

CLOSURE PLAN

**NEW LONDON LAGOONS
FROTHINGHAM ROAD
NEW LONDON, NEW HAMPSHIRE**

PREPARED FOR

**TOWN OF NEW LONDON
375 MAIN STREET
NEW LONDON, NEW HAMPSHIRE 03257**

BY

NOBIS ENGINEERING, INC.

(800) 394-4182
www.nobiseng.com

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BACKGROUND

The New London wastewater lagoons were constructed in the 1960s and were in operation until construction of the sewer line to Sunapee in 1980. The property is accessed via a driveway at the end of Frothingham Road, southeast of South Pleasant Street. The lagoons are approximately 100 feet upgradient and east of Lyon Brook, which flows southeast. Originally there were six lagoons, of which three remain and are currently holding water.

Although there are no records regarding when or how the first three lagoons were filled in, historical aerial photography supports the assumption that it occurred sometime between 1990 and 1995. The waste material in the two smaller lagoons was removed before the areas were backfilled. However, the material in the third and largest of the three former lagoons will need to be removed. Based on visual observations, it is estimated that the buried lagoon encompasses approximately 0.2 acres.

The remaining three open lagoons extend approximately 1,010 feet in a northwest-southeast alignment encompassing approximately 0.9 acres. The lagoons are approximately 2 feet deep from top of berm to top of waste, and are separated by earthen embankments, with a berm along the southwest side. The bottom surface of the lagoons consists of a layer of sludge waste material that will be removed prior to filling and leveling the area. In 1989 and 2001, ditches were constructed on the upgradient (northeast) side of the lagoons to intercept stormwater runoff from uphill areas and divert it around the lagoons. The water retained in the lagoons therefore, is contributed primarily from rain falling directly onto the area, and eventually infiltrates/evaporates. The Town of New London plans to close the wastewater lagoons in accordance with the New Hampshire Department of Environmental Services (NHDES) Sludge Management Rules (Env-Wq 800).

LAGOON CLOSURE ALTERNATIVES

There are two possible alternatives for closure of the lagoons: 1) cap the sludge waste material in place, or, 2) remove the sludge waste material for off-site disposal and/or land application.

The alternative of capping the material in place would require evaluation of the potential impacts to groundwater and a comprehensive closure plan, including:

- Material analysis and testing
- Installation of monitoring wells
- Financial assurance

- Hydrologic study
- Site use restrictions
- Strict maintenance of the site (mowing, control of tree growth, etc.)
- Annual reporting
- On-going monitoring for 10-30 years
- Minimum 2-foot thick soil cap

Although it is possible to leave the waste material in place, given the extensive long-term site maintenance and monitoring requirements in accordance with Env-Sw 807.05, this alternative is not ideal. There are unquantifiable risks associated with leaving the material in place, primarily the potential for contamination of Lyon Brook and long-term impacts to water quality. Removal of the waste material is a preferable alternative since it is a permanent solution that does not require on-going monitoring or costs. The excavated material will be analyzed for possible reuse by land application or will be disposed of off-site. The lagoons will be filled in and the property will be maintained and held in an easement.

PROJECT DESCRIPTION – REMOVAL OF WASTE MATERIAL

Summary

The proposed closure of the lagoons will include excavation and removal of the sludge material from the buried lagoon, removal of the sludge material lining the bottom of the open lagoons, leveling the berm between the open lagoons and backfilling the lagoons, and revegetation of the area. It is anticipated that the lagoon closure work will be conducted in OSHA Level D construction personal protective equipment (PPE), however, there is potential for the sludge removal operations to require additional air monitoring and potential PPE upgrades. Contractor safety will be monitored during construction operations and PPE will be upgraded as necessary.

Sludge Waste Excavation

In order to access and remove the sludge waste in the buried lagoon, the top layer of material must also be removed. Due to the unknown characteristics of the materials used to fill the buried lagoon, all of the material will be removed (to the bottom of the sludge waste) and will be handled as waste. The excavated material is anticipated to be fairly dry and will be stockpiled in the designated staging area for analysis prior to disposal.

The process of excavating waste material from the three open lagoons is complicated by the presence of water in the lagoons. Ideally, operations will take place during dry periods, however; this may not be possible. Any standing water in the lagoons will need to be pumped out prior to starting earth moving operations. Water may be pumped to several locations for infiltration: 1) the existing dry pond at the former wastewater treatment plant, 2) a stone-lined infiltration trench constructed in the staging area, or 3) the adjacent lagoon. A combination of these locations may be utilized to expedite the dewatering/infiltration process. Work in the open lagoons will be sequential, starting at the southernmost point (Lagoon 1) and progressing northward to Lagoon 3. The water in Lagoon 1 will be pumped into Lagoon 2 (or to the wet well or trench) in order to excavate waste material in dry conditions. Waste material will be stockpiled at one end of Lagoon 1 for gradual dewatering and then mixed with wood ash to achieve a workable consistency. Lagoon 2 will be excavated using the same process, displacing water into Lagoon 3 (or to the wet well or trench) and stockpiling/mixing waste material at one end of Lagoon 2. In order to work in Lagoon 3, water will be pumped to the wet well or infiltration trench. Waste material from Lagoon 3 will be excavated and stockpiled/mixed at one end of Lagoon 3. If the stockpiled waste materials in Lagoons 1 and 2 have achieved a workable consistency, they can be consolidated in Lagoon 3.

Lagoon Backfill

After the bottom surfaces of the excavated lagoons have been tested in accordance with the procedures outlined under “Material Analysis and Testing” and have been determined to be free of waste material, the areas will then be backfilled with clean suitable material and stabilized with loam and seed. To reduce the risk of future settling, backfill should be placed in 12-inch lifts and compacted with a minimum of 4 passes by a 10-ton or greater roller. The surface of the former buried lagoon area will be restored to approximate the existing topography. The proposed finish grade across the former open lagoons is approximately 4% from northeast to southwest to promote positive drainage of stormwater without ponding.

Disposition of Sludge Waste

Waste material removed from the lagoons will be analyzed in accordance with the procedures outlined under “Material Analysis and Testing” to determine its suitability for land application either on or off site. If possible, the waste material will be amended as appropriate to achieve the specification for land application and will be spread over the area disturbed by the lagoon closure

activities and stabilized with vegetation. The amount of material that may be applied to the area is determined by Nitrogen loading, with a maximum allowable load of 200 lbs of Nitrogen per acre. If the quality of the material is considered Class A, it may be reused on sites other than the property itself. Should analysis indicate unsuitability for land application, waste material will be transported to and disposed of at a permitted off-site facility. Based on the estimated material quantities (see “Material Quantities” section), and the limitations imposed on land application, it is anticipated that there will be excess material following allowable land application on the site. Should the excess material be considered Class A, it may be used at other locations owned by the Town. Should the excess material be considered Class B, it will be transported to and disposed of at a permitted off-site facility.

Sequence of Work

Steps to complete the lagoon closure will proceed as follows:

1. Upgrade and extend the access driveway from the end of Frothingham Road into the lagoon work area to accommodate heavy truck traffic to and from the site. This may include filling of holes, minor leveling and grading, widening at select locations to allow for vehicle passing, addition of a 6-inch stone surface layer.
2. Clear work areas as required for access. Remove trees and brush from the embankments around the open lagoons, and to the limits shown on the plans. Remove large stumps.
3. Install erosion control measures – stabilize entrance at end of Frothingham Road, and straw wattles along the downgradient perimeter of the work area to prevent sediment migration and impacts to Lyon Brook.
4. Prepare a staging area for material storage as shown on the plans. Clear small trees and brush as necessary.
5. Strip topsoil from the buried lagoon area and stockpile in the staging area for reuse. Excavate material from the buried lagoon area and stockpile in the staging area for analysis, transport, and disposal. Install silt fence around the perimeter of the stockpiles.
6. Perform inspection (by NHDES) and testing of the former buried lagoon subgrade to verify that all contaminated material has been removed.
7. Backfill the former buried lagoon area with imported clean suitable fill. To reduce the risk of future settling, backfill should be placed in 12-inch lifts and compacted with a minimum of 4 passes by a 10-ton or greater roller. Once backfill in this area is complete, it may be

used as a stockpile area for additional imported clean fill material. If the area will not be used for material storage, it should be stabilized with 4 inches of loam and seeded.

