrient removal, and wildlife habitat (or more generally, biological productivity). See Section 2.0 for details.

4.1.1 Groundwater Recharge/Discharge

Since the majority of the NH 125 project corridor overlays stratified drift aquifer, the groundwater recharge/discharge function of the wetlands is an important function. In New England, most wetland situations are net discharge areas, while the surrounding landscape is important for recharging the substantial aquifer found where stratified drift deposits were formed by the melting glaciers.

The basic function of groundwater discharge in wetlands is typically to provide base flow to streams formed in the wetlands or flowing through them. This support for streams is critical during the dry season when stormwater runoff is insufficient to generate enough stream flow. The base flow generated from groundwater discharge is especially important in maintaining key habitat characteristics associated with a cold water fishery such as ample water depths, velocity, and cool temperatures.

Groundwater discharge is also important in that the water provides support for the growth of hydroptic vegetation in the wetland itself, contributing to habitat diversity. Design elements that promote groundwater recharge/discharge include³:

- Excavation to depths which intercept the underlying water table, leading to discharge.

▼
³ Marble, A.D. 1990. A Guide to Wetland Functional Design. U.S. Department of Transportation, Federal Highway Administration. Report No. FHWA-IP-90-010. 230 pp.

- Restoration (along with preservation) of a significant portion of the surrounding watershed to ensure adequate recharge of the water table down gradient where the wetland is located.

4.1.2 Floodflow Alteration (Flood Storage)

One of the most common functions performed by the majority of wetlands impacted by the highway widening project is floodflow alteration or flood storage. The U.S. Army Corps of Engineers (USACOE), the U.S. Environmental Protection Agency (EPA) and the New Hampshire Department of Environmental Services (NHDES) all recommend that projects like this one should not contribute to the additional loss of flood storage that has already occurred due to development.

In addition to wetland creation, compensatory flood storage will be augmented by a number of extended-detention basins that will provide both water quality treatment and stormwater storage at a number of locations along the widened highway. Following standard practice, these basins are being designed for a 25-year storm event with a spillway for discharging the 50-year storm event to a nearby watercourse.

The ability of a wetland to function in floodflow alteration is dependent upon its storage capacity and position in the watershed. Effective desynchronization of downstream peak flows is a function of a wetland's outlet size and elevation. Design elements which typically promote floodflow alteration and storage include⁴:

- A basin-like morphology to increase available floodwater storage.
- Plant establishment with wetland species which are well adapted to the specific planting location (for high productivity and density).
- Establishment of persistent vegetation which provides increased frictional resistance to flowing water.
- A minimal amount of open water in relation to the total wetland area.
- A maximum amount of area where water depth does not exceed 50 percent of plant height.
- Absence of an outlet which limits the rate of discharge from the site.

Not all of the above elements are possible at the Sullivan Properties site. The current design for the site (see Plan Set and overview provided in Section 6) essentially creates a broad wetland with mound-and-pool microtopography, whose persistent woody vegetation will slow the movement of water towards Bayberry Pond. The

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4 *Ibid.*



constructed wetland will also retain water adding to the substantial water holding capacity of the natural wetlands already surrounding the pond.

4.1.3 Water Quality Treatment

Both sediment/toxicant retention and nutrient removal are key components of a wetland's water quality treatment function. The design elements for both are similar as discussed below.

The ability of a wetland to provide treatment and attenuation of water-borne pollutants in surface runoff is a function of its size in relation to the watershed, the period of surface water detention or retention, and the density and type of vegetation within the wetland. The proposed wetlands will be supported by both groundwater and surface runoff during storm events, primarily from upslope areas including NH 125.

The present design provides for treatment of surface water through removal of suspended solids (sediments) and nutrients. As the flow velocity of surface water is reduced in the wetland through contact with vegetation, suspended solids will be trapped and deposited in the wetland. Any pollutants that are attached to the sediments will also be removed. Prolonged contact of water borne pollutants with the vegetation/soil interface as occurs in low gradient and ponded wetlands also encourages nutrient uptake by the plants and chemical breakdown of some pollutants through microbial activity.

Specific design elements intended to address these processes include⁵:

- Plant establishment with multi-stemmed wetland species that are well adapted to the specific planting zone enabling dense and productive vegetative establishment.
- Basin development with a constricted outlet to maximize retention time.
- Flat slopes that minimize the velocity of surface runoff into the wetland.
- Vegetated zones lined with highly organic soil amendments to increase toxicant retention efficiency.

4.1.4 Biological Productivity (including Wildlife Habitat)

The habitat value of the wetlands on the mitigation site varies widely. Wetlands immediately adjacent to NH 125 are relatively low in value due to the proximity of

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5 *Ibid.*

the highway and frequent disturbance. As one proceeds west, however, the wetlands become much more pristine with a much higher habitat quality.

The proposed design will enhance the biological productivity function so as to promote long-term biological health and diversity at the site. Basic site factors such as slope, basin configuration, water quality and quantity, water level variation, and substrate are important in terms of plant productivity, species composition, and system stability. Diversity in cover type and terrain, including vegetative layering, and open water-vegetation interspersions are all important factors influencing wildlife habitat value. Specific design elements which typically address biological productivity include⁶:

- Variable shape and grading to increase "edge effect" between zones.
- Creation of limited areas of open water interspersed with several vegetated classes to increase habitat diversity and interspersions.
- Plantings of trees, shrubs, and emergents arranged in separate and distinct clusters rather than concentric zones.
- Locating species within and among groupings according to their specific environmental requirements.
- Preservation of coarse woody debris in all salvaged topsoil to provide refuges for amphibian larvae and adults (e.g., mole salamanders and wood frogs).
- Provision of logs, stumps and boulders as hiding, perching, or loafing sites for wildlife.
- Planting of native species typical of natural or undisturbed wetlands in the region and which have high wildlife food value.
- Provision of a highly organic substrate (i.e., use of salvaged wetland topsoil or a clean compost mix with a high organic content) to increase primary productivity.
- Establishment of side slopes of 10:1 or less whenever practicable.

4.2 Design Constraints

The major design constraint on the mitigation site is the presence of steep slopes along NH 125. A large wetland basin can not be excavated as it would necessitate even steeper slopes in the transition from wetland to upland as one proceeds eastward towards NH 125. The presence of a number of very large, mature trees

6. Marble, A.D. 1990. A Guide to Wetland Functional Design. U.S. Department of Transportation, Federal Highway Administration. Report No. FHWA-IP-90-010. 230 pp.

having important wildlife value also limits any desire to clear and excavate a larger area for wetland creation. Both constraints were discussed in a joint site visit with the Army Corps on April 12, 2005. It was concluded that the goals of the mitigation should include both habitat restoration and wetland creation, instead of simply maximizing the acreage of created wetlands. It was also agreed that suitable benchmarks could be found in the nearby natural wetlands to establish grading elevations for the vegetation zones in the created wetlands.

4.3 Phased Construction

Phased development of the mitigation area so that it is concurrent with highway construction is necessary to facilitate the excavation and salvage of sufficient quantities of wetland humus and topsoil. A determination will also be made of the suitability of the excess borrow material from the mitigation site for use as fill for the highway widening and other planned improvements.

Construction of the mitigation area will require extensive grading. Care will need to be exercised in minimizing activities within the finish graded areas to prevent sedimentation and disturbance of substrate soil structure, e.g., compaction. Excavation can be performed at any time of year, however construction during the late summer will enable excavation to occur with minimal or no dewatering. Seepage of groundwater from side slopes may be more of a problem during the spring. Tree and shrub planting can be performed throughout the growing season if certain precautions relative to watering and pruning are followed. Bare-rooted or dormant woody stock will have to be planted in the spring. Herbaceous plants should also be planted in the spring. As the planting zones are excavated and finish grades established, additional erosion controls will need to be installed to prevent silt and sediment from accumulating in the specific zone. Sequencing and scheduling of excavation and planting will be up to the site contractor, however construction activities will incorporate the recommended planting windows as specified by NHDOT.

4.4 Construction Timing/Sequencing

As described above, the wetland mitigation will need to be completed in phases. A pre-construction conference will be held with the contractor, the NHDOT's site engineer, their wetlands consultant, and an Army Corps representative to ensure a thorough understanding of the construction plan. An example of the proposed construction sequence follows but is ultimately the responsibility of the contractor performing the mitigation construction.

1. Contact nursery to order plant stock and schedule delivery window. Provide adequate time for site preparation prior to scheduled delivery of plant materials.
2. Install erosion control measures between areas to be disturbed and existing wetlands and/or waterbodies.
3. Establish sub-grade contours within mitigation sites. Construct temporary drainage/dewatering structures as required. Contact Army Corps for inspection.
4. Remove wetland topsoil from areas of large wetland impact and stockpile onsite. Inspect these areas for invasive plants before salvaging the wetland topsoil.
5. Spread and till topsoil mix within areas to be planted, seed and install erosion control measures as necessary.
6. Initiate planting schedule as seasonally appropriate.
7. Develop as-built plans if required and conduct onsite inspection with Army Corps for their sign-off.
8. Complete permanent seeding and landscaping. Install temporary irrigation system if specified.
9. Initiate monitoring program.
10. Remove temporary erosion control measures after vegetation is established and the soils are stabilized.
11. Remove temporary irrigation system, if applicable, after 2 years.
12. Take remedial actions annually as necessary.

5

Hydrology

5.1 Water Budget Analysis

The hydrologic support for the proposed wetlands will be primarily groundwater, with the addition of surface runoff during storm events. The mitigation site sits atop a stratified drift aquifer with a veritable unlimited supply of water to support created wetlands. In addition, there is evidence onsite of side-slope seepage of groundwater, which is expected to occur as excavation occurs into the slope on parcel R5/Lot 20. This groundwater can be expected to have a "head," which will readily seep from the slope when the overlying soils are removed; i.e., similar to the small, side-hill seep containing cattails (see Photo 10) just upslope and slightly to the north of the recently constructed detention basin.

5.2 Groundwater Monitoring

With the above site characteristics in mind, no formal monitoring of groundwater elevations was considered necessary. The Soil Survey (SCS 1994) and soil borings conducted by NHDOT in 2003 provide additional information on the expected elevations of the water table for various areas and soil types onsite.

Considering the goals of the mitigation and the little risk involved with the design, NHDOT does not propose to conduct any future groundwater monitoring.

Site Design – Overview

6.1 Grading Plan

The grading plan for the mitigation site is shown in **Figure 3** and on Sheet 6 of the Construction Plan Set. Excavation of the wetland and upland/wetland transition zones will be one-foot lower than finish grades to accommodate the placement of wetland topsoil. A typical section or profile through the site is shown in **Figure 4**.

The proposed design calls for the construction of a mound-and-pool microtopography starting at the toe of the existing fill embankment adjacent to the natural wetland (at elevation 134.5) on the western side of the site. The topography then transitions into a gradual slope proceeding east towards NH 125. This proposed geomorphology is illustrated in **Figure 5**.

Excavation for the forested wetland zone will result in approximately 6.5 acre-feet of additional flood storage on the mitigation site.⁷

6.2 Soils Plan

The soils plan for the mitigation site is shown on Sheet 7 of the Construction Plan Set.

6.2.1 Requirements

The current Army Corps guidelines for wetland topsoil that require a 4-12 percent minimum organic content (9-21 percent organic matter) will be followed. A minimum of 12 inches will be applied in all wetland zones.

6.2.2 Proposed Source

Soils salvaged from wetlands impacted by the project and free of invasive species will be used to provide topsoil for the constructed wetlands. Should there be an

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⁷ Flood elevations for the Sullivan properties are not available from the standard sources like FEMA. For simplicity it was assumed that all of the soil volume excavated for the forested wetland zone provides additional flood storage if needed.



insufficient quantity available, a commercial supplier capable of manufacturing topsoil to the required specifications from clean leaf compost will be used. See additional discussion in Section 6.7 below.

6.3 Planting Plan

The planting plan for the mitigation site is shown on Sheet 8 of the Construction Plan Set.

6.3.1 Description of Community Types

The following elevations, along with the resulting acreages, were assumed for the respective zones within the mitigation site:

<u>Wetland Class/Habitat</u>	<u>Elevation (feet)</u>	<u>Acres Created</u>
Shrub/Forested Wetland	132.5-137.0	1.31
Upland/Wetland Transition	137.0-147.5	0.67
Upland Shrub/Forest	>147.5	0.88
Turtle Nesting Habitat		<u>0.07</u>
	Total	2.93

With the exception of the detention basin that has become a shallow marsh (see Photos 8-9), wetter habitat zones including open water and scrub-shrub were not designed as they would have necessitated deeper excavation with unavoidable steep side slopes. Because of the site's existing topography, a gradual transition into existing slopes would have been impossible with a deeper basin.

6.3.2 Species Lists by Types

The planting plan will give preference to native plant species already found in wetlands onsite. See Table 3-2. for a list of species compiled in the spring of 2006.

Table 6-2 provides a more complete list of species suitable for the various proposed vegetation zones that can be used to supplement the local list. The practicability of salvaging sod or root mats from wetlands that will be impacted by the highway construction (in addition to simply salvaging soils, see Section 6.2.2 above) will also be evaluated.



