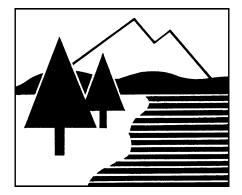
DRAINAGE ANALYSIS

PROPOSED HOUSING DEVELOPMENT

10 LEE ROAD MADBURY, NH



FOR 10 LEE ROAD, LLC

29 October 2021 Revised 1-19-2022





Ambit Engineering, Inc.

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EXECUTIVE SUMMARY

This drainage analysis examines the pre-development (existing) and post-development (proposed) stormwater drainage patterns for the proposed building and associated future site improvements at 10 Lee Road in Madbury, NH. The site is shown on the Town of Madbury Assessor's Tax Map 8 as Lot 9. The total size of the lot is 1,586,706 square-feet (36.4258 acres).

The development will provide for the future construction of a 6,996 square-foot building, with associated landscaping, utilities, and parking. The new buildings will be serviced by public water and electricity. Septic systems will be provided on-site. The development has the potential to increase stormwater runoff to adjacent properties, and therefore must be designed in a manner to prevent that occurrence. This will be done primarily by capturing stormwater runoff and routing it through appropriate stormwater facilities, designed to ensure that there will be no increase in peak runoff from the site as a result of this project.

The hydrologic modeling utilized for this analysis uses the "Extreme Precipitation" values for rainfall from The Northeast Regional Climate Center (Cornell University).

INTRODUCTION / PROJECT DESCRIPTION

This drainage report is designed to assist the owner, planning board, contractor, regulatory reviewer, and others in understanding the impact of the proposed development project on local surface water runoff and quality. The project site is shown on the Town of Madbury, NH Assessor's Tax Map 8 as Lot 9. Bounding the site to north is NH Route 155 and a trust. Bounding the site to east and south is Town property, private residences, and an LLC. Bounding the site to the west is private residences and a Town conservation area. A vicinity map is included in the Appendix to this report.

The proposed development will add a new building and a new parking area adjacent to existing buildings on the site. This report makes some concept assumptions as to the future impervious coverage of the proposed lots, as requested by the Town.

This report includes information about the existing site and the proposed building necessary to analyze stormwater runoff and to design any required mitigation. The report includes maps of pre-development and post-development watersheds, subcatchment areas and calculations of runoff. The report will provide a narrative of the stormwater runoff and describe numerically and graphically the surface water runoff patterns for this site. Proposed stormwater management methods will also be described, as well as erosion and sediment control practices. To fully understand the proposed site development the reader should also review a complete site plan set in addition to this report.

METHODOLOGY

"Extreme Precipitation" values from The Northeast Regional Climate Center (Cornell University) have been used for modeling purposes. These values have been used in this analysis.

This report uses the US Soil Conservation Service (SCS) Method for estimating stormwater runoff. The SCS method is published in The National Engineering Handbook (NEH), Section 4 "Hydrology" and includes the Technical Release No. 20, (TR-20) "Computer Program for Project Formulation Hydrology", and Technical Release No. 55 (TR-55) "Urban Hydrology for Small Watersheds" methods. This report uses the HydroCAD version 10.0 program, written by HydroCAD Software Solutions LLC, Chocorua, N.H., to apply these methods for the calculation of runoff and for pond modeling.

Time of Concentration (Tc) is calculated by entering measured flow path data such as flow path type, length, slope and surface characteristics into the HydroCAD program. For the purposes of this report, a minimum time of concentration of 5 minutes is used. The storm events used for the calculations in this report are the 2-year, 10-year, and 25year (24-hour) storms. Watershed basin boundaries have been delineated using topographic maps prepared by Ambit Engineering and field observations to confirm.