8. Construct a stone-lined infiltration trench in the staging area.
9. Pump water out of Lagoon 1 (into Lagoon 2 / pond at former wastewater treatment plant / infiltration trench) in order to move sludge waste material in dry conditions.
10. Stockpile sludge waste at one end of Lagoon 1 for dewatering and stabilization. Mix waste material with wood ash to achieve a workable consistency.
11. Pump water out of Lagoon 2 (into Lagoon 3 / pond at former wastewater treatment plant / infiltration trench) in order to excavate sludge waste material in dry conditions.
12. Stockpile sludge waste at one end of Lagoon 2 for dewatering and stabilization. Mix waste material with wood ash to achieve a workable consistency.
13. Pump water from Lagoon 3 to the pond at former wastewater treatment plant / infiltration trench as necessary to work in Lagoon 3 in dry conditions.
14. Stockpile sludge waste at one end of Lagoon 3 for dewatering and stabilization. Mix waste material with wood ash to achieve a workable consistency.
15. Consolidate sludge waste material from Lagoons 1 and 2 in Lagoon 3. Perform analysis (composite samples) of sludge waste material as directed by NHDES.
16. Perform testing of Lagoon 1 and Lagoon 2 subgrades to verify that all contaminated material has been removed and inspection (by NHDES).
17. Fill Lagoon 1 with suitable clean material. Level the berm on the downgradient side of Lagoon 1, as well as the berm between Lagoons 1 and 2. To reduce the risk of future settling, backfill should be placed in 12-inch lifts and compacted with a minimum of 4 passes by a 10-ton or greater roller.
18. Fill Lagoon 2 with suitable clean material. Level the berm on the downgradient side of Lagoon 2, as well as the berm between Lagoons 2 and 3. To reduce the risk of future settling, backfill should be placed in 12-inch lifts and compacted with a minimum of 4 passes by a 10-ton or greater roller.
19. Remove consolidated sludge waste material from Lagoon 3. Stockpile the material in the staging area for reuse OR transport off-site for disposal.
20. Perform testing of Lagoon 3 subgrade to verify that all contaminated material has been removed and inspection (by NHDES).
21. Fill Lagoon 3 with suitable clean material. Level the berm on the downgradient side of Lagoon 3. To reduce the risk of future settling, backfill should be placed in 12-inch lifts and compacted with a minimum of 4 passes by a 10-ton or greater roller.

22. Perform final grading of the former lagoon areas to achieve grades as shown on the plans.
23. Amend stockpiled waste material as necessary to meet specifications for land application.
Spread material over areas disturbed by closure activities in accordance with allowable application rates (maximum 200 lbs Nitrogen per acre) and results of material analysis.
24. Stabilize amended waste material with seed and mulch after land application.
25. Stockpile excess Class A material for reuse at other Town-owned locations.
26. Transport excess Class B material or unsuitable waste material to an approved off-site disposal facility.
27. Backfill infiltration trench with clean material.
28. Restore any additional areas of disturbance (i.e. former staging area) with 4 inches of loam and seed.
29. Remove erosion control measures once vegetation is established.

MATERIAL QUANTITIES

Based on historical information from the Town and the NHDES, it has been assumed that the sludge waste material at the bottom of the open lagoons is between 1 and 1-1/2 feet thick. The original depth of the buried lagoon is unknown, but has been assumed to be of similar depth to the three open lagoons. As stated earlier, the characteristics of the fill used in the buried lagoon are unknown so all of the material will be excavated and analyzed to determine how it should be handled. For the purposes of the cost estimates, it has been assumed that the top 2 feet of material over the buried lagoon may be reused as backfill.

Leveling the existing berms between and downgradient of the open lagoons will result in a small quantity of material that can be used as fill. Additional clean suitable material will be imported as fill for the lagoons.

A summary of the anticipated quantities of material assuming 1-1/2 feet of waste, is provided in Table 1-1, below. Additional material quantities are included in the cost estimates in Appendix A.

Table 1-1 Estimated Material Quantities

	<u>Neat Volume (CY)</u>	<u>1.25 x Volume (CY)</u>
Lagoon 1	720	899
Lagoon 2	579	724
Lagoon 3	432	540
Buried Lagoon	616	769
Sludge Removal		
TOTAL	2,347	2,932
Earthwork for berm/lagoon leveling		
Cut (Berm)	(498)	
Fill	6,921	
Net Fill	6,423	8,029
Less Topsoil (4")		(921)
Net Fill (IMPORT)		7,108

MATERIAL ANALYSIS AND TESTING

Although preliminary material testing was included as part of the original proposal for the closure plan, after discussions with the NHDES and in the interest of saving costs and redundant efforts, it was decided to defer testing until construction is underway.

The sludge waste material will undergo vector attraction reduction and stabilization by mixing it with wood ash. Prior to land application and/or disposal, material samples will be collected from the stabilized material and analyzed in accordance with Env-Wq 807.05. Inspection, sampling, and analysis of the excavated lagoon subgrades will also be performed to verify that all contaminants have been removed. All sampling will be performed with NHDES oversight and direction. Samples will be sent to an independent laboratory for analysis.

Depending upon the results of the analysis, the sludge waste material will be classified as “Class A Biosolids” in accordance with 40 CFR 503.32(a)(3) or “Class B Biosolids” in accordance with 40 CFR 503.32(b). Although not anticipated based on historic material data, it is possible that the material will not meet the criteria for classification as Class A or Class B. If this is the case, the material may be amended to meet the criteria, or may simply be transported for disposal at an approved off-site facility.

- Class A material may be reused for land application as a topsoil material. Costs to transport and dispose of Class A material range from \$25-\$30 (per Casella) per wet ton.
- Class B material may be reused for land application as a topsoil material only on the site itself. Costs to transport and dispose of Class B material range from \$35-\$60 (per Casella) per wet ton.

- Raw sludge (i.e. material that does not meeting the criteria for classification as Class A or Class B) material may not be reused for land application and must be transported to and disposed of at an approved off-site facility. Costs to transport and dispose of raw sludge material range from \$80-\$125 (per Casella) per wet ton.

PERMITTING REQUIREMENTS

NHDES Wetlands Bureau

The open lagoons and portions of the areas surrounding the lagoons have been identified as jurisdictional wetlands. Earthwork activities in wetlands require a permit from the NHDES Wetlands Bureau in accordance with Env-Wt 300. Direction has been provided by the Wetlands Bureau indicating that a Standard Dredge and Fill Permit application is required in order to proceed with the lagoon closure process. However, based on a determination of “minimal environmental impact” of the project due to the removal of contaminated material and restoration of the natural upland buffer to Lyon Brook, mitigation for impacted wetland areas will not be required. The associated fee for this permit is \$200. The Standard Dredge and Fill Permit is valid for 5 years.