**Table 6-1
Proposed Plantings for the Various Zones Within the Mitigation Site**

Name	Indicator Status	Type/Size	Planting Density
Shrub/Forested Swamp			
Arrowwood (<i>Viburnum dentatum</i>)	FAC	container/2'-3'	6' o.c.
Winterberry Holly (<i>Ilex verticillata</i>)	FACW+	container/2'-3'	6' o.c.
Pussy Willow (<i>Salix discolor</i>)	FACW	container/2'-3'	6' o.c.
Silky Dogwood (<i>Cornus amomum</i>)	FACW	container/2'-3'	6' o.c.
Highbush Blueberry (<i>Vaccinium corymbosum</i>)	FACW	container/2'-3'	6' o.c.
Speckled Alder (<i>Alnus rugosa</i>) ²	FACW+	container/2'-3'	6' o.c.
Red Maple (<i>Acer rubrum</i>)	FAC	container/4'	9' o.c.
Swamp White Oak (<i>Quercus bicolor</i>)	FACW+	container/4'	9' o.c.
Green Ash (<i>Fraxinus pennsylvanica</i>)	FACW	container/4'	9' o.c.
Gray Birch (<i>Betula populifolia</i>)	FAC	container/4'	9' o.c.
Northern Arrowwood (<i>Viburnum recognitum</i>)	FACW-	container/2'-3'	6' o.c.
Steeple-bush (<i>Spirea tomentosa</i>)	FACW	container/2'-3'	6' o.c.
Upland/Wetland Transition			
American Cranberry (<i>Viburnum trilobum</i>) ¹	FACW	container/2'-3'	6' o.c.
Eastern Hemlock (<i>Tsuga canadensis</i>)	FACU	ball & burlap/5'	9' o.c.
Red-osier Dogwood (<i>Cornus sericea</i>)	FACW+	container/2'-3'	6' o.c.
Gray Dogwood (<i>Cornus racemosa</i>)	FAC	container/2'-3'	6' o.c.
Broad-leaved Meadow Sweet (<i>Spirea latifolia</i>)	FAC	container/2'-3'	6' o.c.
Eastern White Pine (<i>Pinus strobus</i>)	FACU	ball & burlap/3'	6' o.c.
Eastern White Pine (<i>Pinus strobus</i>)	FACU	3 gallon container/3'	6' o.c.
Nannyberry (<i>Viburnum lentago</i>)	FAC	container/2'-3'	6' o.c.
Witch Hazel (<i>Hamamelis virginiana</i>)	FAC-	container/2'-3'	6' o.c.
Red Maple (<i>Acer rubrum</i>)	FAC	container/4'	9' o.c.
Quaking Aspen (<i>Populus tremula</i>)	FACU	container/4'	6' o.c.
American Hazelnut (<i>Corylus americana</i>) ¹	FACU-	container/2'-3'	6' o.c.
Red Oak (<i>Quercus rubra</i>)	FACU-	bare root/ 2-1 trans.	9' o.c.
Chokecherry (<i>Prunus virginiana</i>)	FACU	container/2'-3'	6' o.c.
Grey Birch (<i>Betula populifolia</i>)	FAC	container/2'-3'	6' o.c.
River Bank Grape (<i>Vitis riparia</i>)	FACW	container/2'-3'	6' o.c.
Oblong-Leaf Service Berry (<i>Amelanchier canadensis</i>)	FAC	container/2'-3'	6' o.c.
Silky Dogwood (<i>Cornus amomum</i>)	FACW	container/2'-3'	6' o.c.
Black Chokeberry (<i>Aronia melanocarpa</i>)	FAC	container/2'-3'	6' o.c.
Upland Restoration/Enhancement			
Crab Apple (<i>Malus cultivars</i> - Indian Summer, Manchurian, Snowdrift, Profusion, or Golden Hornet) ¹	UPL	ball & burlap/3'	9' o.c.

Name	Indicator Status	Type/Size	Planting Density
Eastern Burning Bush (<i>Euonymus atropurpureus</i>)	FACU	ball & burlap/3'	6' o.c.
White Oak (<i>Quercus alba</i>) ¹	FACU-	ball & burlap/3'	9' o.c.
Eastern White Pine (<i>Pinus strobus</i>)	FACU	ball & burlap/3'	6' o.c.
Eastern White Pine (<i>Pinus strobus</i>)	FACU	3 gallon container/3'	6' o.c.
American Hazelnut (<i>Corylus americana</i>) ¹	FACU-	container/2'-3'	6' o.c.
Alternate-leaved Dogwood (<i>Cornus alterniflora</i>) ¹	UPL	container/2'-3'	6' o.c.
Red Oak (<i>Quercus rubra</i>) ¹	FACU-	container/2'-3'	9' o.c.
Shagbark Hickory (<i>Carya ovata</i>) ¹	FACU-	ball & burlap/3'	9' o.c.
Black Cherry (<i>Prunus serotina</i>) ¹	FACU	container/2'-3'	6' o.c.
Nannyberry (<i>Viburnum lentago</i>)	FAC	container/2'-3'	6' o.c.
Northern Bayberry (<i>Myrica pensylvanica</i>) ^{1,2}	FAC	container/2'-3'	6' o.c.
Cockspur Hawthorn (<i>Crataegus crus-galli</i>) ¹	FACU	container/2'-3'	6' o.c.
Sweet Fern (<i>Comptonia peregrina</i>) ²	UPL	1 gallon container	3' o.c.

1 Wildlife habitat improvement species.

2 Nitrogen fixing species.

During construction, seeding will take place immediately after the application of topsoil to ensure rapid coverage for the site. The seed bank within the transplanted soils will also contribute to this initial flush of vegetation. The Shrub/Forest Swamp Seed Mix (Table 6-2) will be applied to the wooded wetland zone and the lower portion of the upland/wetland transition zone. The Upland Zone Seed Mix (Table 6-3) will be applied to all re-graded upland areas. See details on Construction Plan Sheet 7.

Table 6-2
Shrub/Forest Swamp Seed Mix

Botanical Name	Common Name	Lbs/Acre
<i>Panicum virgatum</i>	Switch Grass	6.0
<i>Agrostis alba</i>	Redtop Grass	4.0
<i>Bidens frondosa</i>	Beggars Tick	1.0
<i>Leersia oryzoides</i>	Rice Cut Grass	0.75
<i>Eupatorium macculatum</i>	Joe-Pye-Weed	0.75
<i>Eupatorium perfoliatum</i>	Boneset	0.75
Total lbs/acre		13.25*

*Seeding Rate = 13.25 lbs. (Pure Live Seed)/Acre

**Table 6-3
Upland Zone Seed Mix**

Botanical Name	Common Name	Lbs/Acre
<i>Chrysanthemum leucanthemum</i>	Ox Eye Daisy	3.50
<i>Coreopsis lanceolata</i>	Lanceleaf Coreopsis	4.25
<i>Cichorium intybus</i>	Chicory	1.50
<i>Oenothera lamarckiana</i>	Evening Primrose	1.50
<i>Festuca rubra</i>	Creeping Red Fescue	8.00
<i>Giallardia pulchella</i>	Indian Blanket	3.75
<i>Hesperis matronalis</i>	Dames' Rocket	1.50
<i>Polygonum pensylvanicum</i>	Knotweed	1.50
<i>Rudbeckia hirta</i>	Black-eyed Susan	3.00
Total lbs/acre		28.50*

*Seeding Rate = 28.50 lbs (Pure Live Seed)/Acre

Both of the above seed mixes contain only native species, are appropriate for erosion control, and provide wildlife habitat value.

6.4 Irrigation and Special Requirements (Mulch)

Irrigation or regular watering for no longer than two years will be required to ensure high survival of the planted material. The bases of all woody stock will also be surrounded by mulch to preserve moisture.

6.5 Coarse Woody Debris and Rocks

During the salvage of wetland soils from impacted wetlands, every attempt will be made to also retrieve coarse woody debris like stumps with roots attached, fallen trees, etc. The goal will be to have at least 4 percent of the ground at the mitigation site covered with this woody debris. Since extensive open water and other very wet zones will not be present, a very limited number of boulders or large rocks will be collected and placed within the site.

6.6 Erosion Control

NHDOT's standards for erosion and sedimentation control will be followed during all phases of the wetland construction.

6.7 Invasive and Noxious Species

All the proposed plant stocks, including the seed mixes, are native or indigenous species. None of the species is found on the Army Corps' list of invasive species. In addition, all locations along the highway corridor that are identified for possible salvaging of wetland soil will be inspected by a wetland scientist to determine if they are free of invasives. Should invasive species be present, the site will be rejected and alternative locations sought.

Should insufficient topsoil be available, a commercial source such as Agresource Inc. (Amesbury, MA) will be sought. Suitable topsoil of a specified organic content can be manufactured from leaf compost that is typically available from municipalities during the fall season. Leaf compost has the advantage in that it is relatively "clean" or free from weed seeds that might include invasive species.

After construction, the wetland will be inspected twice per year for five years (see Section 7.0). If invasives are found they will be removed at the appropriate time in the growing season to prevent further propagation. Recommended protocols for removal published by NHDES and similar agencies will be followed.

6.8 Limitations on Off-Road Vehicle Use

The mitigation site will be signed to indicate that motorized vehicles are not allowed. A fence will also be installed on the northern and eastern boundaries to prevent unauthorized entry as these are the areas that would most likely provide an opportunity for access.

6.9 Preservation including Buffers

The current design ensures that a sufficient upland buffer to adjacent properties and the highway will exist on the southern and eastern sides of the site. The western side is contiguous with the extensive wooded wetland surrounding Bayberry Pond which provides a very effective buffer. On the northern side, mature trees will be preserved wherever practical to provide a screen and buffer to the adjacent business.

After construction of the wetlands, the entire mitigation site, including all unimpacted wetlands and upland, will be preserved in perpetuity. As required by the Corps *Guidance* document, the permittee (NHDOT) shall execute and record the preservation document with the Registry of Deeds for the Town of Kingston and the State of New Hampshire. A copy of the executed and recorded document will then be sent to the Corps of Engineers within 90 days of the date it was recorded.

NHDOT intends to ultimately transfer ownership of the parcels to the Town of Kingston with the appropriate deed restriction and conservation easement to ensure the entire 14.7-acre site remains protected.

Monitoring

During the first full growing season after construction, and for four subsequent years, the mitigation site will be evaluated at least once in the late spring/early summer and again in late summer/early fall. The observations will be compared to the Success Standards listed in the *Guidance For Mitigation Plan Checklist* (USACOE June 15, 2004). A formal post-construction assessment will also be performed after the fifth growing season.

As required by the Corps *Guidance* document, the following text is included herein.

7.1 Monitoring Plan Guidance

If mitigation construction is initiated in, or continues throughout the year, but is not completed by December 31 of any given year, the permittee (NHDOT) will provide the Corps, Policy Analysis and Technical Support Branch, a letter providing the date mitigation work began and the work completed as of December 31. The letter should be sent no later than January 31 of the next year. The letter must include the Corps permit number.

For each of the first five full growing seasons following construction of the mitigation site, the site shall be monitored. Observations will occur at least two times during the growing season – in late spring/early summer and again in late summer/early fall. Each annual monitoring report shall be submitted to the Corps, Regulatory Division, Policy Analysis and Technical Support Branch, no later than December 15 of the year being monitored. Failure to perform the monitoring and submit monitoring reports constitutes permit non-compliance. Each report coversheet shall indicate the permit number and report number (Monitoring Report 1 of 5, for example). The reports shall answer the following success-standard questions and shall address in narrative format the items listed after the questions. The reports shall also include the monitoring report appendices listed below. The first year of monitoring shall be the first year that the site has been through a full growing season after completion of construction and planting. For these special conditions, a growing season starts no later than May 31. However, if there are problems that will need to be addressed and if the measures to correct them require prior approval from

the Corps, the permittee shall contact the Corps by phone, email, or letter as soon as the need for corrective action is discovered.

Remedial measures shall be implemented at least two years prior to the completion of the monitoring period- to attain the success standards described below within five growing seasons after completion of construction of the mitigation site. Should measures be required within two years of the end of the monitoring period, the monitoring period will be extended to ensure two years of monitoring after the remedial work is completed. Measures requiring earth movement or changes in hydrology shall not be implemented without written approval from the Corps.

At least one reference site adjacent to or near each mitigation site will be described and shown on a locus map in the monitoring report.

7.2 Success Standards

The Success Standards as listed in the *Guidance* are described below and summarized in Table 7-1. These standards will be implemented by NHDOT for the Sullivan site as appropriate.

1) Does the site have at least 500 trees and shrubs per acre, of which at least 350 per acre are trees for proposed forested cover types, that are healthy and vigorous and are at least 18" tall in 75% of each planned woody zone AND at least the following number of non-exotic species including planted and volunteer species? Volunteer species should support functions consistent with the design goals. To count a species, it should be well represented on the site (e.g., at least 50 individuals of that species per acre).

<u># Species planted</u>	<u>Minimum # species required (volunteer and planted)</u>
2	2
3	3
4	3
5	4
6	4
7	5
8	5
9 or more	6

Vegetative zones consist of areas proposed for various types of wetlands (shrub swamp, forested swamp, etc.). The performance standards for density can be assessed using either total inventory or quadrat sampling methods, depending upon the size and complexity of the site.

2) Does each mitigation site have at least 80% areal cover, excluding planned open water or planned bare soil areas (such as turtle nesting), by noninvasive species? Do planned emergent areas on each mitigation site have at least 80% cover by noninvasive hydrophytes? Do planned scrub-shrub and forested cover types have at least 60% cover by noninvasive hydrophytes, of which at least 15% are woody species? For the purpose of this success standard, invasive species of hydrophytes are:

- Cattails – *Typha latifolia*, *Typha angustifolia*, *Typha glauca*;
- Common Reed – *Phragmites australis*;
- Purple Loosestrife – *Lythrum salicaria*;
- Reed canary Grass – *Phalaris arundinacea*; and
- Buckthorn – *Rhamnus frangula*

3) Are Common reed (*Phragmites australis*), Purple loosestrife (*Lythrum salicaria*), Russian and Autumn Olive (*Elaeagnus* spp.), Buckthorn (*Rhamnus* spp.), Japanese knotweed (*Polygonum cuspidatum*), and /or Multiflora rose (*Rosa multiflora*) plants at the mitigation site being controlled?