SITE SPECIFIC INFORMATION

Based on the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), Soil Survey of Rockingham County, New Hampshire the site is made up of eight soil types:

Soil Symbol	Soil Name and Slopes
CfB	Charlton fine sandy loam, 3 to 8 percent slopes
CsB	Charlton fine sandy loam, 3 to 8 percent slopes, very stony
PdB	Paxton fine sandy loam, 0 to 8 percent slopes, very stony
PdD	Paxton fine sandy loam, 15 to 25 percent slopes, very stony
PdE	Paxton very stony fine sandy loam, 25 to 60 percent slopes
ScA	Scantic silt loam, 0 to 3 percent slopes
SuB	Sutton fine sandy loam, 0 to 8 percent slopes, very stony
WsB	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony

All existing and proposed site development takes place on one soil type: CfB – Charlton fine sandy loam, 3 to 8 percent slopes. The soil report qualifies the depth to the water table or restrictive feature as greater than 80 inches. The Hydrologic Soil Group is class B, with an estimated infiltrative capacity of moderately low to high (0.14 to 14.17

in/hr).

A copy of the custom soil survey for this project site is included in the Appendix to this report.

The physical characteristics of the site consist of flat (1-3%) to steep (25-60%) grades that generally slope from the north to the south of the lot. Elevations on the site range from 140 to 194 feet above sea level. The existing site is partially developed and includes two existing buildings located at the north of the lot, with an asphalt parking area. Vegetation around the developed portion of the lot consists of established grasses, shrubs, and trees. The rest of the lot is undeveloped, forested land.

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) number 33017C0320E (effective date September 30, 2015), the project site is located in Zone X and is determined to be outside of the 0.2% annual chance floodplain. A copy of the FIRM map is included in the Appendix.

PRE-DEVELOPMENT DRAINAGE

In the pre-development condition, the site has been analyzed as five subcatchment basins (E1, E2, E3, E4, and E5) based on localized topography and discharge location. Subcatchment E1 contains all the proposed development area and most of the existing development, and drains to the west of the north "arm" of the lot. Subcatchment E2 contains a minor amount of developed area and drains to the east of the north arm of the lot. Subcatchment E3 drains south to Beards Creek running through the middle of the lot and then to the east. Subcatchment E4 is a small area diverted from subcatchment E3, which drains to the east. Subcatchment E5 forms the entire southern "arm" of the property, which drains to the north in the direction of Beards Creek. E5 contains some development in the form of electrical lines, but that land use is not expected to change the impervious area in the analysis, and will not be altered by the proposed development.

				-		
Watershed	Basin	Тс	CN	10-Year	25 -Year	То
Basin ID	Area (SF)	(MIN)		Runoff (CFS)	Runoff (CFS)	Design
						Point
E1	295,488	19.0	60	7.75	13.94	DP1
E 2	15,070	5.5	75	1.36	1.98	DP1
E 3	232,162	58.3	58	2.35	4.51	DP1
E4	371	5.0	55	0.01	0.02	DP1
E 5	1,032,671	24.0	68	38.00	60.48	DP1

 Table 1: Pre-Development Watershed Basin Summary

POST-DEVELOPMENT DRAINAGE

The proposed development has been designed to match the pre-development drainage patterns to the greatest extent feasible. In the post-development condition, the site has been analyzed as six major watershed basins, (P1a, P1b, P2, P3, P4, and P5). Since the design of the future houses is currently conceptual, some assumptions were made regarding the delineation of watershed basins and the determination of land usage. The delineation between Basins P2, P3, P4 and P5 correspond to approximately the same as the delineation between E2, E3, E4 and E5, respectively. Subcatchments P1a and P1b were subdivided from subcatchment P1, to represent the distinction between relatively unchanged land in P1a, and proposed development in P1b. Subcatchments P1a, P1b, and P2 are the only lots with any expected change from the proposed development. Subcatchment P1a contains a significant increase in impervious area, and as such, will be detained in a detention pond, and released with an outlet control structure. In the event of a 100-year storm event or an outlet control structure failure, an emergency bypass was designed to release stormwater. Since all subcatchments ultimately flow to Beards Creek, the creek will serve as the considered discharge point for the entire property.

