TOWN OF OXFORD — BOARD OF SELECTMEN

APPLICATION FOR SPECIAL PERMIT FOR EARTH REMOVAL

FEE: $820.00
($120 ad fee +
$700 review fee).

APPLICANT NAME: S & K Development LLC

APPLICANT ADDRESS: 710 Main Street, North Oxford, MA 01537

SUBJECT PROPERTY: 19 Oxbow Road

STREET LOCATION: 19 Oxbow Road

ASSESSOR'S REFERENCE: MAP AND PARCEL: Map 9 Parcel A21

REGISTRY OF DEEDS: BOOK 61728 **PAGE** 100

OWNER'S NAME: S & K Development LLC

OWNER'S ADDRESS: 710 Main Street, North Oxford, MA 01537

DESCRIPTION: (Describe briefly any pertinent information about the animals; e.g. type and number of animals)

Owner/Applicant is applying for an Earth Removal Permit (ERP) for the above property. The Board of Selectmen had issued an ERP to the previous property owner 05/07/2003.

The ERP was revoked per violations noted in 6/1/2004 notice for the following: 1) Operating outside specified days and times 2)No quarterly reports 3)No sanitary facilities 4) No gates or fencing to secure the site. The current owner seek to rectify these violations.

(SIGNATURE OF APPLICANT) 10/14/2022 (DATE)

(SIGNATURE OF OWNER) 10/14/2022 (DATE)

Updated April 2020

COPY

TO THE APPLICANT:

Please furnish the following information and return to the appropriate board, office, department, commission or division of the Town of Oxford (pursuant to Chapter 53, Section 1 through 5, General By-Laws, Town of Oxford):

APPLICANT or
PRINCIPLE OF ORGANIZATION: S & K Development LLC

Address: 710 North Main Street, North Oxford,MA 01537

PROPERTY
OWNER: Same as above.

Address: Same as above.

****

Board of Assessors:

Property Location: 19 Oxbow Road ✓

Please list parcel owned by above applicant:

Map: 09 ✓ Parcel: A21 ✓ Date Purchased: 1/10/2020 ✓

[signature] 10-14-22

Assessor's Office Date

****

Tax Collector:

Tax Status: Current

Real Estate: Current

Personal Property Tax:

[signature] 10-14-22

Treasurer/Collector's Office Date

Revised Form 4/15/2020

The Commonwealth of Massachusetts
Department of Industrial Accidents
Office of Investigations
Lafayette City Center
2 Avenue de Lafayette, Boston, MA 02111-1750
www.mass.gov/dia

Workers' Compensation Insurance Affidavit: General Businesses

Applicant Information **Please Print Legibly**

Business/Organization Name: S+K Development LLC

Address: 710 Main St., North Oxford

City/State/Zip: 01537 Phone #: 508-207-6855

Are you an employer? Check the appropriate box:

1. ☐ I am a employer with _____ employees (full and/ or part-time).*
2. ☐ I am a sole proprietor or partnership and have no employees working for me in any capacity. [No workers' comp. insurance required]
3. ☒ We are a corporation and its officers have exercised their right of exemption per c. 152, §1(4), and we have no employees. [No workers' comp. insurance required]**
4. ☐ We are a non-profit organization, staffed by volunteers, with no employees. [No workers' comp. insurance req.]

Business Type (required):

5. ☐ Retail
6. ☐ Restaurant/Bar/Eating Establishment
7. ☒ Office and/or Sales (incl. real estate, auto, etc.)
8. ☐ Non-profit
9. ☐ Entertainment
10. ☐ Manufacturing
11. ☐ Health Care
12. ☐ Other _____

*Any applicant that checks box #1 must also fill out the section below showing their workers' compensation policy information.
**If the corporate officers have exempted themselves, but the corporation has other employees, a workers' compensation policy is required and such an organization should check box #1.

I am an employer that is providing workers' compensation insurance for my employees. Below is the policy information.

Insurance Company Name: _____

Insurer's Address: _____

City/State/Zip: _____

Policy # or Self-ins. Lic. #_____ Expiration Date: _____

Attach a copy of the workers' compensation policy declaration page (showing the policy number and expiration date).