4) Are all slopes, soils, substrates, and constructed features within and adjacent to the mitigation site stabilized?

**Table 7-1
Success Standards and Criteria for the Mitigation Site.**

Success Standard	Criteria
1. 500 trees and shrubs per acre, and the minimum number of total species (planted and volunteer) as specified in the <i>Guidance</i> (2004)	At least 350 stems are species originally proposed for the forested zones, that are healthy and vigorous and ≥ 18 in. tall. Also, total number of species shall meet the requirements as listed in the <i>Guidance</i> .
2. 80% areal cover of the entire site by non-invasives (excluding open water or special bare soil areas, i.e., turtle nesting areas)	80% areal cover by non-invasives in emergent zones and 60% cover (of which 15% are woody species) in scrub-shrub and forested zones.
3. Common reed, purple loosestrife, Russian and autumn olive, and/or multiflora rose are controlled.	Absence of stems of these species on the site.
4. All slopes, soils, substrates and constructed features are stabilized	No evidence of sedimentation in runoff from the site during storms and all erosion control measures are in good condition.

7.3 Monitoring Report Narrative Requirements

Items for narrative discussion:

- Highlighted summary of problems that need immediate attention (e.g., problem with hydrology, severe invasives problem, serious erosion, major losses from herbivory, etc.). This should be at the beginning of the report.
- Dates work on each mitigation site began and ended.
- Describe the monitoring inspections that occurred since the last report.
- Soils data, commensurate with the requirements of the soils portion of the 1987 Corps Delineation manual (Technical Report Y-87-1) New England District data form, should be collected after construction and every alternate year through the monitoring period. If monitoring wells or gauges were installed as part of the project, this hydrology data should be submitted annually.
- Concisely describe remedial actions done during the monitoring year to meet the four success standards – actions such as removing debris, replanting controlling invasive plant species (with biological, herbicidal, or mechanical methods), regarding the site, applying additional topsoil or soil amendments, adjusting site hydrology, etc. Also describe any other remedial actions done at each site.
- Report the status of all erosion control measures on the compensation site. Are they in place and functioning? If temporary measures are no longer needed, have they been removed?
- Give visual estimates of (1) percent vegetative cover for each mitigation site and (2) percent cover of the invasive species listed under Success Standard No. 2, above, in each mitigation site.
- What fish and wildlife use the site and what do they use it for (nesting, feeding, shelter, etc.)?
- By species planted, describe the general health and vigor of the surviving plants, the prognosis for their future survival and a diagnosis of the cause(s) of morbidity or mortality.
- What remedial measures are recommended to achieve or maintain achievement of the four success standards and otherwise improve the extent

to which the mitigation site replace the functions and values lost because of project impacts?

Monitoring Report Appendices

Appendix A – A copy of this permit's mitigation special conditions and summary of the mitigation goals.

Appendix B – An as-built plan showing topography to 1-foot contours, any inlet/outlet structures and the location and extent of the designed plant community types (e.g., shrub swamp). Within each community type the plan shall show the species planted – but it is not necessary to illustrate the precise location of each individual plant. This is should be included in the final monitoring report unless there are grading modifications or additional plantings of different species in subsequent years.

Appendix C – A vegetative species list of volunteer species in each plant community type. The volunteer species list should, at a minimum, include those that cover at least 5% of their vegetative layer.

Appendix D – Representative photos of each mitigation site taken from the same locations for each monitoring event.

7.4 Post-Construction Assessment

As required by the Corps *Guidance* document, the following commitment is included herein:

A post construction assessment of the condition of the mitigation site shall be performed following the fifth growing season after completion of the mitigation site construction. "Growing season" in this context begins no later than May 31st. To ensure objectivity, the person(s) who prepared the annual monitoring reports shall not perform this assessment without written approval from the Corps. The assessment report shall be submitted to the Corps by December 15 of the year the assessment is conducted; this will coincide with the year of the final monitoring report, so it is acceptable to include both the final monitoring report and assessment in the same document.

The post-construction assessment shall include the four assessment appendices listed below and shall:



- Summarize the original or modified mitigation goals and discuss the level of attainment of these goals at each mitigation site (include vernal pool creation if that is a component of the mitigation).
- Describe significant problems and solutions during construction and maintenance (monitoring) of the mitigation sites(s).
- Identify agency procedures or policies that encumbered implementation of the mitigation plan. Specifically note procedures or policies that contributed to less success or less effectiveness than anticipated in the mitigation plan.
- Recommend measures to improve the efficiency, reduce cost, or improve the effectiveness of similar projects in the future.

Assessment Appendices

Appendix A – Summary of the results of a functions and values assessment of the mitigation site, using the same methodology used to determine the functions and values of the impacted wetlands.

Appendix B – Calculation of the area of wetlands in each mitigation site using the 1987 Corps Wetland Delineation Manual. Supporting documents shall include (1) a scaled drawing showing the wetland boundaries and representative transects and (2) data sheets for corresponding data points along each transect.

Appendix C – Comparison of the area and extent of delineated constructed wetlands (from Appendix B) with the area and extent of created wetlands proposed in the mitigation plan. This comparison shall be made on a scaled drawing or as an overly on the as-built plan. This plan shall also show the major vegetation community types.

Appendix D – Photos of each mitigation site taken from the same locations as the monitoring photos, including photos of vernal pools, if applicable.

7.5 Contingency Plans (Remedial Actions)

Careful mitigation planning coupled with accurate implementation is the key to mitigation success. However, unforeseen problems can arise. In order to ensure mitigation success, problems will have to be addressed and rectified as they arise. A contingency plan involves developing a list of proposed remedial measures (Table 7-2, adapted from NAI 1992).

Mitigation effectiveness can often be substantially improved through very simple measures. A list of potential problems can be developed based on the performance standards set forth in Section 7.2. In its simplest terms, remediation will take place if

standards are not met. However, the decision to invoke a contingency plan must be carefully evaluated. For example, it may not be practical to rectify a minor problem that could impair other functioning elements of the system. The performance standards may also prove to be unreasonable. Therefore decisions on remediation, if necessary, will be made on a case-by-case basis after consultation with the Army Corps.

**Table 7-2
Summary of Remedial Measures for Mitigation Deficiencies¹**

Deficiency	Remedial Measures
Final elevations not as planned	Regrade
Inadequate soil saturation/inundation after at least 1 full growing season	Regrade only if there is not a predominance of OBL, FACW, and FAC species
<50% hydrophytes	Supplement seeding/planting
Inadequate species composition	Supplement seeding/planting
Inadequate plant density	Fertilize, supplement seeding
Significant erosion	Install erosion control blankets or similar materials
<80% areal cover by non-invasives	Replant as necessary
Marginal tree/shrub vigor	Fertilize
Substantial human disturbance	Fencing, legal remedies
Significant wildlife depredation/damage	Trapping/relocation, netting
Presence of invasive plant species	Biocontrol, manual removal, systemic herbicide control (e.g., Rodeo)
Presence of archaeological resources	Notify SHPO and contract with an archaeological consultant to conduct investigation
Presence of hazardous waste	Notify NHDES and contract with a hazardous waste firm to determine extent of contamination

¹ Partially adapted from Normandeau Associates Inc. 1992. Wetland Mitigation Technical Report, Epping-Hampton, NHDOT Project 11324, F018-2(72). Bedford, NH. 72 pp.

8

Summary

The Sullivan Properties are one of the three components of the mitigation package described in the FEA for the Plaistow-Kingston Project. The goal of this package is to provide compensation for the unavoidable wetland impacts associated with the project, specifically the wetland functions and values that may be lost due to the proposed widening and other improvements along NH 125. The principal functions and values of the impacted wetlands are: groundwater recharge/discharge; floodflow alteration; sediment and toxicant retention; nutrient removal; and wildlife habitat.

The Sullivan Properties total 14.7 acres, of which approximately 12 acres will be left undisturbed by the proposed wetland creation and habitat restoration. Approximately 1.31 acres will be used for forested wetland creation, with an additional 0.67 acres for a transition zone from wetland to upland. A turtle nesting island (0.07 acres) with a "sandy beach" area will be constructed in the created wetland to further enhance wildlife habitat value. Selected upland areas (0.88 acres) will also be restored by regrading the site's existing steep slopes and replanting them, as well as other currently barren areas, with plant species of high wildlife value for food or cover. As recommended by the Corps, the proposed design attempts to preserve to the greatest extent practicable the mature trees presently growing on the site.

The stormwater detention basin, whose construction was completed in 2005, has also developed into an emergent marsh of approximately 0.24 acres. Although not its primary intent, this area provides additional habitat diversity on the mitigation site.

Hydrological support for the created wetlands will be provided primarily by groundwater inflow, with additional surface-water input during major storm events. The additional flood storage provided by the excavated wetlands is approximately 6.5 acre-feet.

The mitigation site will be monitored for five years with reports submitted annually to the Army Corps. Appropriate remedial actions, including the removal of invasive species, will be taken to correct deficiencies as they occur. Off-road vehicle access will be restricted through both signage and fencing.

0.0.

Photos



Sullivan Properties, Kingston, NH – July 2006



Photo 1. Upper portion of parcel R5/Lot 20, looking west from the edge of NH 125 showing the former paved parking area.



Photo 2. View back towards NH 125 looking east showing the existing driveway into the site.

Sullivan Properties, Kingston, NH – July 2006



Photo 3. Lower portion of parcel R5/Lot 20 looking west showing unpaved area formerly used for outdoor storage of construction materials.



Photo 4. Lower portion of R5/Lot 20 looking southeast. Abandoned propane tank in background.

Sullivan Properties, Kingston, NH – July 2006



Photo 5. Lower portion of parcel R5/Lot 20 looking south with natural wetland to right.



Photo 6. View of forested wetland bordering the disturbed area of previous photo.

Sullivan Properties, Kingston, NH – July 2006



Photo 7. Another view of the interior of the forested wetland.



Photo 8. Wet detention basin constructed on parcel R5/Lot 20 looking east towards NH 125 and Landscapers Depot.

Sullivan Properties, Kingston, NH – July 2006



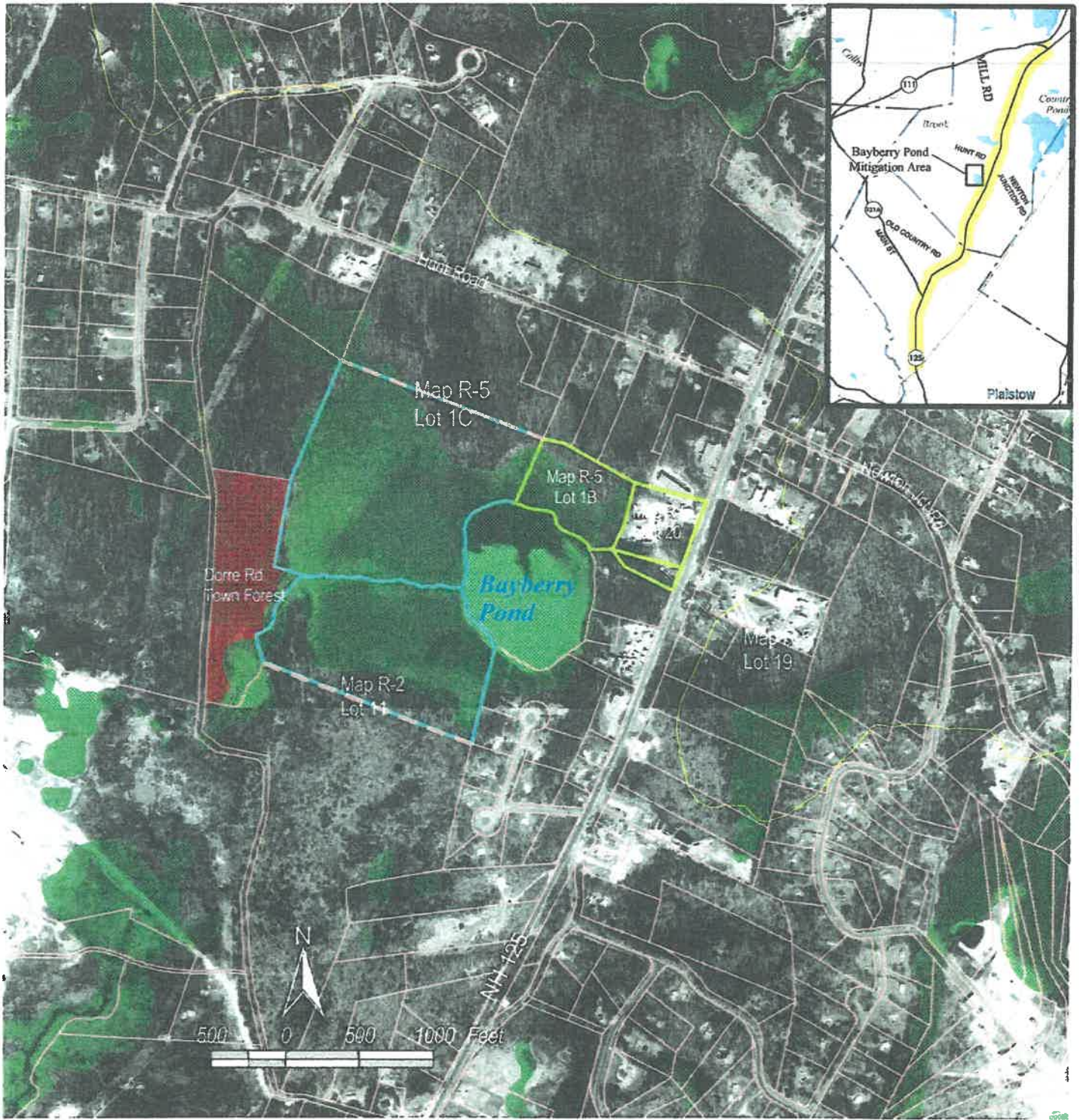
Photo 9. Headwall and overflow outlet pipes from wet detention basin. A second drain (to left of headwall) is set at a lower elevation and provides a continual flow through the basin.