Watershed Basin ID	Basin Area (SF)	Tc (MIN)	CN	10-Year Runoff	25-Year Runoff (CFS)	Design Point
				(CFS)		
P1a	214,195	19.0	58	4.82	9.06	DP1
P1b	83,653	6.9	81	8.82	12.28	DP1
P2	13,441	5.5	66	0.83	1.32	DP1
P3	231,924	58.3	58	2.35	4.50	DP1
P4	382	5.0	55	0.01	0.02	DP1
P5	1,032,212	24.0	70	38.00	60.48	DP1

Table 2: Post-Development Watershed Basin Summary

The overall impervious coverage of the area analyzed in this report for all basins **increases** from 0.704 acres (1.95%) in the pre-development condition to 1.238 acres (3.42%) in the post-development condition. Since the site represents an increase in impervious area, the project proposes the construction of a detention pond to reduce the peak flow discharge from the site.

Table 3 shows a summary of the comparison between pre-developed flows and postdeveloped flows for the design point in Beards Creek (DP1). The comparison considers the reduced flows as a result of infiltration.

Table 3: Pre-Development to Post-Development Comparison

	Q2 (CFS)	Q10 (CFS)		Q25 (CFS)		
Design	Pre	Post	Pre	Post	Pre	Post	Description
Point							
DP1	15.49	15.21	46.17	45.28	75.59	74.37	Beards Creek

Note that all drainage points of interest experience lower or equal peak flows.

OFFSITE INFRASTRUCTURE CAPACITY

There is no Town infrastructure utilized in this project in regard to storm drainage. All retention and routing to the final destination of the stormwater is done on-site.

EROSION AND SEDIMENT CONTROL PRACTICES

The erosion potential for this site as it exists is moderate due to the presence of gravel areas that are highly erodible. During construction, the major potential for erosion is wind and stormwater runoff. The contractor will be required to inspect and maintain all necessary erosion control measures, as well as installing any additional measures as required. All erosion control practices shall conform to "The Stormwater Management and Erosion Control Handbook for Urban and Developing Areas in New Hampshire." Some examples of erosion and sediment control measures to be utilized for this project during construction may include:

- Silt Soxx (or approved alternative) located at the toe of disturbed slopes
- Catch Basin Filters
- Stabilized construction entrance at access point to the site
- Temporary mulching and seeding for disturbed areas
- Spraying water over disturbed areas to minimize wind erosion

After construction, permanent stabilization will be accomplished by permanent seeding, landscaping, and surfacing the access drives and parking areas with asphalt paving and other areas with concrete walkways.

CONCLUSION

The proposed development has been designed to match the pre-development drainage patterns to the greatest extent feasible. With the design of the holding pond, the postdevelopment runoff rates are reduced to be below the pre-development runoff rates. Erosion and sediment control practices will be implemented for both the temporary condition during construction and for final stabilization after construction. Therefore, there are no negative impacts to downstream receptors or adjacent properties anticipated as a result of this project.

REFERENCES

- Comprehensive Environmental Inc. and New Hampshire Department of Environmental Services. *New Hampshire Stormwater Manual (Volumes 1, 2 and 3)*, December 2008 (Revision 1.0).
- Minnick, E.L. and H.T. Marshall. Stormwater Management and Erosion and Sediment Control Handbook for Urban and Developing Areas in New Hampshire, prepared by Rockingham County Conservation District, prepared for New Hampshire Department of Environmental Services, in cooperation with USDA Soil Conservation Service, August 1992.
- 3. HydroCAD Software Solution, LLC. *HydroCAD Stormwater Modeling System Version 10.0* copyright 2013.

APPENDIX F

INSPECTION & MAINTENANCE PLAN



INSPECTION & LONG-TERM MAINTENANCE PLAN FOR PROPOSED HOUSING DEVELOPMENT

10 LEE ROAD MADBURY, NH

Introduction

The intent of this plan is to provide 10 Lee Road, LLC (herein referred to as "owner") with a list of procedures that document the inspection and maintenance requirements of the stormwater management system for this development. Specifically, the detention pond and associated structures on the project site (collectively referred to as the "Stormwater Management System"). The contact information for the owner shall be kept current, and if there is a change of ownership of the property this plan must be transferred to the new owner.