Failure to secure coverage as required under § 25A of MGL c. 152 can lead to the imposition of criminal penalties of a fine up to $1,500.00 and/or one-year imprisonment, as well as civil penalties in the form of a STOP WORK ORDER and a fine of up to $250.00 a day against the violator. Be advised that a copy of this statement may be forwarded to the Office of Investigations of the DIA for insurance coverage verification.

I do hereby certify, under the pains and penalties of perjury that the information provided above is true and correct.

Signature: _____ Date: 10/14/2022

Phone #: 508-207-6855

Official use only. Do not write in this area, to be completed by city or town official.

City or Town: _____ **Permit/License #** _____

Issuing Authority (check one):

1. ☐ **Board of Health** 2. ☐ **Building Department** 3. ☐ **City/Town Clerk** 4. ☐ **Licensing Board**
5. ☐ **Selectmen's Office** 6. ☐ **Other** _____

Contact Person: _____ **Phone #:** _____

S. J. MULLANEY ENGINEERING, INC.
CIVIL SITE DESIGN & PERMITTING

March 25, 2021
S & K Development LLC
19 Oxbow Road
Oxford, MA

Stormwater Report

Table of Contents:

- Narrative Summary 1
  - Pre and Post Development Conditions 1-3
  - Low Impact Development Measures 4
  - Summary of Stormwater Standards 1-10 4-6
- Stormwater Checklist 7-14
- HydroCAD SCS Method Calculations
  - Watershed Routing Diagram 15
  - Tabular Summaries for the 2, 10 and 100-Year Storms 16-18
  - Detailed Summaries and Hydrographs for 100-Year Storm 19-29
  - Detailed Summaries and Hydrographs of Stormwater Basins 208, 308 & 318 for the 2, 10 and 100-Year Storms. 30-47
- HydroCAD Literature 48-50
- SCS CN and Rainfall Literature 51-56
- Site Plan 218-D-1, sheets 1 to 5, reduced size 57-61
  - Stormwater Pollution Prevention and Erosion & Sedimentation Control Plan (Plan 218-D-1, sheet 5, reduced size) 61

Narrative Summary:

These drainage calculations analyze existing and proposed stormwater runoff conditions for Plan 218-D-1, entitled, “Site Plan of Land in Oxford, Massachusetts, Located on 19 Oxbow Road,” which depicts a proposed earth removal project. Per the Town of Oxford Zoning Bylaws Chapter XVIII, a Special Permit is required from the Board of Selectmen for earth removal. The previous property owner was issued an earth removal permit on 5/7/2003, which was revoked in 2004. Per the violation letter dated 6/1/2004 the following violations were noted:

1. Conducting operations outside of the specified days and times.
2. Non quarterly reports have been received by the Town.
3. No sanitary facilities on the site.
4. No gates or fencing to secure the site.

The current applicant/owner seeks to complete the removal project begun by the previous owner and intends to correct the violations noted in the 6/1/2004 letter. Following the earth removal, the property is intended to be developed as residential dwellings. Additional soil evaluation testing will be needed to develop future building sites.

The Town of Oxford General Bylaws Chapter 67 (Stormwater Management Requirements) requires a Stormwater Management Plan to be designed to meet the requirements of the Massachusetts Stormwater Management Standards. Therefore, this report has been prepared in accordance with Volume 3, “Documenting Compliances with the Massachusetts Stormwater Management Standards,” Chapter 1, pages 1 to 40, as posted online by Massachusetts Department of Environmental Protection (DEP). The typical mechanism for an applicant to meet the requirements identified in the DEP's Stormwater Managements Standards (SMS) is through the Notice of Intent (NOI) process with the Town's Conservation Commission. The proposed project does not require the filing of a NOI as the proposed work is outside areas subject to the jurisdiction of the Conservation Commission.