Photo 10. Side-hill seep located just to the north of the wet detention basin.

Figures

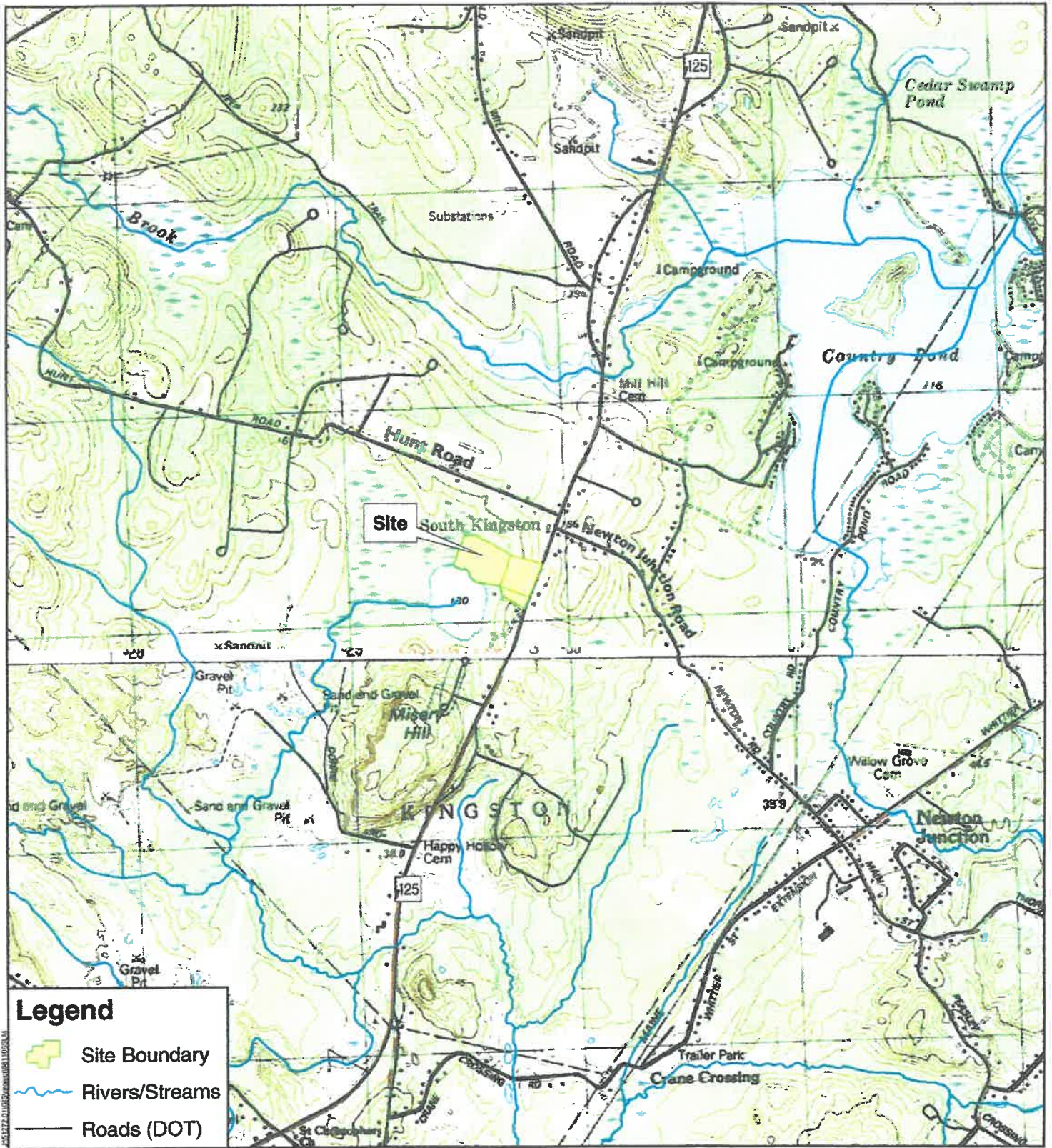




Vanasse Hangen Brustlin, Inc.

**Figure 1 - Aerial Photo
Sullivan Properties & Bayberry Pond
Kingston, New Hampshire**

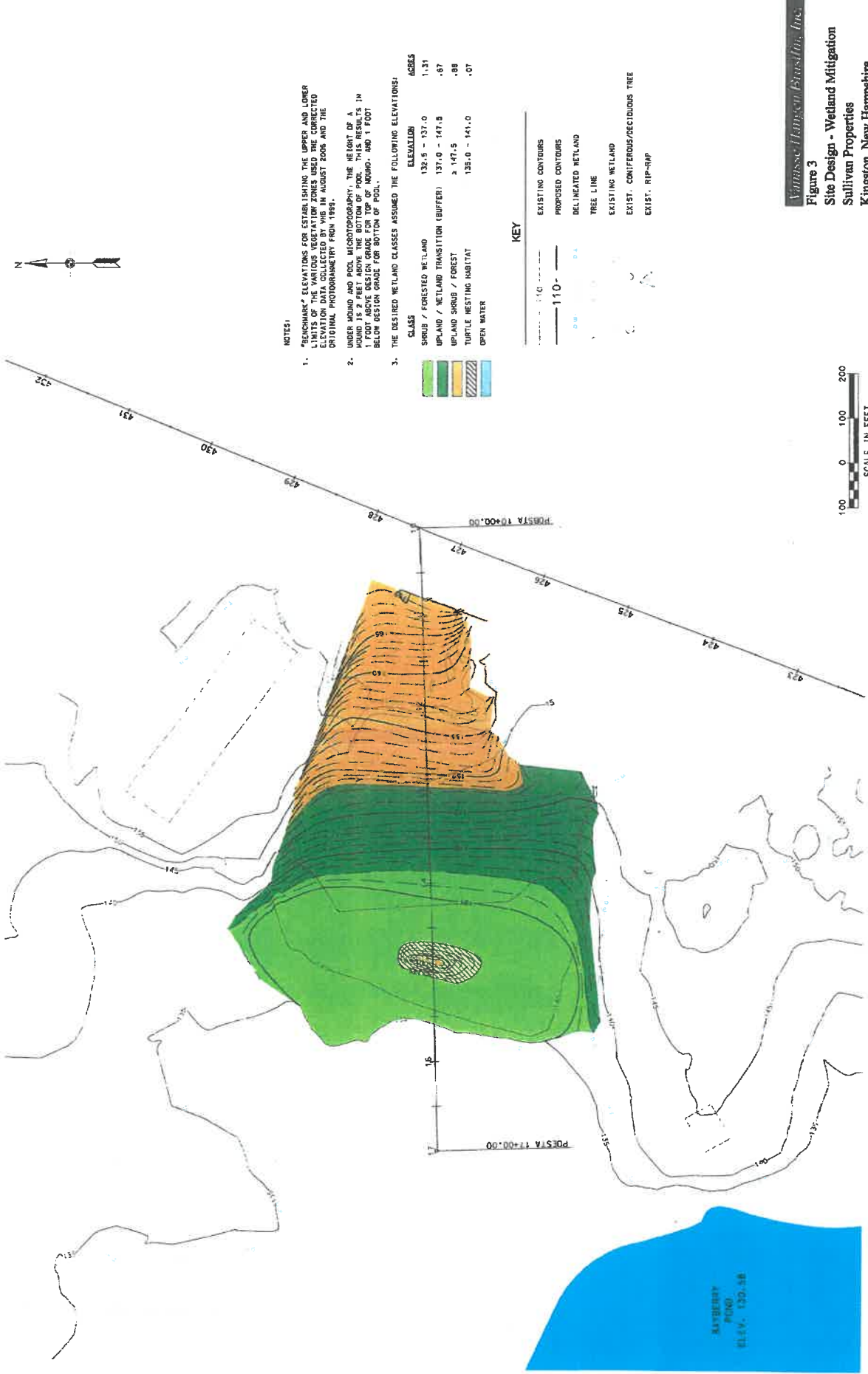
Note: Dashed lot lines represent portions of Map R-5/Lot 10 and R-2/Lot 11 that may be acquired for mitigation.
Aerial: 1998 B&W Digital Orthophoto, GRANIT GIS System



**Figure 2. Site Location Map
Sullivan Properties & Bayberry Pond
Kingston, New Hampshire**

South Burlington, Vermont

Source:
USGS Topo (Kingston Quad)



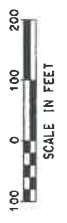
NOTES:

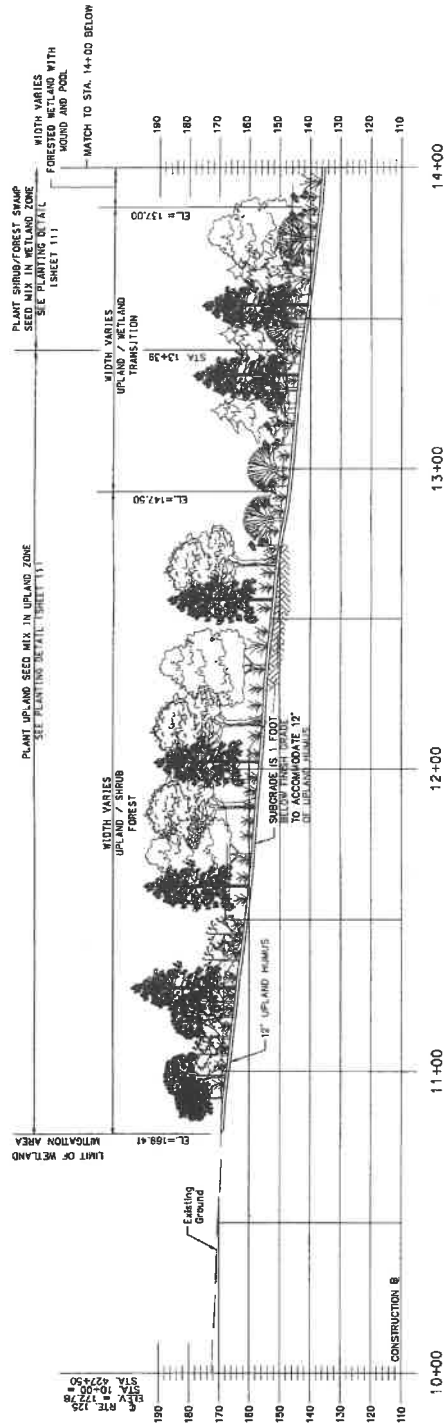
1. "BENCHMARK" ELEVATIONS FOR ESTABLISHING THE UPPER AND LOWER LIMITS OF THE VARIOUS VEGETATION ZONES USED THE CORRECTED ELEVATIONS OF THE BENCHMARK POINTS AS DETERMINED BY AUGUST 2005 AND THE ORIGINAL PHOTOGRAMMETRY FROM 1985.
2. UNDER MOUND AND POOL MICROTOPOGRAPHY, THE HEIGHT OF A MOUND OR POOL SHALL BE 1.0 FEET ABOVE THE DESIGN GRADE FOR TOP OF MOUND, AND 1 FOOT BELOW DESIGN GRADE FOR BOTTOM OF POOL.
3. THE DESIGN WETLAND CLASSES ASSUMED THE FOLLOWING ELEVATIONS:

CLASS	ELEVATION	ACRES
SHRUB / FORESTED WETLAND	132.5 - 137.0	1.31
UPLAND / WETLAND TRANSITION (BUFFER)	137.0 - 141.5	.67
UPLAND SHRUB / FOREST	3 147.5	.88
TURTLE NESTING HABITAT	135.0 - 141.0	.07
OPEN WATER		

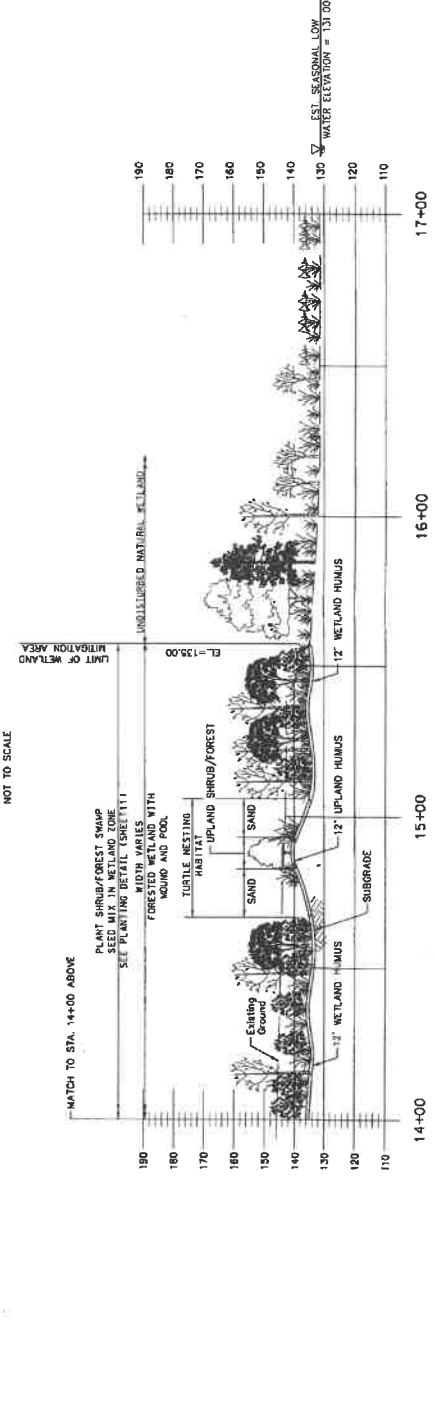
KEY

- EXISTING CONTOURS
- PROPOSED CONTOURS
- DELIMITED WETLAND
- TREE LINE
- EXISTING WETLAND
- EXIST. CONIFERUS/DECIDUOUS TREE
- EXIST. RIP-RAP