The following inspection and maintenance program is necessary to keep the stormwater management system functioning properly and will help in maintaining a high quality of stormwater runoff to minimize potential environmental impacts. By following the enclosed procedures, the owner will be able to maintain the functional design of the stormwater management system and maximize its ability to remove sediment and other contaminants from site generated stormwater runoff.

Annual Report

The owner shall prepare an annual Inspection & Maintenance Report. The report shall include a summary of the system's maintenance and repair by transmission of the Inspection & Maintenance Log and other information as required. A copy of the report is required to be delivered annually to the Madbury Planning Board.

Inspection & Maintenance Checklist/Log

The following pages contain the Stormwater Management System Inspection & Maintenance Requirements and a blank copy of the Stormwater Management System Inspection & Maintenance Log. These forms are provided to the owner as a guideline for performing the inspection and maintenance of the Stormwater Management System. This is a guideline and should be periodically reviewed for conformance with current practice and standards.

Stormwater Management System Components

The Stormwater Management System is designed to mitigate both the quantity and quality of sitegenerated stormwater runoff. As a result, the design includes the following elements:

Non-Structural BMPs

Non-Structural best management practices (BMP's) include temporary and permanent measures that typically require less labor and capital inputs and are intended to provide protection against erosion of soils. Examples of non-structural BMP's on this project include but are not limited to:

- Temporary and Permanent mulching
- Temporary and Permanent grass cover
- Shrubs and ground covers
- Miscellaneous landscape plantings
- Dust control
- Tree protection
- Topsoiling
- Sediment barriers
- Stabilized construction entrance

Structural BMPs

Structural BMP's are more labor and capital-intensive structures or installations that require more specialized personnel to install. Examples on this project include but are not limited to:

- Sediment Forebay
- Detention Pond
- Outlet Control Structure

Inspection and Maintenance Requirements

The following summarizes the inspection and maintenance requirements for the various BMP's that may be found on this project.

- 1. **Grassed areas:** During construction after each rain event of 0.5" or more during a 24-hour period, inspect grassed areas for signs of disturbance, such as erosion. If damaged areas are discovered, immediately repair the damage. Repairs may include adding new topsoil, lime, seed, fertilizer, and mulch. After construction review grassed areas after large storm events.
- 2. Plantings: Planting and landscaping (trees, shrubs) shall be monitored bi-monthly during the first year to insure viability and vigorous growth. Replace dead or dying vegetation with new stock and adjust the conditions that caused the dead or dying vegetation. During dryer times of the year, provide weekly watering or irrigation during the establishment period of the first year. Make the necessary adjustments to ensure long-term health of the vegetated covers, i.e., provide more

permanent mulch or compost or other means of protection.

- **3. Storm Drain and Catch Basin Inlets/Outlets:** Monitor drain inlets and outlet aprons for excessive accumulation of sediments or missing stone/riprap. Remove sediments as required to maintain filtering capabilities of the stone—replace missing riprap.
- 4. **Detention Pond:** After installation of the detention pond, perform the following inspections on an annual basis:
 - **a.** Monitor for excessive or concentrated accumulations of debris, or excessive erosion below the various pipe inlets. Remove debris as required and replace or augment inlet fabric strips.
 - **b.** Monitor the outfall structure for problems with uneven flow or clogged pipes. Repair or remove clogs as required.
 - c. Monitor vegetation on pond and replace dead or dying vegetation as required.
 - d. Monitor rodent screens and repair or replace as required.
 - e. Monitor side slopes of ponds for damage or erosion—repair, as necessary.

Pollution Prevention

The following pollution prevention activities shall be undertaken to minimize potential impacts on stormwater runoff quality. The Contractor is responsible for all activities during construction. The Owner is responsible thereafter.