Pre-development Conditions:

The locus property is located at 19 Oxbow Road and identified by the Town of Oxford Assessors as Map 9 Parcel 21. The property is situated on the northerly side Oxbow Road and contains ±5.98 acres and is located in a ±7.706-acre drainage area. The property is located at the bend along a high point. The Town of Oxford performed an earth removal project on the adjacent property (Map 9 Parcel A21-01) which improved the sight distance around the bend. The predevelopment drainage area is further divided into three predevelopment drainage subcatchments, numbered 10, 20 and 30. Subcatchment 10 is the area tributary to Oxbow Road easterly and serves as the first point of analysis. Subcatchment 20 drains to an existing low point on the property (Pond 28) which appears to have served as a temporary settling pond. Discharge from Pond 28 that does not exfiltrate, flows westerly to Oxbow Road to the second point of analysis (Pond 39). Subcatchment 30 is the area tributary westerly along Oxbow Road and flow to the second point of analysis (Pond 39). Note Pond 39 is summation nodes and not an actual structure.

Subcatchment / Pond	10	20 / 28	30 / 39
Corresponding Post Development Subcatchment / Pond	100, (Portions of 300) / 109	200 / 208	300, 310, 320 (Portions of 200) / 329
Location	Easterly portion of property draining easterly along Oxbow Road. Tributary area includes abutting residential properties.	Center portion of the property draining to an existing low point.	Westerly portion of the property draining towards Oxbow Road.
Primary Tributary Area Surface Cover	Mix of woods, gravel surface, grass, pavement and rooftop. .	Mix of woods and gravel surfaces.	Mix of woods, brush, gravel surface, grass, pavement and rooftop. .

The Worcester County Soil Survey, issued by the USDA Soil Conservation Service (SCS), now the Natural Resources Conservation Service (NRCS), includes delineation of soils in the vicinity of the locus by name and by hydrologic characteristics. The soil maps show broad areas that have similar patterns. The Soil Survey identifies the following soils in the drainage area:

Subcatchment(s)	Soil Name	Map Unit	Hydrologic Soil Group (HSG)
10	Charlton-Hollis Rock Outcrop Complex	102C	B
10	Paxton Fine Sandy Loam	307C	C
20	Charlton-Hollis Rock Outcrop Complex	102C	B
20	Paxton Fine Sandy Loam	307E	C

30	Charlton-Hollis Rock Outcrop Complex	102C	B
30	Paxton Fine Sandy Loam	307E	C

The locus property primarily contains Charlton-Hollis Rock Complex soil based on the mapping and confirmed by on-site soil testing. The Soil Survey identifies the permeability of Charlton-Hollis Rock Complex soil as moderate or moderately rapid. The Soil Survey mapping also indicates the area contains Paxton soils but this was not represented in most of the test holes. Soil test hole #6 indicated a change from gravelly soils to silt loam at a depth of 14 feet. Conservatively, the drainage calculations assume the Soil Survey mapping is correct.

Post-development Conditions:

S & K Development LLC proposes to complete the earth removal project begun by the previous owner. The grading shown respects the required 50-foot setback from abutting property lines. The site access is via the existing gravel driveway. Two stormwater ponds (308 & 318) are proposed on the easterly and westerly sides of the access drive to control stormwater runoff from the property. The existing depression Pond 28 is relabeled in post development as Pond 208. The proposed site alterations are located outside any jurisdictional areas with the Massachusetts Wetlands Protection Act, therefore, the filing of a Notice of Intent with the Conservation Commission is not required. The previous owner had obtained a Negative Determination of Applicability for the earth removal operation on the property.

Under post-development conditions, the three pre-development subcatchments are divided into five (5) post-development Subcatchments (100, 200, 300, 310 and 320). The limits of the subcatchments are depicted on Site Plan 218-D-1. The two pre-development points of analysis (Ponds 19 and 39) are identified as Ponds 109 and 329, respectively, in the post-development analysis. Note Ponds 109 and 329 are summation nodes and not an actual structures.