TYPICAL SECTION
(WESTERN END)
NOT TO SCALE



TYPICAL SECTION
(EASTERN END)
NOT TO SCALE

Vannasse Hangen Brustlin, Inc.
 Figure 4
 Typical Section - Mitigation Design
 Sullivan Properties
 Kingston, New Hampshire









Vanasse Hangen Brustlin, Inc.
Figure 5 Proposed Hydrogeomorphology

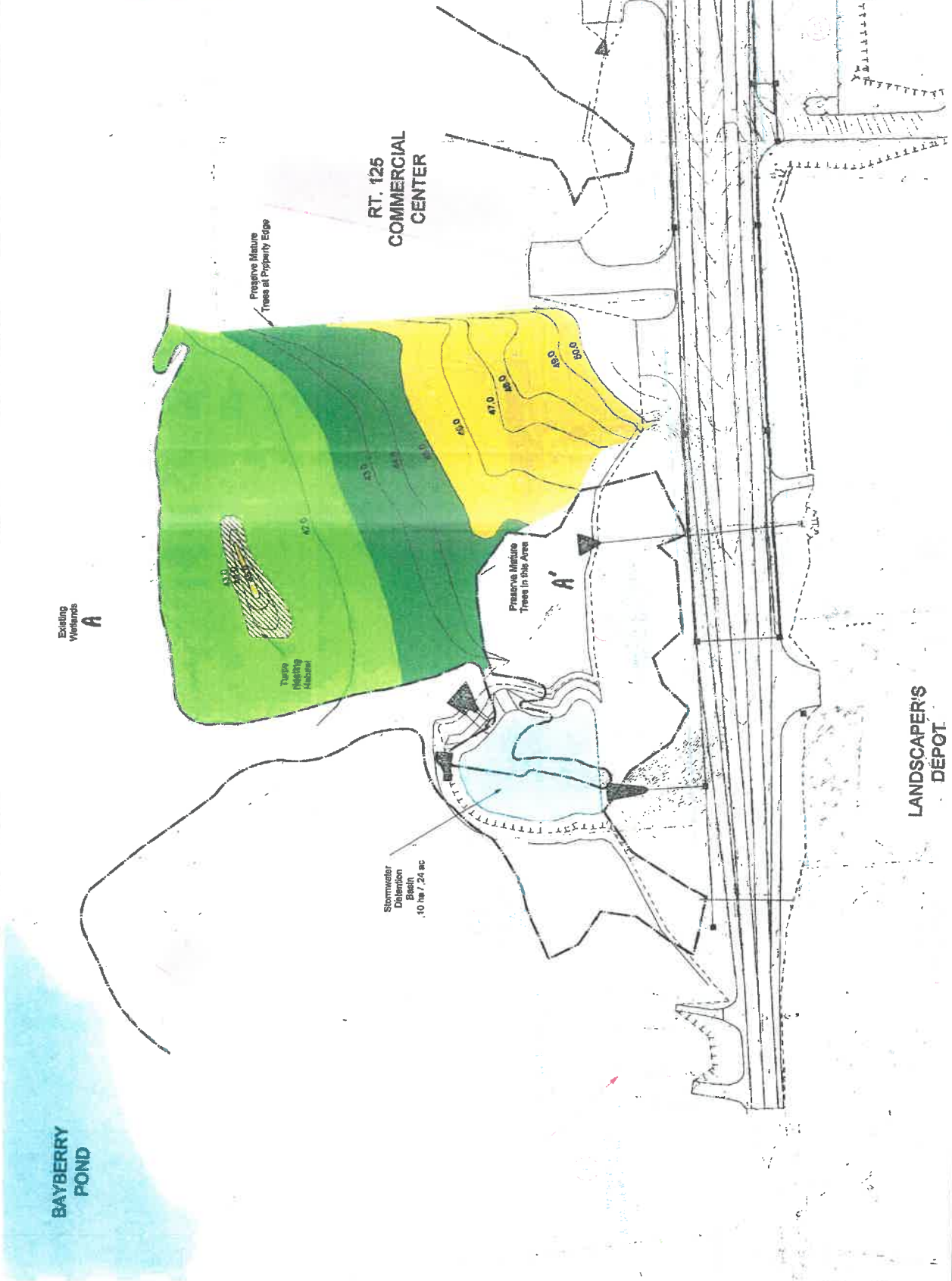
Appendices

-
- ▶ Appendix A — Original Concept Design
 - ▶ Appendix B — Soil Boring Logs
 - ▶ Appendix C — NEWILD Species Lists

**Appendix A — Original Concept
Design**

Legend:

	Forested Wetland Elev. = 41.00 - 42.50	Ht./Ac. 0.50 / 1.23
	Upland / Wetland Transition Elev. = 42.50 - 45.00	0.30 / 0.73
	Upland Shrub / Forest Elev. > 45.00	0.28 / 0.71
	Turtle Nesting Habitat 0.03 / 0.07	
	Existing Wetland Boundary	
	Open Water	

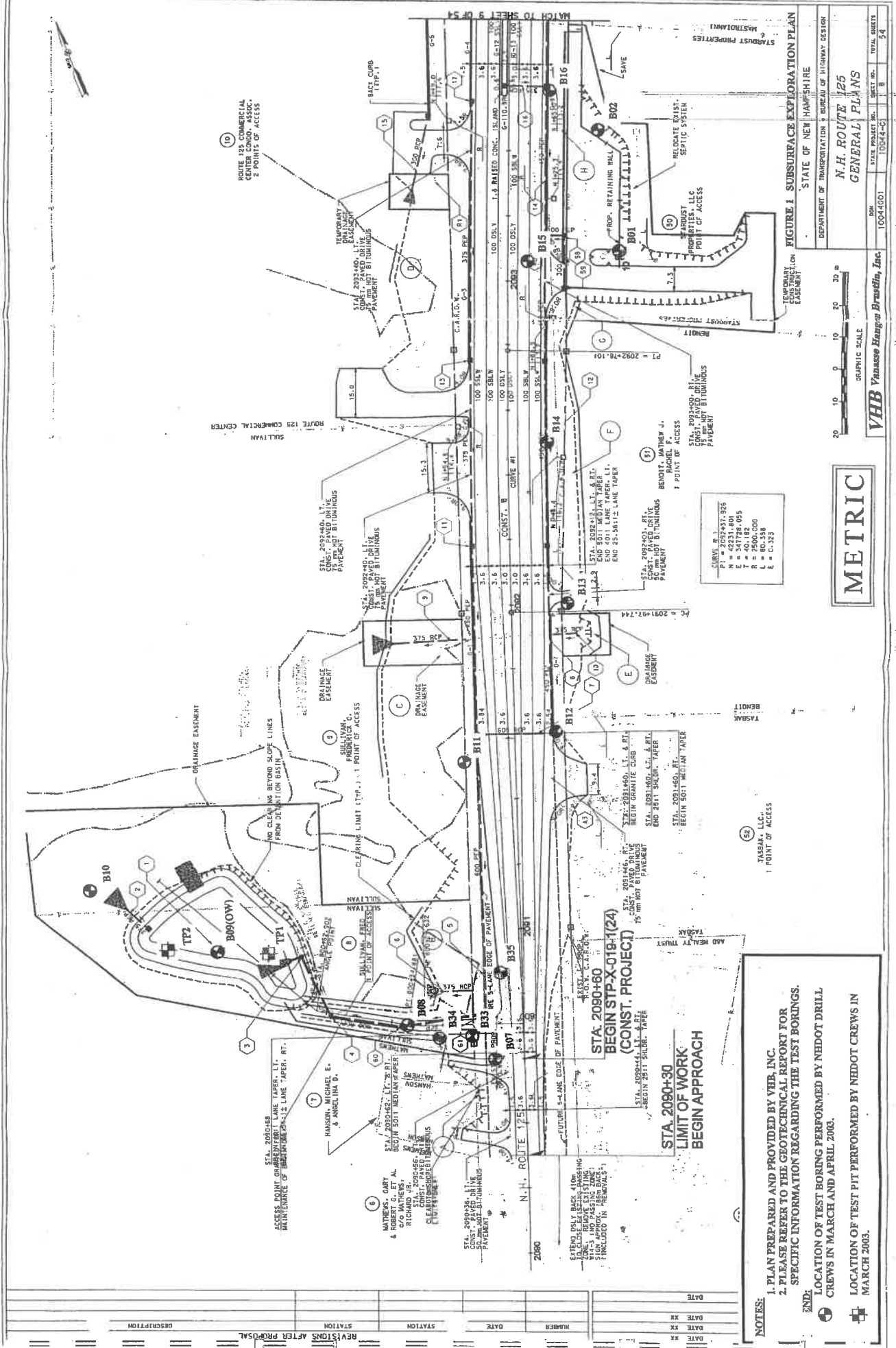


Ytasse Hansen Brustlin, Inc.
 Figure A-1
 Conceptual Mitigation Design
 Sullivan Properties (Map R5, Lot 20)
 Kingston, New Hampshire



Appendix B — Soil Boring Logs

Geotechnical Report
Route 125 at Hunt and Newton Junction Roads
Kingston 10044-C



STATE OF NEW HAMPSHIRE
 DEPARTMENT OF TRANSPORTATION & BUREAU OF HIGHWAY DESIGN
N.H. ROUTE 125
GENERAL PLANS

FIGURE 1 SUBSURFACE EXPLORATION PLAN
 CONTRACT NO. 10044601
 SHEET NO. 8
 TOTAL SHEETS 54

GRAPHIC SCALE
 20 10 0 10 20 30 m

VHB Vanasse Hangen Brustlin, Inc.

METRIC

CURVE # 1
 PI = 209247.926
 N = 42331.801
 E = 10111.095
 T = 40.182
 R = 2500.000
 L = 80.358
 E = 0.133

NOTES:
 1. PLAN PREPARED AND PROVIDED BY VHB, INC.
 2. PLEASE REFER TO THE GEOTECHNICAL REPORT FOR
 SPECIFIC INFORMATION REGARDING THE TEST BORINGS.
 END.
 LOCATION OF TEST BORING PERFORMED BY NHDOT DRILL
 CREWS IN MARCH AND APRIL, 2003.
 LOCATION OF TEST PIT PERFORMED BY NHDOT CREWS IN
 MARCH, 2003.

DATE	DESCRIPTION	STATION	NUMBER	DATE

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
 MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION
 PROJECT **KINGSTON 10044-C** BRIDGE NO. _____
 DESCRIPTION NH Route 125 at Hunt Road and Newton Junction Road



BORING NO. B08
 SHEET NO. 1 OF 1
 STA. 2090+71.1 OFF. Lt 35.11
 BASELINE Rt. 125
 ELEVATION (m) 48.71
 START/END 3/17/03 / 3/17/03
 DRILLER Jeff Kibbee
 INSPECTOR Richard Mechaber
 CLASSIFIER RAM
 NORTH/EAST 42088 / 347637

GROUNDWATER						EQUIPMENT	SAMPLER	CASING	CORE
DATE	TIME	DEPTH (m)	ELEVATION (m)	BOTTOM OF CASING	BOTTOM OF HOLE	TYPE:	S	NW	NX
						SIZE I.D. (mm):	34.9	75.2	47.6
						HAMMER WT. (kg):	63.5	DRILL RIG CME 45-C Track rig	
						HAMMER FALL (m):	0.76		
						HAMMER TYPE:	Automatic		

DEPTH (m)	STRATA CHANGE (m)	BOUNDARY ELEVATION (m)	BLOWS PER 0.15 m	SAMPLE NUMBER	SAMPLER RECOVERY (m) [%]	DEPTH RANGE (m)	FIELD CLASSIFICATION AND REMARKS	STRATA SYMBOL
0.0			1			0.00	Topsoil. (Cobble fragment recovered in spoon tip)	-TOPSOIL-
	0.61	48.10	2	S1	0.06 [10]			
			3			0.61		-PROBABLE GLACIAL OUTWASH-
1.5	1.52	47.19		C1	NR []	1.52	Advanced core barrel through probable boulder from 1.5-1.8m.	-GLACIAL TILL-
			7			1.83	Dense, medium brown, FINE to MEDIUM SAND, some gravel/cobble fragments/coarse sand, some silt.	
			15	S2	0.34 [55]	2.44	Water return lost at 2.9m (spin casing) Roller bit advanced rapidly from 2.59-2.74m Drill rig shook at 2.74m.	
3.0			20			3.05		-APPROXIMATE BEDROCK SURFACE-
	4.08	44.63	23	S3	0.37 [60]	3.66	Cobble fragments.	-GLACIAL TILL-
			25			4.11		
4.5				C2	1.37 [94]	5.58	Fine to medium grained biotite GRANITE. Massive, relatively unfractured (2 horizontal fractures and 1 vertical fracture in lower 1/3 of run). RQD=1.38/1.47=94%.	-GLACIAL TILL-
							Bottom of Exploration @ 5.58 m (EL. 43.13 m)	

Notes:
 "NR []" denotes not recorded.