NHDES Alteration of Terrain (AoT) Bureau

Since a significant portion of the project - closure of the open lagoons - will be permitted under the jurisdiction of the Wetlands Bureau and meet the criteria of Env-Wq 1503.03(f), General Permit by Rule, a waiver will be required to allow the closure of the open lagoons to be considered a separate project from other land disturbance activities, and thereby allow distinct and separate project areas to be permitted under General Permit by Rule criteria Env-Wq 1503.03(e) and (f).

NHDES Groundwater Discharge Permitting and Registration Program

The water in the open lagoons is considered wastewater due to its contact with the sludge material. Any dewatering process that entails discharge of the lagoon water outside of the limits of the lagoons themselves will require a Temporary Groundwater Discharge Permit. A copy of this permit application is included in Appendix B and does not have an associated fee. Once approved, the permit is valid for 120 days.

SCHEDULE AND TIMING OF CONSTRUCTION

Due to the presence of water in the lagoons and wetland areas, it is preferable to perform the excavation of waste material in dry conditions during the summer months. The total timeframe for the project is estimated to take approximately 8-9 months and will include:

- Preparation of permit applications / receipt of approvals
This includes preparation and submission of the NHDES Wetland Permit application, preparation and submission of the NHDES AoT waiver request, and preparation and submission of the NHDES Groundwater Discharge Permit application. It is anticipated that this phase of the project may take 3 months, accounting for the NHDES permit review period.
- Preparation of contract documents
This includes preparation of plans suitable for bidding and construction and preparation of technical specifications and bid documents. It is anticipated that this work will be completed during the permit review period.
- Project bidding and contract award
This includes time for contractors to review the project scope and prepare bids, review of bids received, and official award of the contract. It is anticipated that this process will take approximately 2 months.
- Project construction
Assuming that the construction work will be performed during the summer months, it is anticipated that the time required to complete the closure will be 3 months.

LONG TERM MAINTENANCE

Upon completion of closure activities, a conservation easement will be put on the property, restricting any future disturbance of the site, with the exception of maintenance. Existing public pedestrian access to the Lyon Brook Trail will be preserved. The easement will be held by a land trust, who will be responsible for annual (minimum) monitoring of the site. Maintenance of the property will include annual mowing, bi-annual clearing of brush along drainage swales, and periodic repairs to the access road as necessary.

SUMMARY AND RECOMMENDATIONS

Given that the Town of New London is seeking a permanent closure of the former lagoons, total removal of the waste material is recommended. This solution requires an NHDES Wetland Permit, a waiver from NHDES Alteration of Terrain Bureau, and an NHDES Temporary Groundwater Discharge Permit. Based on historical analytical data and information from NHDES, it is anticipated that the sludge waste material removed from the lagoons will be suitable for reuse via land application. Depending upon the classification of the material as determined by laboratory analysis, the material may be reused on or off the site. Due to the nature of the material and the requirements for amendment and stabilization, there is no definitive way to verify the material classification prior to excavation. Assumptions have been made about the average depth of the waste material in the lagoons in order to estimate closure costs. The Town may want to consider performing additional exploration in the base of the lagoons to verify these assumptions, due to the potential cost impacts. The closure process will take approximately 9 months to complete, with estimated costs detailed in the following Appendix A.

Appendix A

New London Lagoon Closure
New London, New Hampshire
Construction Cost - Waste Removal
Nobis Project No. 89390.00
September 28, 2015

Option 1 - Engineer's Estimate: cap waste in place

Total Estimated Cost = \$ 1,482,691

Option 2 - Engineer's Estimate: waste excavation, reuse, and disposal

Total Estimated Cost (Class A Material) = \$ 941,042

Total Estimated Cost (Class B Material) = \$ 1,106,946

Option 3 - Engineer's Estimate: waste excavation and disposal

Total Estimated Cost (Class A Material) = \$ 1,022,262

Total Estimated Cost (Class B Material) = \$ 1,158,921

Supplemental Estimate - Resource Management, Inc.: waste excavation, reuse, and disposal

Total Estimated Cost (Class A Material) = \$ 846,860

New London Lagoon Closure
New London, New Hampshire
Option 1 - Engineer's Estimate: cap waste in place
Nobis Project No. 89390.00

Item	Quantity	Unit	Price (Per Unit)	Estimated Cost
Site Preparation				
Tree Clearing and Grubbing	1	Ac	\$ 13,750.00	\$ 13,750
6" Crushed Gravel (access road improvements)	650	CY	\$ 23.00	\$ 14,950
Access Road Grading	3750	SY	\$ 0.55	\$ 2,063
Straw Wattle Installation	1160	LF	\$ 3.00	\$ 3,480
Siltfence (for stockpiles)	1000	LF	\$ 2.75	\$ 2,750
Excavate Infiltration Trench	130	CY	\$ 11.00	\$ 1,430
6" Class C Stone (infiltration trench lining)	30	CY	\$ 35.50	\$ 1,065
Preparation of SWPPP	1	LS	\$ 2,500.00	\$ 2,500
Sludge Consolidation (from buried Lagoon & Lagoon 3 into Lagoons 1 & 2)				
Pump Wastewater out of Lagoons	90	Days	\$ 50.00	\$ 4,500
Common Excavation (Buried Lagoon)	1250	CY	\$ 13.00	\$ 16,250
Muck Excavation (Lagoon 3)	540	CY	\$ 38.25	\$ 20,655
Material Placement in Lagoons 1 & 2	1790	CY	\$ 25.50	\$ 45,645
Material Sampling & Analysis				
	1	LS	\$ 2,000.00	\$ 2,000
Lagoon Backfill and Capping				
Clean Fill Material (Buried Lagoon and Lagoon 3)	2030	CY	\$ 17.00	\$ 34,510
Additional Clean Fill Material (Lagoons 1 & 2)	3570	CY	\$ 10.40	\$ 37,128
Hauling Fill Material	5600	CY	\$ 10.40	\$ 58,240
Construct Low Permeability Cap (over Lagoons 1 & 2)	1750	CY	\$ 100.00	\$ 175,000
Earthwork (cut/fill labor - excl. material)	9300	CY	\$ 25.50	\$ 237,150
Restoration				
4" Loam	1160	CY	\$ 27.00	\$ 31,333
Turf establishment with mulch and tackifiers	2	Ac	\$ 2,000.00	\$ 4,316
Landfill Design and Construction				
Design and Permitting, Contract Documents and Bidding	1	LS	\$ 60,000.00	\$ 60,000
Construction Oversight	1	LS	\$ 100,000.00	\$ 100,000
Groundwater Monitoring (30-year timeframe assumed)				
Install Wells, Initial Sampling Round, Prepare Report	1	LS	\$ 10,000.00	\$ 10,000
Annual Monitoring	30	YR	\$ 5,000.00	\$ 150,000
Annual Report Preparation	30	YR	\$ 8,000.00	\$ 240,000
Permit Renewal Fee and Well Maintenance (every 5 years)	6	YR	\$ 2,500.00	\$ 15,000
			Cost	\$ 1,283,714.72
			Mobilization / Demobilization (5%)	\$ 64,186
			Contingency (10%)	\$ 134,790
			Estimated Total Cost	\$ 1,482,691

NOTES

1. Cost references: NHDOT Weighted Average Unit Prices 2015 Qtrs 1-2 and 2014 Qtrs 3-4 and 2015 R.S. Means Heavy Construction Cost Data
2. Two feet of material excavated from the buried lagoon has been assumed to be clean and reused as backfill.
3. Disposal of lagoon water has been assumed to be via infiltration.