The design storm for the calculations is the 100-year event which corresponds to the design storm identified in the Earth Removal Bylaw. These calculations also include the 2 and 10-year storm events as required by the Massachusetts Stormwater Standards. The stormwater collection system is designed to pre-treat, attenuate and recharge stormwater. Pretreatment consists of runoff from grassed surfaces flowing to rip-rap swales, discharging to a sediment forebay. The sediment forebay discharges via stone dikes to the infiltration portion of stormwater basins. A broad-crested weir serves as an emergency outlet for larger storm events. Exfiltration will serve as the outlet for the stormwater basins. Exfiltration over the stormwater basin's surface area is identified as being discarded in the calculations.

The sediment forebay is also sized to attenuate larger storm events prior to discharge into the infiltration basin. No impervious surfaces are proposed for the project; therefore, no water quality volumes or recharge volume are required per the Stormwater Management Standards. The soil test holes were used in determining the high groundwater elevations that limit attenuation and storage depths of the infiltration basin. An exfiltration rate of 1.02 inches per hour is used in modeling the infiltration basin, which is a minimum rate recommended for sandy loam soils (ref: "Estimation of Soil Properties," Transactions of the American Society of Agricultural Engineers, Vol. 25, No. J, 1982, also known as the Rawls rate).

Low Impact Development (LID) Measures:

The goal of LID measures is the reduction of impervious surfaces. Since no impervious surfaces are proposed the project is an LID. Also, the proposed project utilizes the existing site access and low point (Pond 28) in the grading. The proposed project has been calculated to not increase stormwater runoff rates.

Summary of Stormwater Management Standards:

Standard 1: No New Untreated Discharges or Erosion to Wetlands:

Plan 218-D-1, sheet 5 provides a Stormwater Pollution Prevention and Erosion & Sedimentation Control Plan for this project which contains notes and details identifying erosion control measures to be utilized on site.

Standard 2: Peak Rate Attenuation:

Calculations for peak attenuation have been prepared for the 2, 10 and 100-year storm events as required by the Stormwater Management Standards.

Calculation Methodology Summary

These drainage calculations analyze existing and proposed stormwater runoff conditions for Plan 218-D-1. The calculations have been prepared using the HydroCAD Stormwater Modeling System. HydroCAD uses the Natural Resources Conservation Service (NRCS) (formerly the Soil Conservation Service (SCS)) TR-20 methodology. Please note that both pre-development and post-development calculations have been prepared on the same HydroCAD file.

(SCS) TR-20 Methodology

The charts below summarize the peak surface stormwater runoff (in cubic feet per second ((CFS)) for each storm event using (SCS) TR-20 methodology. The charts below summarizes the peak surface stormwater runoff (for each storm event using (SCS) TR-20 methodology. Under post development conditions, the results indicate that the overall drainage area experiences a decrease in peak rates of runoff for the calculated storm events. Accordingly, we do not anticipate adverse effects or flooding of neighboring or down gradient properties.

2-Year Storm		
Point of Analysis (Subcatchment or Pond)	Peak Runoff Rate, Q ($ft.^3$/sec.)	
	Predevelopment	Postdevelopment
#1:10 /100	3.37	2.20
#2: 39 /329	2.47	1.17

March 25, 2021
S & K Development LLC
19 Oxbow Road
Oxford, MA

Stormwater Report

10-Year Storm		
Point of Analysis (Subcatchment or Pond)	Peak Runoff Rate, Q (ft.^{3}/sec.)	
	Predevelopment	Postdevelopment
#1:10 /100	6.72	4.38
#2: 39 /329	5.15	2.50

100-Year Storm		
Point of Analysis (Subcatchment or Pond)	Peak Runoff Rate, Q (ft.^{3}/sec.)	
	Predevelopment	Postdevelopment
#1:10 /100	13.34	8.70
#2: 39 /329	10.58	5.23

Standard 3: Recharge

This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook. In the Handbook required recharge is calculated by multiplying the impervious area by a factor depth based on the hydrologic soil type displaced by the impervious surface. Since the project does not proposed any impervious the required recharge volume is zero and the Standard has been met.

Standard 4: Water Quality

The sections, Monitoring and Operation, Operations, Maintenance, and Stormwater Basin Maintenance, of the Drainage System Operations & Maintenance Plan on Plan 218-D-1, sheet 5, provide long term pollution prevention provisions.