TB-02 S:\GINT\PROJECTS\K10044\TB.GPJ BORING.GDT 6/26/2003 4:30:39 PM

Sampler	Identification	COHESIVE SOILS		NON-COHESIVE SOILS		Soil Descriptions	Proportion
		Blows/0.30m	Consistency	Blows/0.30m	Density		
S	Split Spoon	0 - 1	Very Soft	0 - 4	Very Loose	Capitalized Soil Name	Major Component
T	Thin Wall Tube	2 - 4	Soft	5 - 10	Loose	Lower Case Adjective	35% - 50%
U	Undisturbed Piston	5 - 8	Medium Stiff	11 - 24	Medium Dense	Some	20% - 35%
O	Open End Rod	9 - 15	Stiff	25 - 50	Dense	Little	10% - 20%
A	Auger Flight	16 - 30	Very Stiff	> 50	Very Dense	Trace	1% - 10%
C	Core Barrel	31 - 60	Hard				
		> 60	Very Hard				

METRIC

WOR - Weight of Rod
 WOH - Weight of Hammer

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
 MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION
 PROJECT **KINGSTON 10044-C** BRIDGE NO. _____
 DESCRIPTION **NH Route 125 at Hunt Road and Newton Junction Road**



BORING NO. B09(OW)

SHEET NO. 1 OF 1
 STA. 2090+95 OFF. Lt 92
 BASELINE Rt. 125
 ELEVATION (m) 45.94
 START/END 3/12/03 / 3/13/03
 DRILLER Jeff Kibbee
 INSPECTOR Richard Mechaber
 CLASSIFIER RAM
 NORTH/EAST 42,130 / 347,592

GROUNDWATER						EQUIPMENT	SAMPLER	CASING	CORE
DATE	TIME	DEPTH (m)	ELEVATION (m)	BOTTOM OF CASING	BOTTOM OF HOLE	TYPE	S	NW	NX
3/13	0930	2.53	43.41	na	8.23	SIZE I.D. (mm):	34.9	76.2	47.6
						HAMMER WT. (kg):	63.5	DRILL RIG CME 45-C Track rig	
						HAMMER FALL (m):	0.76		
						HAMMER TYPE:	Automatic		

DEPTH (m)	STRATA CHANGE (m)	BOUNDARY ELEVATION (m)	BLOWS PER 0.15 m.	SAMPLE NUMBER	SAMPLER RECOVERY (m) [%]	DEPTH RANGE (m)	FIELD CLASSIFICATION AND REMARKS	STRATA SYMBOL
0.0	0.15	45.78	4	2 1	S1	0.40 [65]	0.00 0.61	S-1B: V. loose, light brown, FINE SAND, trace medium to coarse sand. S-1A: V. loose, dark brown, organic FINE SAND and SILT (Topsoil). (0.15m) Casing advanced harder at 0.61m, much harder at 1.37m. Gravel and cobbles noted at 0.76m. -GLACIAL OUTWASH-
1.5	1.58	44.35	11	21 15	S2	0.40 [65]	1.58 2.19	
3.0			15	16 20	S3	0.46 [75]	3.05 3.66	-GLACIAL TILL-
4.5			22	57 105	C1	0.30 [67]	4.11 4.57	Advanced core barrel through probable boulder from 4.11-4.57m.
6.0			90/0.09		S4	0.49 [89]	4.57 5.12	Very dense, medium brown and rust-colored, FINE to COARSE SAND, little silt, little fine gravel.
7.5	6.55	39.38			C2	1.31 [90]	5.55 8.02	-APPROXIMATE BEDROCK SURFACE- Fine grained biotite SCHIST, moderately fractured (0.08-0.38m fracture spacing), fracture planes dipping approx. 20 degrees, fracture surfaces rusty. RQD=1.07/1.47=73%
8.02	8.02	37.92						Notes: 1. Please refer to observation well log for details regarding the well installation. Bottom of Exploration @ 8.08 m (EL. 37.85 m) 2. Please refer to Table 2 for groundwater level reading information.

TB-02, S:\GINTWP\PROJECTS\K10044\TB.GPJ BORING.GDT 7/11/2003 2:22:45 PM

Sampler	Identification	COHESIVE SOILS		NON-COHESIVE SOILS		Soil Descriptions Capitalized Soil Name Lower Case Adjective Some Little Trace	Proportion Major Component 35% - 50% 20% - 35% 10% - 20% 1% - 10%
		Blows/0.30m	Consistency	Blows/0.30m	Density		
S	Split Spoon	0 - 1	Very Soft	0 - 4	Very Loose		
T	Thin Wall Tube	2 - 4	Soft	5 - 10	Loose		
U	Undisturbed Piston	5 - 8	Medium Stiff	11 - 24	Medium Dense		
O	Open End Rod	9 - 15	Stiff	25 - 50	Dense		
A	Auger Flight	16 - 30	Very Stiff	> 50	Very Dense		
C	Core Barrel	31 - 60	Hard	WOR - Weight of Rod WOH - Weight of Hammer			
		> 60	Very Hard				

METRIC

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
 MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION
 PROJECT **KINGSTON 10044-C** BRIDGE NO. _____
 DESCRIPTION **NH Route 125 at Hunt Road and Newton Junction Road**



BORING NO. B10
 SHEET NO. 1 OF 1
 STA. 2091+15 OFF. Lt 130
 BASELINE Rt. 125
 ELEVATION (m) 43.39
 START/END 3/13/03 / 3/14/03
 DRILLER Jeff Kibbee
 INSPECTOR Richard Mechaber
 CLASSIFIER RAM
 NORTH/EAST 42162 / 347563

GROUNDWATER						EQUIPMENT	SAMPLER	CASING	CORE
DATE	TIME	DEPTH (m)	ELEVATION (m)	BOTTOM OF CASING	BOTTOM OF HOLE	TYPE:	S	NW	NX
3/14	1000	1.40	41.99	4.57	4.57	SIZE I.D. (mm):	34.9	76.2	47.6
						HAMMER WT. (kg):	63.5	DRILL RIG CME 45-C Track rig	
						HAMMER FALL (m):	0.76		
						HAMMER TYPE:	Automatic		

DEPTH (m)	STRATA CHANGE (m)	BOUNDARY ELEVATION (m)	BLOWS PER 0.15 m	SAMPLE NUMBER	SAMPLER RECOVERY (m) [%]	DEPTH RANGE (m)	FIELD CLASSIFICATION AND REMARKS	STRATA SYMBOL
0.0	0.12	43.27	1			0.00	S-1A: Topsoil (0.12m)	
			2	S1	0.27 [45]		S-1B: Loose, light brown, silty FINE SAND.	
			2				-GLACIAL OUTWASH-	
			1			0.61	Difficult drilling at 1.13m	
	1.13	42.26						
1.5			9			1.52	Dense, tan to rusty brown, FINE SAND, little gravel, little silt.	
			13	S2	0.43 [70]			
			13			2.13		
3.0			7			3.05	Similar to S2, except medium dense.	
			7	S3	0.46 [75]		-GLACIAL TILL-	
			8			3.55		
			15					
4.5			29			4.57	Very dense, grey-green, FINE to MEDIUM SAND, some silt, some gravel and cobble fragments.	
			37	S4	NR []			
			38			5.18		
			85					
6.0			41			6.10	Very dense, grey-brown, FINE to MEDIUM SAND, some silt, trace gravel/cobble fragments.	
			57	S5	0.49 [80]			
			58			6.71		
			60					
7.5			37			7.62	Tan, silty FINE SAND, little gravel. Spoon refusal on probable bedrock/boulder.	
			52	S6	NR []			
			150/0.12			8.05	Bottom of Exploration @ 8.05 m (EL. 35.34)	
							Notes:	
							"NR []" denotes not recorded.	

TB-02 S:\3\INT\PROJECTS\K10044\TB.GPJ BORING.GDT 6/23/2003 9:25:22 AM

Sampler	Identification	COHESIVE SOILS		NON-COHESIVE SOILS		Soil Descriptions	Proportion
		Blows/0.30m	Consistency	Blows/0.30m	Density		
S	Split Spoon	0 - 1	Very Soft	0 - 4	Very Loose	Capitalized Soil Name	Major Component
T	Thin Wall Tube	2 - 4	Soft	5 - 10	Loose	Lower Case Adjective	35% - 50%
U	Undisturbed Piston	5 - 8	Medium Stiff	11 - 24	Medium Dense	Some	20% - 35%
O	Open End Rod	9 - 15	Stiff	25 - 50	Dense	Little	10% - 20%
A	Auger Flight	16 - 30	Very Stiff	> 50	Very Dense	Trace	1% - 10%
C	Core Barrel	31 - 60	Hard			METRIC	
		> 60	Very Hard				

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
 MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION
 PROJECT **KINGSTON 10044-C** BRIDGE NO. _____
 DESCRIPTION NH Route 125 at Hunt Road and Newton Junction Road



BORING NO. B11
 SHEET NO. 1 OF 1
 STA. 2091+51.43 OFF. Lt 15.53
 BASELINE Rt. 125
 ELEVATION (m) 46.47
 START/END 3/18/03 / 3/19/03
 DRILLER Jeff Kibbee
 INSPECTOR Richard Mechabe
 CLASSIFIER RAM
 NORTH/EAST 42156 / 347683

GROUNDWATER						EQUIPMENT	SAMPLER	CASING	CORE
DATE	TIME	DEPTH (m)	ELEVATION (m)	BOTTOM OF CASING	BOTTOM OF HOLE	TYPE:	S	NW	NX
						SIZE I.D. (mm):	34.9	76.2	47.6
						HAMMER WT. (kg):	63.5	DRILL RIG	
						HAMMER FALL (m):	0.76	CME 45-C Track rig	
						HAMMER TYPE:	Automatic		

DEPTH (m)	STRATA CHANGE (m)	BOUNDARY ELEVATION (m)	BLOWS PER 0.15 m	SAMPLE NUMBER	SAMPLER RECOVERY (m) [%]	DEPTH RANGE (m)	FIELD CLASSIFICATION AND REMARKS	STRAT SYMBO
0.0			WOH			0.00	Topsoil	
			1	S1	0.15 [25]		-TOPSOIL-	
	0.91	45.56	2			0.61	Encountered probable boulder at 0.91m± depth.	
1.5			10	S2	0.43 [70]	1.52	Medium dense, light brown, FINE to MEDIUM SAND, some silt, little gravel.	
			7			2.13	-POSSIBLE WEATHERED GLACIAL TILL-	
3.0			6	S3	NR []	3.05	Medium dense, medium brown, FINE to MEDIUM SAND, little gravel, little silt.	
	3.66	42.82	9			3.66		
4.5			34	S4	0.34 [55]	4.57	Very dense, medium brown and rusty colored, FINE to COARSE SAND, some angular gravel, little silt.	
			21			5.18	-GLACIAL TILL-	
6.0	5.91	40.56		C1	1.46 [107]	5.91	-APPROXIMATE BEDROCK SURFACE-	
						7.28	Very fine grained GRANODIORITE. Upper 0.61m extremely fractured to gravel size pieces, with heavy rusting on fracture surfaces. Lower 0.91m± with 10± fractures, most chloritized, several with slickensides. RQD=0.55/1.46=38%	
							Bottom of Exploration @ 7.28 m (EL. 39.19)	

Notes:
 "NR []" denotes not recorded.

TB-02, S:\GINT\PROJECTS\K10044\TB.GPJ BORING.GDT 6/23/2003 9:28:26 AM

Sampler	Identification	COHESIVE SOILS		NON-COHESIVE SOILS		Soil Descriptions	Proportion
		Blows/0.30m	Consistency	Blows/0.30m	Density		
S	Split Spoon	0 - 1	Very Soft	0 - 4	Very Loose	Capitalized Soil Name	Major Component
T	Thin Wall Tube	2 - 4	Soft	5 - 10	Loose	Lower Case Adjective	35% - 50%
U	Undisturbed Piston	5 - 8	Medium Stiff	11 - 24	Medium Dense	Some	20% - 35%
O	Open End Rod	9 - 15	Stiff	25 - 50	Dense	Little	10% - 20%
A	Auger Flight	16 - 30	Very Stiff	> 50	Very Dense	Trace	1% - 10%
C	Core Barrel	31 - 60	Hard				
		> 60	Very Hard				

METRIC

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
 MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION
 PROJECT KINGSTON 10044-C BRIDGE NO. _____
 DESCRIPTION NH Route 125 at Hunt Road and Newton Junction Road



BORING NO. B33
 SHEET NO. 1 OF 1
 STA. 2090+67.29 OFF. Lt 15.6
 BASELINE Rt. 125
 ELEVATION (m) 48.84
 START/END 3/27/03 / 3/27/03
 DRILLER Jeff Kibbee
 INSPECTOR Richard Mechaber
 CLASSIFIER RAM
 NORTH/EAST 42077 / 347654

GROUNDWATER						EQUIPMENT	SAMPLER	CASING	CORE
DATE	TIME	DEPTH (m)	ELEVATION (m)	BOTTOM OF CASING	BOTTOM OF HOLE	TYPE:	S	NW	NX
						SIZE I.D. (mm):	34.9	76.2	47.6
						HAMMER WT. (kg):	63.5	DRILL RIG	
						HAMMER FALL (m):	0.75	CME 45-C Track rig	
						HAMMER TYPE:	Automatic		

DEPTH (m)	STRATA CHANGE (m)	BOUNDARY ELEVATION (m)	BLOWS PER 0.15 m	SAMPLE NUMBER	SAMPLER RECOVERY (m) [%]	DEPTH RANGE (m)	FIELD CLASSIFICATION AND REMARKS	STRATA SYMBOL
0.0	0.09	48.74	1			0.00	S-1A: Topsoil (0.09m) S-1B: Dark brown silty SAND, some gravel, trace organics. -GLACIAL TILL- Possible boulder at approximately 0.61m. Roller bit hard to 0.85m, then drill string dropped 0.01m± twice at 0.85m.	
			2 18 20/0.12	S1	0.24 [42]	0.58		
	0.85	47.98				0.85	-APPROXIMATE BEDROCK SURFACE- C-1: Medium grained, light gray biotite GRANITE, slight horizontal fabric, moderately fractured (every 0.09m±) at dips from 0 to 45±°, with one high angle, rusted fracture at 1.28m±. RQD=0.37/0.73=50%. Water return lost at 1.31m, return sporadic until 1.58m, at which point rock became harder.	
1.5						1.58	C-2: Medium grained, light gray biotite GRANITE with pink potassium feldspars; 3 to 4 fracture zones in upper 0.37m of recovery, then sound for next 0.30m, then severely fractured and rust-colored in bottom 0.18m. RQD=0.37/0.80=46% Bottom of Exploration @ 2.38 m (EL. 46.46)	
						2.38		
							Notes: Boring backfilled with bentonite chips from 2.26m (caved beneath) to 1.68m.	