New London Lagoon Closure
New London, New Hampshire
Option 2 - Engineer's Estimate: waste excavation, reuse, and disposal
Nobis Project No. 89390.00

Item	Quantity	Unit	Price (Per Unit)	Estimated Cost	
Site Preparation					
Tree Clearing and Grubbing	1	Ac	\$ 13,750.00	\$ 13,750	
Strip and Stockpile Topsoil	160	CY	\$ 3.50	\$ 560	
6" Crushed Gravel (access road improvements)	650	CY	\$ 23.00	\$ 14,950	
Access Road Grading	3750	SY	\$ 0.55	\$ 2,063	
Straw Wattle Installation	1160	LF	\$ 3.00	\$ 3,480	
Siltfence (for stockpiles)	1000	LF	\$ 2.75	\$ 2,750	
Excavate Infiltration Trench	130	CY	\$ 11.00	\$ 1,430	
6" Class C Stone (infiltration trench lining)	30	CY	\$ 35.50	\$ 1,065	
Preparation of SWPPP	1	LS	\$ 2,500.00	\$ 2,500	
Sludge Removal					
Pump Wastewater out of Lagoons	90	Days	\$ 50.00	\$ 4,500	
Common Excavation (Buried Lagoon)	1250	CY	\$ 13.00	\$ 16,250	
Muck Excavation (Lagoons 1-3)	2170	CY	\$ 38.25	\$ 83,003	
Material Sampling & Analysis					
	1	LS	\$ 4,000.00	\$ 4,000	
Lagoon Backfill					
Clean Fill Material	6490	CY	\$ 17.00	\$ 110,330	
Hauling Fill Material	6490	CY	\$ 10.40	\$ 67,496	
Earthwork (cut/fill labor - excl. material)	9300	CY	\$ 25.50	\$ 237,150	
Treatment and Dispersment of Sludge					
Wood Ash for Stabilization (50-50 mix)	1410	TON	\$ 19.00	\$ 26,790	
Stabilizing Sludge (mixing)	4340	CY	\$ 16.00	\$ 69,440	
Spreading Stabilized Sludge On Site (6")	9000	SY	\$ 6.40	\$ 57,600	
Disposal of Excess Class B Sludge Material	2280	TON	\$ 63.00	\$ 143,640	
Disposal of Excavated Material from Buried Lagoon	500	TON	\$ 90.00	\$ 45,000	
Restoration					
4" Loam	160	CY	\$ 27.00	\$ 4,333	
Turf establishment with mulch and tackifiers	2	Ac	\$ 2,000.00	\$ 4,316	
Construction Administration					
Bid Docs & Admin, Construction Admin & Limited Oversight	1	LS	\$ 22,000.00	\$ 22,000	
Additional Construction Oversight	1	LS	\$ 20,000.00	\$ 20,000	
				Construction Cost Class A Material	\$ 814,755.22
				Mobilization / Demobilization (5%)	\$ 40,738
				Contingency (10%)	\$ 85,549
Estimated Total Construction Cost					
				Class A Material	\$ 941,042
				Construction Cost Class B Material	\$ 958,395
				Mobilization / Demobilization (5%)	\$ 47,920
				Contingency (10%)	\$ 100,631
Estimated Total Construction Cost					
				Class B Material	\$ 1,106,946

NOTES

1. Cost references: NHDOT Weighted Average Unit Prices 2015 Qtrs 1-2 and 2014 Qtrs 3-4 and 2015 R.S. Means Heavy Construction Cost Data
2. Cost for wood ash was provided by RMI.
3. Costs for sludge disposal were provided by RMI, but are within the ranges provided by Casella.
4. Stabilization of sludge waste material has been assumed to be a 50-50 mixture of sludge and wood ash.
5. Quantity of land applied reused material is based on Nitrogen loading as estimated by RMI.
6. Two feet of material excavated from the buried lagoon has been assumed to be clean and reused as backfill. All other material excavated from the buried lagoon has been assumed to be disposed of as raw material.
7. Disposal of lagoon water has been assumed to be via infiltration.
8. If material is Class A, any excess material is assumed to be used off site. Disposal costs for excess Class A material are not included.

New London Lagoon Closure
New London, New Hampshire
Option 3 - Engineer's Estimate: waste excavation and disposal
Nobis Project No. 89390.00

Item	Quantity	Unit	Price (Per Unit)	Estimated Cost
Site Preparation				
Tree Clearing and Grubbing	1	Ac	\$ 13,750.00	\$ 13,750
Strip and Stockpile Topsoil	160	CY	\$ 3.50	\$ 560
6" Crushed Gravel (access road improvements)	650	CY	\$ 23.00	\$ 14,950
Access Road Grading	3750	SY	\$ 0.55	\$ 2,063
Straw Wattle Installation	1160	LF	\$ 3.00	\$ 3,480
Siltfence (for stockpiles)	1000	LF	\$ 2.75	\$ 2,750
Excavate Infiltration Trench	130	CY	\$ 11.00	\$ 1,430
6" Class C Stone (infiltration trench lining)	30	CY	\$ 35.50	\$ 1,065
Preparation of SWPPP	1	LS	\$ 2,500.00	\$ 2,500
Sludge Removal				
Pump Wastewater out of Lagoons	90	Days	\$ 50.00	\$ 4,500
Common Excavation (Buried Lagoon)	1250	CY	\$ 13.00	\$ 16,250
Muck Excavation (Lagoons 1-3)	2170	CY	\$ 38.25	\$ 83,003
Material Sampling & Analysis				
	1	LS	\$ 4,000.00	\$ 4,000
Lagoon Backfill				
Clean Fill Material	6490	CY	\$ 17.00	\$ 110,330
Hauling Fill Material	6490	CY	\$ 10.40	\$ 67,496
Earthwork (cut/fill labor - excl. material)	9300	CY	\$ 25.50	\$ 237,150
Treatment and Dispersment of Sludge				
Wood Ash for Stabilization (50-50 mix)	1410	TON	\$ 19.00	\$ 26,790
Stabilizing Sludge (mixing)	4340	CY	\$ 16.00	\$ 69,440
<i>Disposal of Class A Sludge Material</i>	<i>3480</i>	<i>TON</i>	<i>\$ 29.00</i>	<i>\$ 100,920</i>
<i>OR</i>				
<i>Disposal of Class B Sludge Material</i>	<i>3480</i>	<i>TON</i>	<i>\$ 63.00</i>	<i>\$ 219,240</i>
Disposal of Excavated Material from Buried Lagoon	500	TON	\$ 90.00	\$ 45,000
Restoration				
4" Loam	1160	CY	\$ 27.00	\$ 31,333
Turf establishment with mulch and tackifiers	2	Ac	\$ 2,000.00	\$ 4,316
Construction Administration				
Bid Docs & Admin, Construction Admin & Limited Oversight	1	LS	\$ 22,000.00	\$ 22,000
Additional Construction Oversight	1	LS	\$ 20,000.00	\$ 20,000
			Construction Cost Class A Material	\$ 885,075.22
			Mobilization / Demobilization (5%)	\$ 44,254
			Contingency (10%)	\$ 92,933
			Estimated Total Construction Cost	
			Class A Material	\$ 1,022,262
			Construction Cost Class B Material	\$ 1,003,395
			Mobilization / Demobilization (5%)	\$ 50,170
			Contingency (10%)	\$ 105,356
			Estimated Total Construction Cost	
			Class B Material	\$ 1,158,921

NOTES

1. Cost references: NHDOT Weighted Average Unit Prices 2015 Qtrs 1-2 and 2014 Qtrs 3-4 and 2015 R.S. Means Heavy Construction Cost Data
2. Cost for wood ash was provided by RMI.
3. Costs for sludge disposal were provided by RMI, but are within the ranges provided by Casella.
4. Stabilization of sludge waste material has been assumed to be a 50-50 mixture of sludge and wood ash.
5. Quantity of land applied reused material is based on Nitrogen loading as estimated by RMI.
6. Two feet of material excavated from the buried lagoon has been assumed to be clean and reused as backfill. All other material excavated from the buried lagoon has been assumed to be disposed of as raw material.
7. Disposal of lagoon water has been assumed to be via infiltration.