The Standards require 80% removal of Total Suspended Solids (TSS) post construction. The post construction condition is grassed surfaces. As in Standard 3, required water quality volumes to be treated are calculated by multiplying the impervious area by a depth factor. Since the project does not proposed any impervious the required recharge water quality volume is zero and the Standard has been met.

Standard 5: Land Uses With Higher Potential Pollutant Loads

The design plan is intended to meet the requirements of the National Storm Water Pollution Discharge Elimination System (NPDES) as documented in Notes II (A), II (B) and II (C) on Plan 218-D-1, sheet 5. Since post construction condition is grassed surfaces, the uses is not considered Land Uses with Higher Potential Pollutant Loads (LUHPPL).

Standard 6: Critical Areas

The site is not located within a critical area.

Standard 7: Redevelopment

The site is not classified as redevelopment.

Standard 8: Construction Period Controls

218 D-1, sheet 5 provides a Stormwater Pollution Prevention and Erosion & Sedimentation Plan for this project. The plan contains notes and details identifying erosions control measures to be utilized on site. The design plan is intended to meet NPDES requirements as documented in Notes II (A), II (B) and II (C).

The Massachusetts Erosion and Sedimentation Control Guidelines require that construction period sediment control traps must be sized to provide 3,600 cubic feet of storage per acre drained. Construction of the site will disturb approximately 3.7 acres.

Sediment trap volume required:

Total site: ±3.7 ac. x 3,600 c.f. / ac. = 13,320 ft^3 (0.31 ac.-ft.)

Notes 1.08 & 1.09 and the Temporary Settling Basin detail on Plan 218-D-1, sheet 5 address this requirement.

Volume 3, Chapter 1, page 41 states, ”When computing the number of acres draining into a common location, it is not necessary to include flows from off-site areas that are either undisturbed or have undergone final stabilization where such flows are diverted around both the disturbed area and the sediment trap.”

Standard 9: Operations and Maintenance Plan

Design Plan 218-D-1, sheet 5 includes a Drainage System Operations & Maintenance Plan in Notes III (B) Monitoring and Operations, III (C) Operations, III (D) Maintenance and III (E) Storm Water Basin Maintenance.

Standard 10: Illicit Discharge to Drainage System

No illicit discharges are proposed. Note I (G) on Plan 218-D-1, sheet 5 contains an illicit discharges compliance note.

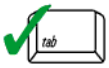
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

S & K Development LLC, 19 Oxbow Road, Oxford, Mass.

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

S & K Development LLC, 19 Oxbow Road, Oxford, Mass.

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

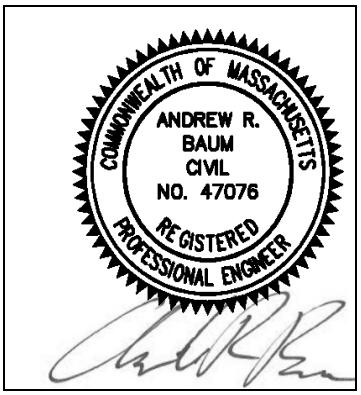
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



Andrew R. Baum, P.E., President
S. J. Mullaney Engineering, Inc.

March 25, 2021

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

S & K Development LLC, 19 Oxbow Road, Oxford, Mass.

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☒ Reduced Impervious Area (Redevelopment Only)

☒ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☒ Use of “country drainage” versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☐ Other (describe): _____

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

S & K Development LLC, 19 Oxbow Road, Oxford, Mass.

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

S & K Development LLC, 19 Oxbow Road, Oxford, Mass.

Checklist (continued)

Standard 3: Recharge (continued)

☒ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Pavement sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☐ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

S & K Development LLC, 19 Oxbow Road, Oxford, Mass.

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☒ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

S & K Development LLC, 19 Oxbow Road, Oxford, Mass.

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

S & K Development LLC, 19 Oxbow Road, Oxford, Mass.