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Sampler	Identification	COHESIVE SOILS		NON-COHESIVE SOILS		Soil Descriptions	Proportion
		Blows/0.30m	Consistency	Blows/0.30m	Density		
S	Split Spoon	0 - 1	Very Soft	0 - 4	Very Loose	Lower Case Adjective	35% - 50%
T	Thin Wall Tube	2 - 4	Soft	5 - 10	Loose	Some	20% - 35%
U	Undisturbed Piston	5 - 8	Medium Stiff	11 - 24	Medium Dense	Little	10% - 20%
O	Open End Rod	9 - 15	Stiff	25 - 50	Dense	Trace	1% - 10%
A	Auger Flight	16 - 30	Very Stiff	> 50	Very Dense		
C	Core Barrel	31 - 60	Hard				
		> 60	Very Hard				

METRIC

TEST BORING REPORT

STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION
MATERIALS & RESEARCH BUREAU - GEOTECHNICAL SECTION

PROJECT **KINGSTON 10044-C** BRIDGE NO. _____
DESCRIPTION **NH Route 125 at Hunt Road and Newton Junction Road**



BORING NO. **B34**

SHEET NO. **1** OF **1**

STA. **2090+66.88** OFF. **Lt 25.51**

BASELINE **Rt. 125**

ELEVATION (m) **48.54**

START/END **3/27/03 / 3/27/03**

DRILLER **Jeff Kibbee**

INSPECTOR **Richard Mechaber**

CLASSIFIER **RAM**

NORTH/EAST **42081 / 347644**

GROUNDWATER						EQUIPMENT	SAMPLER	CASING	CORE
DATE	TIME	DEPTH (m)	ELEVATION (m)	BOTTOM OF CASING	BOTTOM OF HOLE	TYPE:	S	NW	NX
3/28	0845	1.98	46.56	N/A	3.05	SIZE I.D. (mm):	34.9	76.2	47.6
						HAMMER WT. (kg):	63.5	DRILL RIG	
						HAMMER FALL (m):	0.76	CME 45-C Track rig	
						HAMMER TYPE:	Automatic		

DEPTH (m)	STRATA CHANGE (m)	BOUNDARY ELEVATION (m)	BLOWS PER 0.15 m	SAMPLE NUMBER	SAMPLER RECOVERY (m) [%]	DEPTH RANGE (m)	FIELD CLASSIFICATION AND REMARKS	STRATA SYMBOL
0.0	0.12	48.41	1			0.00	S-1A: Topsoil (0.12m) S-1B: Black silty gravelly SAND, with organics.	
			2	S1	NR []			
			4			0.61	-POSSIBLE GLACIAL OUTWASH-	
1.5	1.37	47.16				1.37	Begin NX core at 1.37m. NX barrel dropped in 0.01m± increments to 2.07m depth, then steady advance. Top 0.30m: Gravel/cobble fragments of various lithologies. (probable cobbles/boulders)	
	2.07	46.46		C1	0.73 [50]		-APPROXIMATE BEDROCK SURFACE- Bottom 0.43m: Medium grey, medium-grained biotite QUARTZITE, unfractured. RQD=0.42/1.46=29% (calculated on entire core run) Core barrel advanced rapidly 60mm at 2.59m+/-	
3.0	2.83	45.70				2.83	Medium grey, medium grained biotite muscovite GRANITE, moderately fractured, containing both angled and vertical fractures weathered rusty-colored. RQD=0.12/0.61=20%.	
				C2	0.43 [70]	3.44	Bottom of Exploration @ 3.44 m (EL. 45.09)	
							Notes: 1. "NR []" denotes not recorded. 2. Borehole backfilled with bentonite chips from 3.05m to 1.37m.	

Sampler	Identification	COHESIVE SOILS		NON-COHESIVE SOILS		Soil Descriptions	Proportion
		Blows/0.30m	Consistency	Blows/0.30m	Density		
S	Split Spoon	0 - 1	Very Soft	0 - 4	Very Loose	Capitalized Soil Name	Major Component
T	Thin Wall Tube	2 - 4	Soft	5 - 10	Loose	Lower Case Adjective	35% - 50%
U	Undisturbed Piston	5 - 8	Medium Stiff	11 - 24	Medium Dense	Some	20% - 35%
O	Open End Rod	9 - 15	Stiff	25 - 50	Dense	Little	10% - 20%
A	Auger Flight	16 - 30	Very Stiff	> 50	Very Dense	Trace	1% - 10%
C	Core Barrel	31 - 60	Hard				
		> 60	Very Hard				

METRIC

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**Appendix C — NEWILD Species
Lists**

NEWILD COMPUTER PROGRAM SEARCH RESULTS

The NEWILD computer program (Thomasma et al. 1998) was used to compile lists of vertebrate species potentially utilizing habitats in the Sullivan Properties Mitigation Area. The following habitats were searched:

1. Shrub Swamp
2. Red Maple
3. White Pine/Red Oak/Red Maple
4. Pond

Seasonal Use Symbols:

- B = Breeding season (amphibians and reptiles)
- B = Breeding season (birds and mammals)
- BF = Breeding and feeding (birds and mammals only)
- N = Winter (amphibians and reptiles)
- N = Winter (birds and mammals)
- NF = Winter feeding (birds and mammals only)
- On species list header, * = search restricted to preferred only

Utilized/Preferred symbols:

- x = utilized habitat
- + = preferred habitat

Forest size class symbols:

- S = Regeneration through seedlings
- Sp = Saplings through poletimber
- St = Sawtimber
- L = Large sawtimber
- U = Uneven-aged (Northern hardwoods only)
- On habitat list, x =size class selections

New England Wildlife - search results

Search Summary

The search was done using 1 nonforested habitat

Number of amphibians:	0
Number of reptiles:	0
Number of birds:	14
Number of mammals:	12
TOTAL:	26

Number of species included in search: 338
Total number of species in NEWILD: 338

All seasons selected (preferred only)

Seasonal use symbols:

B = Breeding season (amphibians and reptiles)
B = Breeding season (birds and mammals)
BF = Breeding and feeding (birds and mammals only)
N = Winter (amphibians and reptiles)
N = Winter (birds and mammals)
NF = Winter feeding (birds and mammals only)
on species list header, * = search restricted to preferred only

Utilized/Preferred symbols:

x = utilized habitat
+ = preferred habitat

New England Wildlife - search results

A search was done using the following habitat components:

Nonforested habitats:

Shrub swamp

The following wildlife species were found:

	B*	BF*	N*	NF*
Black-crowned Night-Heron	+			
Yellow-crowned Night-Heron	+			
Glossy Ibis	+			
Red-shouldered Hawk		+		
Common Snipe	+	+	+	+
Yellow-bellied Flycatcher	+	+		
Alder Flycatcher	+	+		
White-eyed Vireo	+	+		
Common Yellowthroat	+	+		
Hooded Warbler	+	+		
Song Sparrow	+	+		
Swamp Sparrow	+	+		
Common Grackle	+	+		
American Goldfinch	+	+		
Virginia Opossum		+		
Water Shrew	+	+	+	+
Little Brown Myotis		+		
Keen's Myotis		+		
Silver-haired Bat		+		
Eastern Pipistrelle		+		
Big Brown Bat		+		
Eastern Cottontail	+	+		
New England Cottontail	+	+	+	+
Snowshoe Hare	+	+		
Raccoon		+		
Lynx		+	+	+

New England Wildlife - search results

Search Summary

The search was done using 2 forested habitats

Number of amphibians:	7
Number of reptiles:	3
Number of birds:	24
Number of mammals:	7
TOTAL:	41

Number of species included in search: 338
Total number of species in NEWILD: 338

All seasons selected (preferred only)

Seasonal use symbols:

B = Breeding season (amphibians and reptiles)
B = Breeding season (birds and mammals)
BF = Breeding and feeding (birds and mammals only)
N = Winter (amphibians and reptiles)
N = Winter (birds and mammals)
NF = Winter feeding (birds and mammals only)
on species list header, * = search restricted to preferred only

Utilized/Preferred symbols:

x = utilized habitat
+ = preferred habitat

Forest size class symbols:

S = Regeneration through seedlings
Sp = Saplings through poletimber
St = Sawtimber
L = Large sawtimber
U = Uneven-aged (Northern hardwoods only)
on habitat list, x = size class selections

New England Wildlife - search results

A search was done using the following habitat components:

Forested habitats (all seasons selected - preferred only)	Sp	St	L	U
Red maple	x	x		

The following wildlife species were found:

	B*	BF*	N*	NF*
Marbled Salamander	+			
Jefferson Salamander	+			
Spotted Salamander	+			
Mountain Dusky Salamander	+			
Slimy Salamander	+			
Four-toed Salamander	+			
Northern Spring Salamander	+			
Five-lined Skink	+			
Eastern Ribbon Snake	+			
Northern Ringneck Snake	+			
Green-backed Heron	+			
Red-shouldered Hawk	+	+		
Broad-winged Hawk	+			
American Woodcock	+			
Eastern Screech-Owl	+	+	+	+
Great Horned Owl	+			
Northern Saw-whet Owl	+		+	
Ruby-throated Hummingbird	+	+		
Red-headed Woodpecker	+	+	+	+
Downy Woodpecker	+	+	+	+
Hairy Woodpecker	+	+	+	+
Least Flycatcher	+	+		
Tree Swallow	+			
Blue Jay	+			
Carolina Wren	+	+	+	+
Winter Wren	+	+		
Blue-gray Gnatcatcher	+	+		
Veery	+	+		
Yellow-throated Vireo	+	+		
Warbling Vireo	+	+		
Yellow-rumped Warbler	+	+		
Northern Waterthrush	+	+		
Louisiana Waterthrush	+	+		
American Goldfinch			+	+
Virginia Opossum	+	+	+	+

	B	BF	N	NF
Beaver		+		+
Woodland Jumping Mouse	+	+	+	
Gray Fox	+	+	+	+
Raccoon	+	+	+	+
Mink	+	+	+	+
Moose		+	+	+

New England Wildlife - search results

Search Summary

The search was done using 3 forested habitats

Number of amphibians:	0
Number of reptiles:	7
Number of birds:	35
Number of mammals:	8
TOTAL:	50

Number of species included in search: 338
Total number of species in NEWILD: 338

All seasons selected (preferred only)

Seasonal use symbols:

- B = Breeding season (amphibians and reptiles)
- B = Breeding season (birds and mammals)
- BF = Breeding and feeding (birds and mammals only)
- N = Winter (amphibians and reptiles)
- N = Winter (birds and mammals)
- NF = Winter feeding (birds and mammals only)
- on species list header, * = search restricted to preferred only

Utilized/Preferred symbols:

- x = utilized habitat
- + = preferred habitat

Forest size class symbols:

- S = Regeneration through seedlings
- Sp = Saplings through poletimber
- St = Sawtimber
- L = Large sawtimber
- U = Uneven-aged (Northern hardwoods only)
- on habitat list, x = size class selections

New England Wildlife - search results

A search was done using the following habitat components:

Forested habitats (all seasons selected - preferred only)	Sp	St	L	U
White pine / Red oak / Red maple	x	x	x	

The following wildlife species were found:

	B*	BF*	N*	NF*
Eastern Box Turtle	+			
Northern Redbelly Snake	+			
Eastern Hognose Snake	+			
Eastern Worm Snake	+			
Northern Black Racer	+			
Black Rat Snake	+			
Northern Copperhead	+			
Turkey Vulture	+			
Sharp-shinned Hawk	+	+	+	+
Cooper's Hawk	+	+	+	+
Broad-winged Hawk	+			
Red-tailed Hawk	+			
Wild Turkey	+		+	+
Northern Bobwhite			+	+
Mourning Dove	+			
Black-billed Cuckoo	+	+		
Yellow-billed Cuckoo	+	+		
Barred Owl	+	+	+	+
Northern Saw-whet Owl			+	
Whip-poor-will	+	+		
Red-headed Woodpecker	+	+	+	+
Red-bellied Woodpecker	+	+	+	+
Downy Woodpecker	+	+	+	+
Northern Flicker	+			
Pileated Woodpecker	+	+	+	+
Least Flycatcher	+	+		
Blue Jay	+	+	+	+
American Crow	+			
Tufted Titmouse	+	+	+	+
White-breasted Nuthatch	+	+	+	+
Blue-gray Gnatcatcher	+	+		
Hermit Thrush			+	+
Wood Thrush	+	+		
Yellow-throated Vireo	+	+		
Cerulean Warbler	+	+		

	B	BF	N	NF
Black-and-white Warbler	+	+		
Worm-eating Warbler	+	+		
Ovenbird	+	+		
Common Yellowthroat	+	+		
Scarlet Tanager	+	+		
Rose-breasted Grosbeak	+	+		
Rufous-sided Towhee	+	+		
Virginia Opossum			+	
Gray Squirrel	+	+	+	+
Southern Flying Squirrel	+	+	+	+
Northern Flying Squirrel	+	+	+	+
White-footed Mouse	+	+	+	+
Southern Red-backed Vole	+	+	+	+
Gray Fox	+	+	+	+
Black Bear	+	+		

New England Wildlife - search results

Search Summary

The search was done using 1 nonforested habitat

Number of amphibians:	9
Number of reptiles:	4
Number of birds:	0
Number of mammals:	9
TOTAL:	22

Number of species included in search: 338

Total number of species in NEWILD: 338

All seasons selected (preferred only)

Seasonal use symbols:

B = Breeding season (amphibians and reptiles)

B = Breeding season (birds and mammals)

BF = Breeding and feeding (birds and mammals only)

N = Winter (amphibians and reptiles)

N = Winter (birds and mammals)

NF = Winter feeding (birds and mammals only)

on species list header, * = search restricted to preferred only.