New London Lagoon Closure
New London, New Hampshire
Supplemental Estimate - Resource Management, Inc.: waste excavation, reuse, and disposal
Nobis Project No. 89390.00

Item	Quantity	Unit	Price (Per Unit)	Estimated Cost
Site Preparation				
<i>Tree Clearing and Grubbing*</i>				
<i>Strip and Stockpile Topsoil*</i>				
6" Crushed Gravel (access road improvements)	650	CY	\$ 23.00	\$ 14,950
Access Road Grading	3750	SY	\$ 0.55	\$ 2,063
<i>Straw Wattle Installation*</i>				
<i>Siltfence (for stockpiles)*</i>				
Preparation of SWPPP	1	LS	\$ 2,500.00	\$ 2,500
Sludge Removal				
<i>Pump Wastewater out of Lagoons*</i>				
<i>Common Excavation (Buried Lagoon)*</i>				
<i>Muck Excavation (Lagoons 1-3)*</i>				
Material Sampling & Analysis*				
Lagoon Backfill				
Clean Fill Material	7300	CY	\$ 17.00	\$ 124,100
<i>Hauling Fill Material*</i>				
<i>Earthwork (cut/fill labor - excl. material)*</i>				
Treatment and Dispersment of Sludge				
<i>Wood Ash for Stabilization*</i>				
<i>Stabilizing Sludge (mixing)*</i>				
<i>Spreading Stabilized Sludge On Site*</i>				
<i>Disposal of Excess Class A Sludge Material*</i>				
<i>Disposal of Excavated Material from Buried Lagoon*</i>				
Disposal of Excavated Material from Buried Lagoon (addn'l material)	940	TON	\$ 90.00	\$ 84,600
Restoration				
<i>4" Loam*</i>				
<i>Turf establishment with mulch and tackifiers*</i>				
RMI COST - includes all items marked with *	1	LS	\$ 505,000.00	\$ 505,000
			Construction Cost	\$ 733,213
			Mobilization / Demobilization (5%)	\$ 36,661
			Contingency (10%)	\$ 76,987
			Estimated Total Construction Cost	\$ 846,860

NOTES

1. Cost references for items not included by RMI: NHDOT Weighted Average Unit Prices 2015 Qtrs 1-2 and 2014 Qtrs 3-4 and 2015 R.S. Means Heavy Construction Cost Data
2. Disposal of lagoon water has been assumed to be via the wet well at the former treatment plant. This may incur an additional cost for disposal, which is not included. Alternately, disposal may occur via infiltration.
3. Costs for sludge material assume that waste will be processed to meet Class A.
4. Cost of hauling fill material has been calculated based on fuel at \$2.60 per gallon. Surcharge will apply if fuel prices increase.
5. Additional cost for disposal of buried lagoon material has been included to account for fill material above waste material.
6. If material is Class A, excess material may be reused off site. Should the Town opt to reuse all the material, disposal cost for Class A material does not apply.



Resource Management, Inc.

August 25, 2015

Naomi-Clare Praul, Project Engineer
Nobis Engineering, Inc.
18 Chenell Drive
Concord, NH 03301

Re: New London, NH Lagoon Closure Project

Dear Naomi-

Thank you for contacting Resource Management, Inc. (RMI) regarding the upcoming closure of the retired wastewater treatment plant lagoons located off of Lyon Brook Drive in New London. It is RMI's understanding that the Town of New London (the Town) would like to close the lagoons and return the site to a vegetated state for use by the Town Conservation Commission. RMI is providing pricing for several scenarios including pricing for just providing recycling services for dewatered solids that the Town removes, to complete removal and recycling services.

RMI has used the information provided by Nobis Engineering and the Town to develop pricing for the project. The closure project consists of two main areas; the upper former ditch and lagoon area that received septage and which is currently filled in, and the lower three lagoons which are labeled as 1, 2 & 3. Based on current estimates, 577 cubic yards of solids need to be removed from the upper buried lagoon, and 2,165 cubic yards of solids need to be removed from open lagoons 1, 2, and 3. Based on the available nitrogen content of the material, and the estimated amount of disturbed area resulting from solids removal and closure operations, RMI estimates that approximately 750 cubic yards will be used to revegetate the site. This will leave approximately 2,000 cubic yards of solids to be treated and taken off site. RMI has assumed a density of the dewatered solids of 1,600# per cubic yard. Also, RMI has confirmed with the New Hampshire Department of Environmental Services (DES) that the material will need to be stabilized prior to beneficial use.

If the Town chooses to do the solids removal, dewatering, and potentially process (stabilize) the material to Class A or Class B pathogen levels, RMI proposes the following pricing:

Material Type	Price per Ton	Estimated Tonnage	Total Cost
Raw Solids	\$90.00	1,594	\$143,424
Class B Solids	\$63.00	2,540	\$160,007
Class A Solids	\$29.00	2,540	\$73,654
Wood Ash for Stabilization	\$19.00	950	\$17,978

The Town is also interested in pricing for a vendor to perform all aspects of the lagoon closure, which RMI, in conjunction with Northern New England Field Services (NNFS), can do. RMI has assumed that water from the lower lagoons can be pumped up to the wet well at the old wastewater treatment plant. The town will provide all the fill material needed to fill in the lagoons once they are cleaned out. The Town would also be responsible for preparing the access road into the lagoons in order insure heavy trucks can get safe access to the lagoons. RMI and NNFS will be responsible for all other aspects of the operations including permitting, pumping off water, clearing and grubbing, all excavation work, loading and trucking as well as all placement of the fill material, solids management and restoration of the site when complete. RMI/NNFS can do this for an all in fee of \$350,000, plus the solids management fee outlined above, plus a fee of \$12.00 per cubic yard for solids that are utilized on site for revegetation. Testing costs associated with the closure will be passed through at cost plus 20% and are estimated to be less than \$2,500. The total cost based on all the aforementioned assumptions would be **\$504,924** and would take approximately 3 months to complete.

I will contact you to make sure you have received this information and to discuss the details. If in the meantime you have any questions, please do not hesitate to contact me.

Sincerely,



Charley Hanson
Senior Project Manager

Appendix C



FOR STATE USE ONLY
Date Received: _____
Site No: _____
Rivers Coordinator Notif. Date: _____

APPLICATION FOR TEMPORARY GROUNDWATER DISCHARGE PERMIT

The TEMPORARY GROUNDWATER DISCHARGE PERMIT is a nonrenewable permit issued under RSQ 485-A:13 and Env-Wq 402 for the temporary discharge of nondomestic wastewater that has received treatment by best available technology (Examples include groundwater remediation, dewatering projects, pump tests of contaminated groundwater, etc.)

SUBMIT:

- ONE SIGNED AND COMPLETED APPLICATION
- SUPPORTING INFORMATION

TO:

NHDES/Water Division
 Drinking Water & Groundwater Bureau
 Temporary Groundwater Discharge Permit Coordinator
 29 Hazen Drive
 P.O. Box 95
 Concord, NH 03302-0095

If you have any questions, please contact the Discharge Permits Coordinator at (603) 271-2513.

CERTIFICATION OF MUNICIPAL NOTIFICATION

In order to meet the requirements of Env-Wq 402, the undersigned certifies that on _____, _____, _____ (date) _____ (year) a copy of this completed permit application was delivered to the Town/City Clerk of _____ (the town in which the proposed discharge will be locate).