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☒ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☐ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

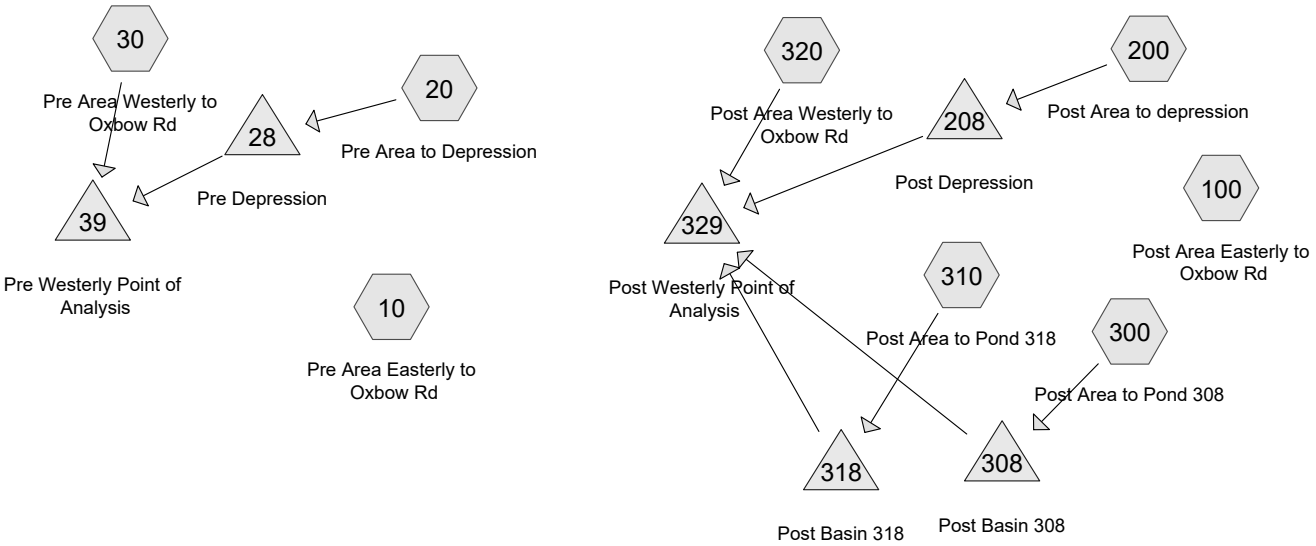
- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.



Subcat Reach Pond Link

Routing Diagram for 218-SKD-19 Oxbow Rd Oxford
Prepared by S. J. Mullaney Engineering, Inc., Printed 3/23/2021

218-SKD-19 Oxbow Rd Oxford *Type III 24-hr 2 Year Rainfall=3.20"*
Prepared by S. J. Mullaney Engineering, Inc. Printed 3/23/2021

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 10: Pre Area Easterly to Runoff Area=3.500 ac 9.11% Impervious Runoff Depth=1.04"
Flow Length=690' Tc=11.0 min CN=74 Runoff=3.37 cfs 0.303 af

Subcatchment 20: Pre Area to Depression Runoff Area=1.046 ac 0.00% Impervious Runoff Depth=1.15"
Flow Length=405' Tc=8.3 min CN=76 Runoff=1.23 cfs 0.100 af

Subcatchment 30: Pre Area Westerly to Runoff Area=3.160 ac 7.09% Impervious Runoff Depth=0.93"
Flow Length=840' Tc=13.5 min CN=72 Runoff=2.47 cfs 0.245 af

Subcatchment 100: Post Area Easterly to Runoff Area=2.282 ac 13.98% Impervious Runoff Depth=1.04"
Flow Length=690' Tc=11.0 min CN=74 Runoff=2.20 cfs 0.197 af

Subcatchment 200: Post Area to depression Runoff Area=0.495 ac 0.00% Impervious Runoff Depth=0.69"
Flow Length=240' Tc=7.7 min CN=67 Runoff=0.30 cfs 0.028 af

Subcatchment 300: Post Area to Pond 308 Runoff Area=1.780 ac 0.00% Impervious Runoff Depth=0.78"
Flow Length=590' Tc=11.3 min CN=69 Runoff=1.17 cfs 0.116 af