Spill Procedures

Any discharge of waste oil or other pollutant shall be reported immediately to the New Hampshire Department of Environmental Services (NHDES). The Contractor/Owner will be responsible for any incident of groundwater contamination resulting from the improper discharge of pollutants to the stormwater system and may be required by NHDES to remediate incidents that may impact groundwater quality. If the property ownership is transferred, the new owner will be informed of the legal responsibilities associated with operation of the stormwater system, as indicated above.

Sanitary Facilities

Sanitary facilities shall be provided during all phases of construction.

Material Storage

No on site trash facility is provided. The customers are required to remove trash from the site. Hazardous material storage is prohibited.

Material Disposal

All waste material, trash, sediment, and debris generated during construction shall be removed from the site and disposed of in accordance with applicable local, state, and federal guidelines and regulations. Removed sediments shall be if necessary dewatered prior to disposal.

Snow & Ice Management for Standard Asphalt and Walkways

Snow storage will be located such that no direct untreated discharges are possible to receiving waters from the storage site.

Invasive Species

Monitor the Stormwater Management System for signs of invasive species growth. If caught early, their eradication is much easier. The most likely places where invasions start is in wetter, disturbed soils or detention ponds. Species such as phragmites and purple loose-strife are common invaders in these wetter areas. If they are found, the owner shall refer to the fact-sheet created by the University of New Hampshire Cooperative Extension or contact a wetlands scientist with experience in invasive species control to implement a plan of action for eradication. Measures that do not require the application of chemical herbicides should be the first line of defense.





New Well Location Approval for Non-Community Public Water Systems

NHDES Drinking Water & Groundwater Bureau

Design Review



RSA/Rule: 485; Env-Dw 406

Directions:

For non-community water systems only – Please complete this form to seek approval to install a new well that will serve a public water system.

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

Definitions:

Non-Community Water System – RSA 485:1-a, XV and X; Env-Dw 103.37

A public water system of piped water for human consumption that is not a community water system, with at least 15 service connections <u>or</u> regularly serves an average of at least 25 individuals daily at least 60 days out of the year.

Non-transient, Non-community (NTNC) Water System – RSA 485:1-a, XI; Env-Dw 103.38

A non-community water system that serves the <u>same 25</u> people, or more, over 6 months per year. Examples: child care centers, schools and workplaces.

Transient, Non-community (TNC) Water System – Env-Dw 103.62

A non-community water system that serves at least 25 persons in a transitory setting for more than 60 days each year. Examples: Restaurants, campgrounds, hotels, and places that serve coffee or other beverage service.

Application Date: <u>1-17-2022</u>	Design Review Number (NHDES use only):
PWS ID Number: <u>1456020</u> (for existing systems)	
10 LEE ROAD	MAP 8 LOT 9
Name of Project	Map & Lot Number
10 LEE ROAD	MADBURY
Location of well (street address)	Location of well (city/town)
Check water system type: 🛛 Non-Transient, Non-Co	mmunity (NTNC) 🗌 Transient, Non-Community (TNC)
1. Property Owner Information	
10 LEE ROAD, LLC	JSPETROVITSIS@GMAIL.COM
Name of Legal Property Owner	Email address
JAMES PETROVITSIS	603-828-2735
Contact Name	Telephone Number
1 BAYSIDE ROAD, BOX 4	
Mailing Address	Fax Number
GREENLAND	NH 03840
City/Town	State ZIP Code + 4
2. Agent Information (if someone has been hired to assi	st the owner with an application, please provide the contact
information. This contact will be used as the primary	contact during approval.)
AMBIT ENGINEERING, INC	JRC@AMBIT ENGINEERING.COM
Agent Company, if applicable	Email address
JOHN CHAGNON, PE	603-430-9282
Contact Name	Telephone Number
200 GRIFFIN ROAD, UNIT 3	603-436-2315
Mailing Address	Fax Number
PORTSMOUTH	<u>NH</u> 03801-7114
City/Town	State ZIP Code + 4