Date: _____ Signed: _____ Applicant (Landowner)

I. Facility Name

Name: _____
 Address: _____
 City/Town: _____ State: _____ Zip: _____

II. Landowner (Applicant)

Name: _____
 Telephone: _(_____) _____
 Mailing Address: _____
 City/Town: _____ State: _____ Zip: _____

III. Facility Owner or Operator (complete only if different from landowner)

Name: _____ Owner Operator
 Telephone: _(_____) _____
 Mailing Address: _____
 City/Town: _____ State: _____ Zip: _____

VII. Permit Issuance Information

The following steps outline the procedure to obtain a New Hampshire Temporary Groundwater Discharge Permit:

- a. Upon receipt of a complete permit application, the Department of Environmental Services (the department) shall issue a permit for a period of up to four months or shall deny the application. The department shall notify the applicant of its decision in writing.
- b. The department shall place conditions upon a temporary groundwater discharge permit, including establishing discharge limits and monitoring requirements, as required to assure conformance with these rules.
- c. The department may enter any permitted facility for the purpose of collecting information, examining records, collecting samples, or undertaking other action associated with the permit.
- d. Applicant may begin discharge after receiving the written permit from the department.
- e. Soil analysis, at the point of discharge, shall be required following cessation of the discharge.

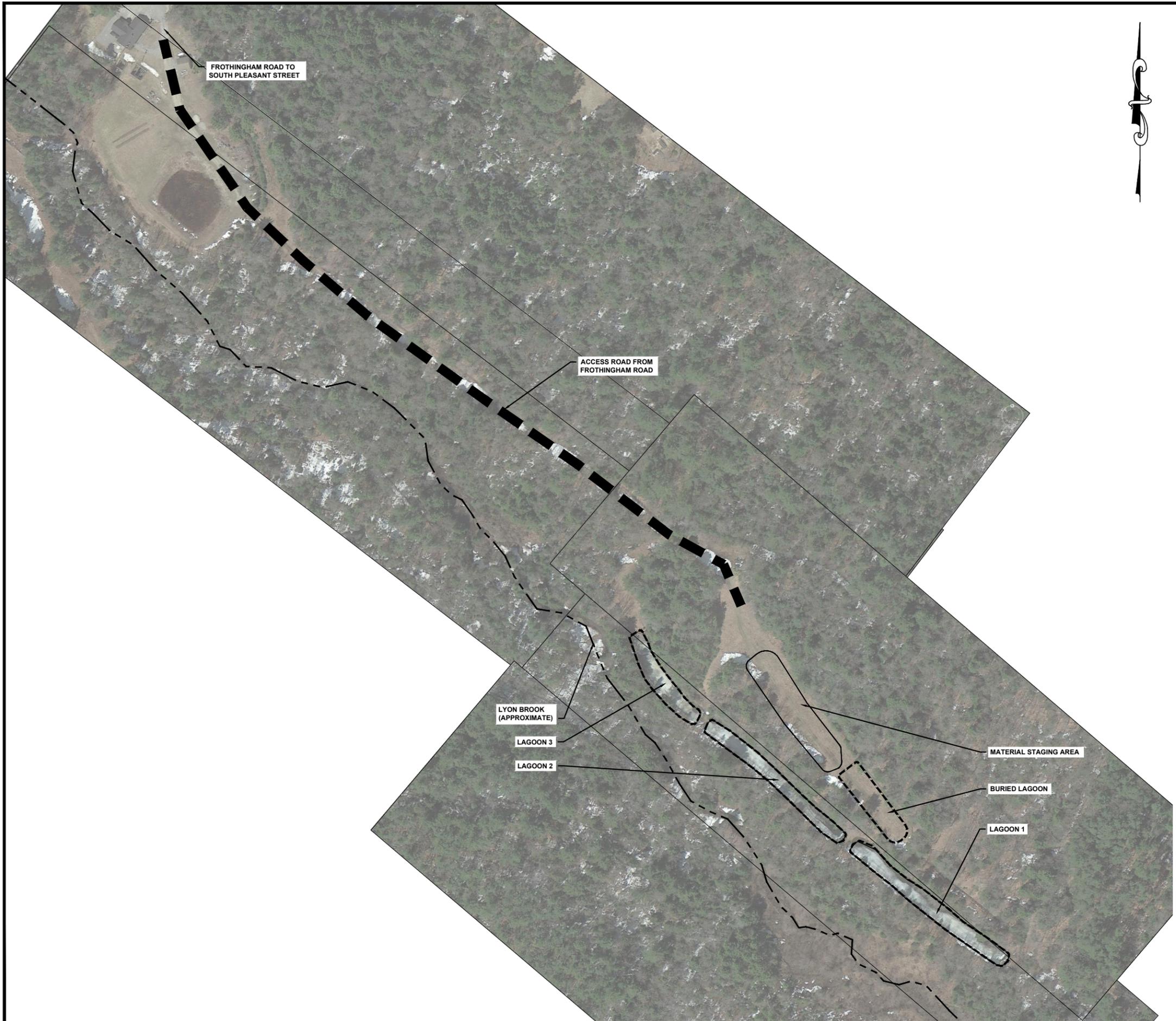
VIII. Certification

- 1. To the best of my knowledge, the data and information which I have submitted to obtain the Temporary Groundwater Discharge Permit from the New Hampshire Department of Environmental Services are true and correct.
- 2. I agree not to discharge to the groundwaters of the State until I have received a written permit from the Department.

Date: _____ Signed: _____
Applicant (Landowner)

No liability is incurred by the State by reason of any approval for Temporary Groundwater Discharge Permit. Approval by the Department is based in information supplied by the applicant. No guarantee is intended or implied by reason of any advice given by the Department or its staff.

Appendix B



Nobis
 Engineering a Sustainable Future
 Nobis Engineering, Inc.
 18 Cheneil Drive
 Concord, NH 03301
 T(603) 224-4182
 www.nobiseng.com
 Client - Focused, Employee - Owned

NOT ISSUED
 FOR
 CONSTRUCTION

**NEW LONDON
 LAGOON CLOSURE**
 FROTHINGHAM ROAD
 NEW LONDON,
 NEW HAMPSHIRE

NO.	DATE	DESCRIPTION
REVISIONS		



DATE: SEPTEMBER 2015
 NOBIS PROJECT NO. 89390.00
 DRAWN BY: NP
 CHECKED BY: EL
 CAD DRAWING FILE:
 89390-C-200-SITE G&D.dwg