Utilized/Preferred symbols:

x = utilized habitat

+ = preferred habitat

New England Wildlife - search results

A search was done using the following habitat components:

Nonforested habitats:

Pond

The following wildlife species were found:

	B*	BF*	N*	NF*
Jefferson Salamander	+			
Silvery Salamander	+			
Blue-spotted Salamander	+			
Tremblay's Salamander	+			
Spotted Salamander	+			
Fowler's Toad	+			
Northern Spring Peeper	+			
Bullfrog	+			
Pickereel Frog	+			
Common Snapping Turtle			+	
Stinkpot			+	
Red-eared Slider			+	
Eastern Painted Turtle			+	
Water Shrew	+	+	+	+
Little Brown Myotis		+		
Keen's Myotis		+		
Silver-haired Bat		+		
Eastern Pipistrelle		+		
Big Brown Bat		+		
Beaver	+	+	+	+
Mink	+	+	+	+
Moose		+		

08/18/2015

Plaistow-Kingston 10044-G, DES Permit #2004-00736

Wetlands Mitigation Summary/Proposal

Overall Project Impact/Mitigation History: In March of 2007 the Department of Transportation (DOT) was permitted 195,572 sq. ft. (4.49 acres) of impact for all contract phases of the Plaistow-Kingston project. Specifically contracts D, E, F, G, and I. At that time, a mitigation package was provided for the overall project based on the permitted impacts per contract, and consisted of various land preservation areas and a wetland restoration site. The mitigation package also included mitigation for impacts to wetlands from the Plaistow 10005, Plaistow-Kingston 10044C (an early project broken out of the 10044B projects), and the Plaistow-Atkinson 12359 projects.

Moving Forward: Project contracts D and F have been constructed. Impacts from these contracts are specified in the "Plaistow-Kingston (Project # 10044) Wetland Impact Summary Sheet" attached. The DOT wishes to recognize that it has met its mitigation obligation for these constructed projects based on the permitted impacts thus far. However, any on-going or future contracts such as E, G, or I will require additional mitigation if they go over their original permitted impacts. The Department proposes to do this via payment into the ARM Fund for any overages. If no overage occurs for a contract, no further mitigation will be required.

Specific to Plaistow-Kingston 10044-G contract:

(responses #4 through #6 specific to July 29, 2015 email from Gino Infascelli)

1. The Department is proposing to mitigate the increased impacts associated with the 10044G contact, totaling 28,071 sq. ft. (0.64 acres), via an ARM Fund payment in the amount of \$135,507.71. See attached "Plaistow-Kingston, 10044G – Wetland Impacts for ARM Fund Mitigation" table and the "DES ARM Fund Wetland Payment Calculation Plaistow-Kingston, 10044G" sheet.
2. The need for the increased impacts is a result of accommodating design constraints not previously known at the time of the original permit. These design constraints include adjustments to the alignment of the Service Road to avoid an existing private water quality detention pond (BMP), a well, and two (2) existing septic systems, and; to accommodate the replacement of a 3rd septic system.
3. In recognition of NH Department of Environmental Services (DES) concerns for impacting wetlands outside of the areas originally permitted, the Department has eliminated from the project a multi-drive connection to the south end of the service road that was requested by the Town of Plaistow.
4. To address DES' question on the need for sheet piling west of STA 109 to 110+50. Test borings drilled in this area by DOT's Bureau of Materials & Research has determined that muck ,to the extent indicated below, was not encountered in any of these borings and any muck present in the bottom of the pond is expected to be surficial. Muck is

considered unsuitable for supporting an embankment and will need to be removed in accordance with Section 203.3.6.1 "Removal and Replacement of Unsuitable Material" of DOT's Standard Specifications. With the muck removed, lateral spreading outside the embankment footprint is not a concern.

5. The DOT's Bureau of Highway Design has evaluated, as requested by DES, the addition of cross-pipes at stations 111+30 and 112+40. Cross-pipe configurations attempting to connect the two sides of the Service Road cannot be done under the current drainage design. The drainage pipes carrying runoff to the Wet-Extended Detention Basin, located at the south end of the Service Road, cannot be lowered to the extent needed to provide cross-pipes under the Service Road.
6. Regarding request by DES for topography plans, the permit and previous Plaistow-Kingston wetland plans did not require submission of contour plans. As such, no provisions were made by DOT in its contract with VHB, the engineering consulting firm hired to finalize the design of the project. Additionally, at this late stage of the contract no funds are left in the contract with VHB to provide for the development and engineering of these plans.

Amendment Discussion - The DOT is requesting an Amendment to Wetland Bureau permit # 2004-00736 to provide for 28,861 square feet (0.66 acres) of additional impacts for the Plaistow-Kingston, 10044G contract. Furthermore, DOT requests concurrence from DES on this mitigation proposal in regards to the approach for mitigation of future overages per contract phases, as well as concurrence for the current overage of the "10044G" contract with an ARM Fund payment by DOT in the amount of \$135,507.71.

PLAISTOW - KINGSTON (Project #10044)

Wetland Impacts Summary

Impact Area Number	Wetland ID Code	PROJECT STATUS		FINAL PLANS		FINAL PLANS		FINAL PLANS		SLOPE & DRAIN		PRELIMINARY		PROPOSED IMPACT CONSTRUCTED PROJECTS (Contracts D, F, G)	PROPOSED IMPACT TOTAL FOR PROJECTS NOT YET PERMITTED (Contracts E & I)	DIFFERENCE (Proposed - Permitted)	
		Permit	Total Wetland Impact Area	Contract 10044D	Contract 10044F	Contract 10044G	Contract 10044G	Contract 10044E	Contract 10044I	square meters (square feet)	square meters (square feet)	square meters (square feet)	square meters (square feet)				square meters (square feet)
1	A	24.2	(250)														
2	AA	1.5	(15)														
3	C	68.6	(936)														
4	EE	68.6	(737)														
5	EE	492.1	(4659)														
6	EE	214.3	(2853)														
7	EE	109.8	(1161)														
8	H	92.7	(997)														
9	I	53.1	(571)														
10	J	233.2	(2599)														
11	J	46.9	(505)														
12	DD	5.3	(57)														
13	CC	198.4	(2134)														
14	CC	198.4	(2134)														
15	CC	306.1	(3283)														
16	X	2.3	(25)														
17	CC	198.4	(2134)														
18	CC	198.4	(2134)														
19	CC	410.0	(4413)														
20	DB	537.4	(5794)														
21	DA	169.7	(1823)														
22	AAA	1065.4	(11464)														
23	ZZ	926.3	(10094)														
24	YY	729.5	(7854)														
25	YY	729.5	(7854)														
26	XX	391.8	(4216)														
27	O	47.0	(506)														
28	IS	392.3	(4216)														
29	IS	392.3	(4216)														
30	P	6.7	(72)														
31	P	53.2	(573)														
32	WW	3.3	(35)														
33	WW	12.3	(133)														
34	Q	61.4	(660)														
35	T	37.7	(405)														
36	PP	52.8	(568)														
37	PP	52.8	(568)														
38	PP	664.8	(7133)														
39	V	1111.1	(11953)														
40	V	170.9	(1839)														
41	W	45.9	(494)														
42	W	45.9	(494)														
43	W	10.0	(108)														
44	RR	227.9	(2452)														
45	X	146.9	(1581)														
46	X	146.9	(1581)														
47	X	88.4	(951)														
48	Y	0.9	(9)														
49	D	974.7	(10447)														
50	D	974.7	(10447)														
503A	PR2	144.6	(1556)														
503B	PR2	144.6	(1556)														
1004A	GOG	190.3	(2051)														
1004B	FR2	202.8	(2194)														
1006	E	202.8	(2194)														
1006A	FR2	202.8	(2194)														
1007	FR2	202.8	(2194)														
1009	L	1512.9	(16200)														
1010/1012	M	1537	(16533)														
1010	R	1537	(16533)														
1012	RS	241.8	(2603)														
1012	K	241.8	(2603)														
TOTALS	Subtotal	20055.4	(216330)	2732.8	(29033)	1699.0	(20429)	5675.6	(61134)	7957.9	(85013)	3495.4	(37654)	13352.3	(142839)	1175.2	(12692)
TOTALS	Subtotal	2.6	(437)	0.2	(6452)	0.2	(6427)	0.6	(1420)	0.0	(0.02)	0.3	(0.86)	1.0	(2.45)	0.1	(0.27)

TOTAL WETLAND IMPACTS	
PERMANENT IMPACTS	9183.9
TEMPORARY IMPACTS	11933.3
TOTAL	21127.9

Note: Due to rounding, impact measurements may not convert exactly between metric and English equivalents.
 1 - PPM includes areas classified as PMS1W, PMS1C, PMS1E, PMS1I, and PMS1W.
 2 - PPM includes areas classified as PMS1D and PMS1E.
 3 - PMS includes areas classified as PMS1W, PMS1C, PMS1E, PMS1I, and PMS1W.
 4 - PPM includes areas classified as PMS1H.
 5 - PMS includes areas classified as PMS1W, PMS1C, PMS1E, PMS1I, and PMS1W.
 * Impact area is compiled under more than one contract.

Assumed Wetland ID Code based on the area of impact compared to FEA.
 Portion of project containing this wetland has not been designed yet. Permit areas used.

Brown, Joshua

From: Jean Brochi
Sent: Friday, January 26, 2024 2:21 PM
To: Laurin, Marc
Cc: OSullivan, Andrew
Subject: RE: Plaistow-Kingston, 10044E - Concurrence on Mitigation

EXTERNAL: Do not open attachments or click on links unless you recognize and trust the sender.

Hi Mark and Andrew,

I have not confirmed mitigation on this project as I am coordinating through Corps on a separate timeline than state.

I will expedite my review once I have all of the documentation needed.

Thanks, Jeannie

From: Laurin, Marc <marc.g.laurin@dot.nh.gov>
Sent: Wednesday, November 15, 2023 11:28 AM
To: Brochi, Jean <Brochi.Jean@epa.gov>
Cc: OSullivan, Andrew <Andrew.M.OSullivan@dot.nh.gov>
Subject: RE: Plaistow-Kingston, 10044E - Concurrence on Mitigation

Caution: This email originated from outside EPA, please exercise additional caution when deciding whether to open attachments or click on provided links.

Jean,

Can you confirm EPA's concurrence of the mitigation for this latest Plaistow-Kingston construction contract, as has been requested of NHDOT by NHDES in order for them to issue their permit.

Thanks,

Marc

From: Laurin, Marc
Sent: Wednesday, October 25, 2023 1:43 PM
To: Jean Brochi <brochi.jean@epa.gov>; Michael Hicks <Michael.C.Hicks@usace.army.mil>
Cc: OSullivan, Andrew <Andrew.M.OSullivan@dot.nh.gov>
Subject: Plaistow-Kingston, 10044E - Concurrence on Mitigation

Jean and Mike,

This project entails re-evaluating and updating the design of previously proposed improvements to a 1.7-mile segment of the NH Route 125 corridor located in Plaistow and Kingston. The 1.7-mile segment is the only remaining segment that has not yet been constructed from a 6-mile project corridor that was previously studied and approved (Plaistow-Kingston, 10044B).

In a response to NHDOT's submittal of the NHDES Wetland Permit application for the Plaistow-Kingston, 10044E contract, the NHDES has requested that follow-up coordination be performed with the ACOE, and EPA to ensure that the mitigation performed under the Plaistow-Kingston 10044B project, meets the current mitigation requirements for permitting Contract E.

Wetland impacts were previously mitigated as part of the overall Plaistow-Kingston 10044B project under NHDES Wetlands Permit #2004-00763 and US Army Corps Permit NAE-2004-01342. This mitigation package included 80.8 acres of land preservation and restoration of two wetlands. The previous permit and mitigation package allowed for up to 1.95 acres of permanent wetland impact under Contract 10044E. With the reduced project footprint (from 5 lanes to 3 lanes), wetland impacts were substantially reduced. The currently proposed 10044E Contract will have 0.354 acres of permanent wetland and bank impacts.

The stream impacts and mitigation package were more recently discussed with NHDOT Natural Resource Agency Coordination Meetings on November 18, 2020 and March 20, 2019. The previous mitigation package did not address stream impacts since it was developed prior to the NHDES rules that require separate mitigation for watercourse-related impacts. The 10044E contract, as currently proposed, includes approximately 29 linear feet of permanent stream impact (5 linear feet of channel impact and 24 linear feet of bank impact to the Little River from culvert extension).

Lori Sommer of NHDES reviewed the previous mitigation package and determined that it adequately compensates for the lost functions that would have been required as mitigation for the Little River impacts. As such, it was determined that no further mitigation is necessary for the 10044E project.

Your concurrence that no further mitigation is necessary for the impacts associated with the 10044E Contract is requested.

Let me know if you need further information.

Thanks,

Marc