-	
3.	Justification
	State if there is an existing public water supply nearby and if so, why you are not able to connect. Also state why
	the new well(s) is needed. Examples: 1) Systems expansion from 40 people to 100 people. 2) Declining yield from
	existing source 3) New facility that needs water
	No municipal supply nearby. Existing private well. Expansion of demand; existing well radius not protected.
	No maneipal supply nearby. Existing private wen. Expansion of demand, existing wen radius not protected.
_	
4.	
	Include information about irrigation and fire flows, if applicable. For example: The new well will serve a
	campground with 80 campsites or a restaurant with 100 seats.
	The new well will service 19 Apartments; DES design flow (peak) of 9,300 GPD
F	Design Flow – Env-Dw 406.08
5.	Design Flow – Env-Dw 406.08
	Calculate Design Flow using Table 406-1: <u>9,300</u> gallons per day (gpd)
	Enter supporting calculations below including irrigation and fire flow needs, if applicable:
	C2 Reducement V 150 CRD / Reducement 0 200 CRD
	62 Bedrooms X 150 GPD / Bedroom = 9,300 GPD
6.	Number of Equivalent Units – Env-Dw 406.06
	gpd X <u>1 eq. unit</u> =eq. unit(s) (round to nearest whole number)
	300 gpd
	Note: No fee is needed for Well Locations Approvals. A fee is required for Final Design Approvals.
	Note. No jee is needed for wen Locations Approvals. A jee is required for rinar Design Approvals.
-	New Para and a difference of the second state in the second state
1.	Please list any other wells or water supplies on the property and their uses.
	None
1	
1	
1	
1	
1	
1	
1	
1	
1	
1	
1	

8. Sanitary Protective Area – Env-Dw 406.12	
	PA) using the calculated design flow from Section 5 and Table 406-2
	Section 5 as the permitted production volume. For NTNC systems, multiply the
SPA = <u>150 (175) feet</u>	
The SPA is FREE of (check all applicable bo	xes):
🕅 Wastewater systems (septic tanks, gr	ease traps, effluent disposal areas/leach fields);
Fertilization areas;	
 Dumpsters;	
Detention ponds, infiltration systems	s, storm water treatment systems; and
Fuel of other hazardous chemicals su	ch as: oil, gasoline, underground propane and natural gas tanks, etc.
List any other use in the SPA: Gravel drive	to well; pump house
If any of these are located in the SPA, at	
	iters, wetlands, & natural drainage ways? <u>Yes</u> (yes/no)
Is the well at least 50 feet from the edge o	f the right-of-way, driveways, & parking areas? Yes (yes/no)
Is the wellhead above the 100-year floodp	lain elevations? <u>Yes</u> (yes/no)
Is the SPA within the owner's property? Ye	<u>es</u> (yes/no)
Is the wellhead outside the leach field nitra	ate set-back areas? <u>Yes</u> (yes/no)
If any of these answers are "no", attach	a waiver request Env-Dw 202.03
9. Additional System Information	
Do you have pressure storage? <u>Yes</u> (yes/no	o) If yes, how many gallons of storage? <u>TBD</u>
Do you have atmospheric storage tanks? T	BD (yes/no) If yes, how many gallons of storage? TBD
10. Application Check List - include the follow	wing with this application form (check all that apply):
Waivers Request – Env-Dw 202	
Well Location Plan with the following:	
- North Arrow	- Surface waters, wetlands, drainage ways
- Scale	- 100-year floodplain elevation
 Property boundaries 	- Wellhead location
- Lot numbers	- SPA, with the radius noted
- Name of adjacent owners	- 50' radius (common setback)
 Contours, if available Nitrate setbacks 	- Wastewater disposal areas – existing and proposed
11. Signature Required:	- Buildings, roads, right-of-way, driveways, and parking areas
John Chagnon	1-17-2022
Signature of owner or owner's agent	Date
John Chagnon, PE	
Print name of owner or owner's agent	

Return completed form by mail, fax, or email to: NHDES Drinking Water & Groundwater Bureau PO Box 95, Concord, NH 03302-0095 Fax: (603) 271-5171 Email: dwgbinfo@des.nh.gov