SHEET TITLE

SITE OVERVIEW

SHEET
C-1

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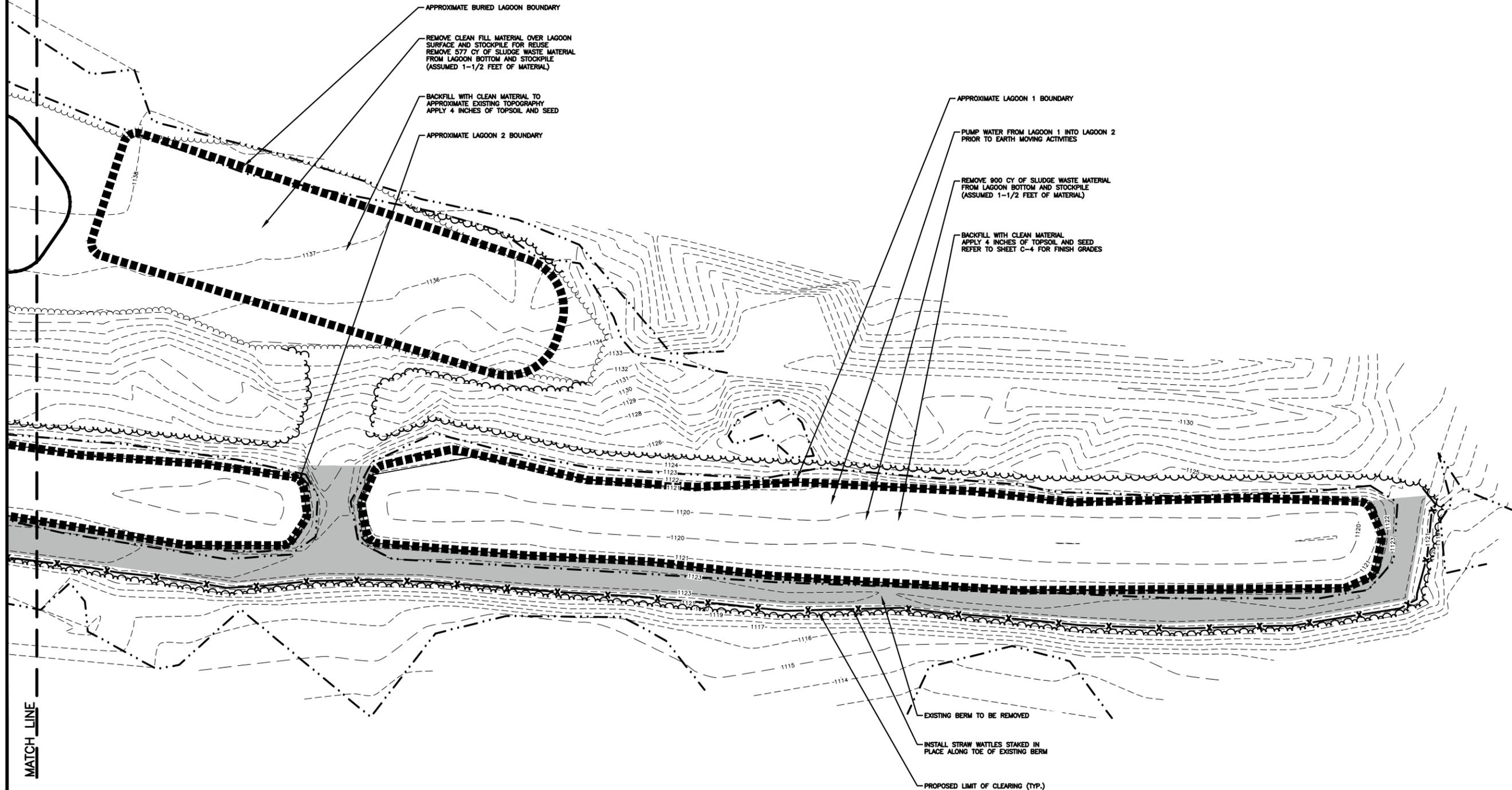


NOTES:

1. THE PURPOSE OF THIS PLAN IS TO SHOW THE PROPOSED CLOSURE OF FOUR EXISTING SEPTAGE LAGOONS. WASTE MATERIAL WILL BE REMOVED AND THE LAGOONS WILL BE FILLED WITH CLEAN MATERIAL. WASTE MATERIAL WILL BE AMENDED FOR SURFACE APPLICATION. REFER TO SHEET C-6 FOR DETAILED CONSTRUCTION SEQUENCE.
2. HORIZONTAL DATUM IS BASED ON NH STATE PLANE COORDINATES NAD83. VERTICAL DATUM IS BASED ON NAVD 1988. ALL ELEVATIONS SHOWN ARE IN REFERENCE TO THE SURVEY AND MUST BE VERIFIED BY THE GENERAL CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.
3. CONTRACTOR WILL NOTIFY OWNER & ENGINEER IMMEDIATELY IF SITE CONDITIONS DIFFER FROM WHAT IS SHOWN ON PLAN.
4. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING DIG SAFE (1-888-DIG-SAFE) AT LEAST 72 HOURS PRIOR TO THE COMMENCEMENT OF WORK. THE CONTRACTOR WILL COORDINATE WORK WITH THE CITY FIRE, POLICE, AND COMMUNITY DEVELOPMENT DEPARTMENTS.

PLAN REFERENCES:

1. EXISTING CONDITIONS, TOPOGRAPHICAL INFORMATION, NORTH ORIENTATION, NORTH ARROW, AND COORDINATE VALUES DEPICTED ON THESE DRAWINGS ARE BASED ON FIELD SURVEY PERFORMED ON MAY 21 AND JUNE 17, 2015 BY RICHARD D. BARTLETT AND ASSOCIATES, LLC.
2. THOMAS SOKOLOSKI, CERTIFIED WETLAND SCIENTIST #127, OF TES ENVIRONMENTAL CONSULTANTS, LLC OF BOW, NH, PERFORMED THE WETLAND MAPPING ON MAY 19, 2015 ACCORDING TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL AND THE REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL: NORTHEAST REGION, VERSION 2.0, JANUARY 2012, US ARMY CORPS OF ENGINEERS.



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LAGOON CLOSURE**
FROTHINGHAM ROAD
NEW LONDON,
NEW HAMPSHIRE

NO.	DATE	DESCRIPTION

REVISIONS

GRAPHIC SCALE

DATE:	SEPTEMBER 2015
NOBIS PROJECT NO.	89390.00
DRAWN BY:	NP
CHECKED BY:	EL
CAD DRAWING FILE:	89390-C-200-SITE G&D.dwg
SHEET TITLE	

SITE PLAN



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 LAGOON CLOSURE

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 NEW HAMPSHIRE

NO.	DATE	DESCRIPTION
REVISIONS		



DATE:	SEPTEMBER 2015
NOBIS PROJECT NO.	89390.00
DRAWN BY:	NP
CHECKED BY:	EL
CAD DRAWING FILE:	89390-C-200-SITE G&D.dwg
SHEET TITLE	

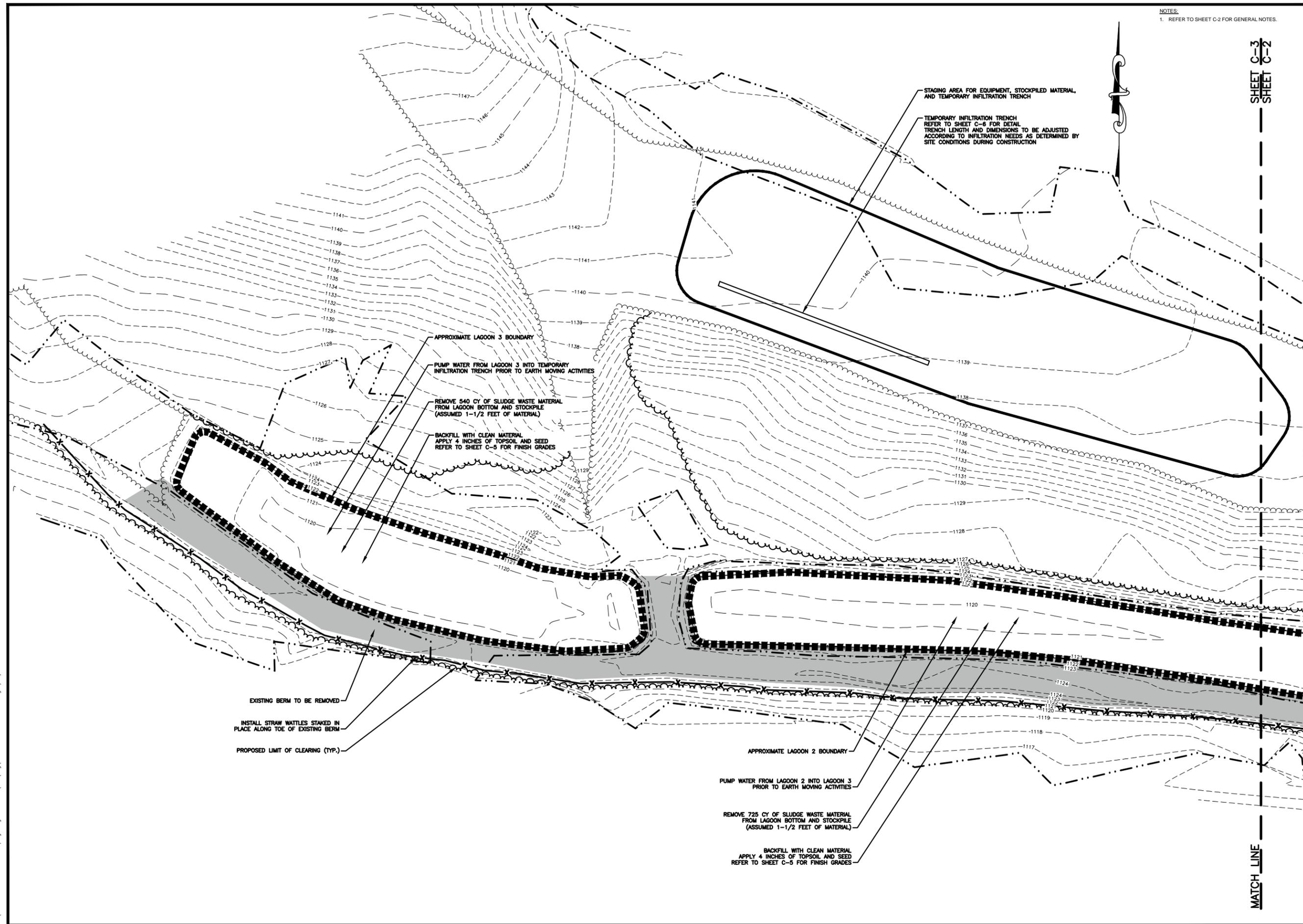
SITE PLAN

SHEET
 C-3

NOTES:
 1. REFER TO SHEET C-2 FOR GENERAL NOTES.

SHEET C-3
 SHEET C-2

MATCH LINE



SHEET C-5
SHEET C-4

MATCH LINE

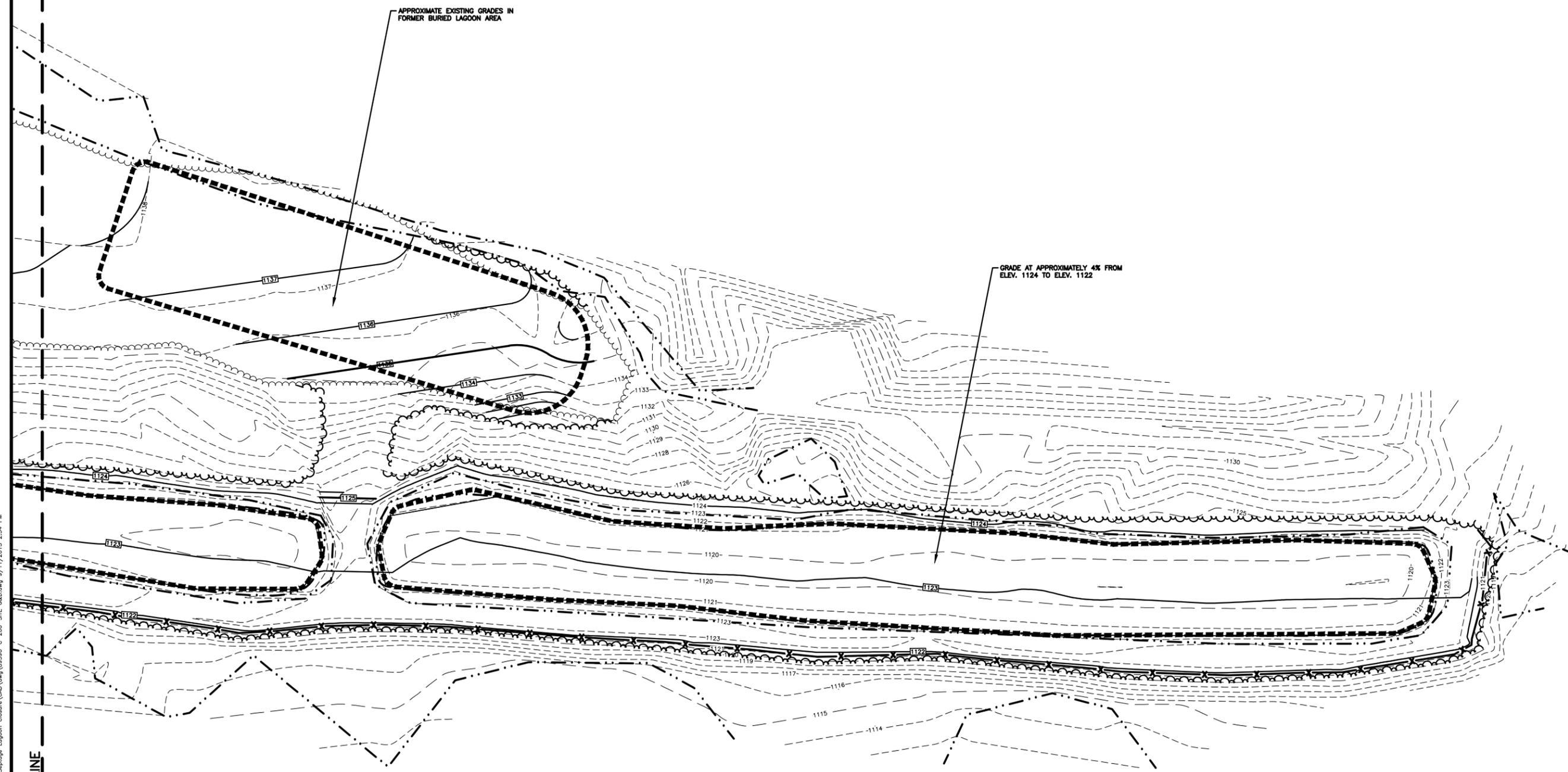
NOTES:
1. REFER TO SHEET C-2 FOR GENERAL NOTES.

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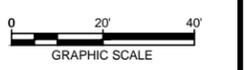
NEW LONDON LAGOON CLOSURE

FROTHINGHAM ROAD
NEW LONDON,
NEW HAMPSHIRE



NO.	DATE	DESCRIPTION

REVISIONS



DATE: SEPTEMBER 2015
 NOBIS PROJECT NO. 89390.00
 DRAWN BY: NP
 CHECKED BY: EL
 CAD DRAWING FILE:
 89390-C-200-SITE G&D.dwg

SHEET TITLE

GRADING PLAN

SHEET
C-4

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NOTES:
1. REFER TO SHEET C-2 FOR GENERAL NOTES.

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SHEET C-5
SHEET C-4

NOT ISSUED
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NEW LONDON LAGOON CLOSURE

FROTHINGHAM ROAD
NEW LONDON,
NEW HAMPSHIRE

NO.	DATE	DESCRIPTION
REVISIONS		



DATE:	SEPTEMBER 2015
NOBIS PROJECT NO.	89390.00
DRAWN BY:	NP
CHECKED BY:	EL
CAD DRAWING FILE:	89390-C-200-SITE G&D.dwg
SHEET TITLE	

GRADING PLAN

SHEET
C-5