Subcatchment 310: Post Area to Pond 318 Runoff Area=1.541 ac 0.00% Impervious Runoff Depth=0.60"
Flow Length=435' Tc=9.6 min CN=65 Runoff=0.74 cfs 0.077 af

Subcatchment 320: Post Area Westerly to Runoff Area=1.608 ac 13.93% Impervious Runoff Depth=0.88"
Flow Length=840' Tc=13.5 min CN=71 Runoff=1.17 cfs 0.118 af

Pond 28: Pre Depression Peak Elev=662.66' Storage=2,796 cf Inflow=1.23 cfs 0.100 af
Discarded=0.05 cfs 0.063 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.063 af

Pond 39: Pre Westerly Point of Analysis Inflow=2.47 cfs 0.245 af
Primary=2.47 cfs 0.245 af

Pond 208: Post Depression Peak Elev=661.04' Storage=626 cf Inflow=0.30 cfs 0.028 af
Discarded=0.02 cfs 0.026 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.026 af

Pond 308: Post Basin 308 Peak Elev=653.68' Storage=2,792 cf Inflow=1.17 cfs 0.116 af
Discarded=0.07 cfs 0.093 af Primary=0.00 cfs 0.000 af Outflow=0.07 cfs 0.093 af

Pond 318: Post Basin 318 Peak Elev=647.03' Storage=1,511 cf Inflow=0.74 cfs 0.077 af
Discarded=0.07 cfs 0.075 af Primary=0.00 cfs 0.000 af Outflow=0.07 cfs 0.075 af

Pond 329: Post Westerly Point of Analysis Inflow=1.17 cfs 0.118 af
Primary=1.17 cfs 0.118 af

218-SKD-19 Oxbow Rd Oxford *Type III 24-hr 10 Year Rainfall=4.50"*
Prepared by S. J. Mullaney Engineering, Inc. Printed 3/23/2021

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 10: Pre Area Easterly to Runoff Area=3.500 ac 9.11% Impervious Runoff Depth=1.97"
Flow Length=690' Tc=11.0 min CN=74 Runoff=6.72 cfs 0.575 af

Subcatchment 20: Pre Area to Depression Runoff Area=1.046 ac 0.00% Impervious Runoff Depth=2.13"
Flow Length=405' Tc=8.3 min CN=76 Runoff=2.37 cfs 0.186 af

Subcatchment 30: Pre Area Westerly to Runoff Area=3.160 ac 7.09% Impervious Runoff Depth=1.82"
Flow Length=840' Tc=13.5 min CN=72 Runoff=5.15 cfs 0.479 af

Subcatchment 100: Post Area Easterly to Runoff Area=2.282 ac 13.98% Impervious Runoff Depth=1.97"
Flow Length=690' Tc=11.0 min CN=74 Runoff=4.38 cfs 0.375 af

Subcatchment 200: Post Area to depression Runoff Area=0.495 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=240' Tc=7.7 min CN=67 Runoff=0.75 cfs 0.060 af

Subcatchment 300: Post Area to Pond 308 Runoff Area=1.780 ac 0.00% Impervious Runoff Depth=1.60"
Flow Length=590' Tc=11.3 min CN=69 Runoff=2.67 cfs 0.238 af

Subcatchment 310: Post Area to Pond 318 Runoff Area=1.541 ac 0.00% Impervious Runoff Depth=1.33"
Flow Length=435' Tc=9.6 min CN=65 Runoff=1.94 cfs 0.171 af

Subcatchment 320: Post Area Westerly to Runoff Area=1.608 ac 13.93% Impervious Runoff Depth=1.75"
Flow Length=840' Tc=13.5 min CN=71 Runoff=2.50 cfs 0.234 af

Pond 28: Pre Depression Peak Elev=663.73' Storage=5,527 cf Inflow=2.37 cfs 0.186 af
Discarded=0.07 cfs 0.102 af Primary=0.00 cfs 0.000 af Outflow=0.07 cfs 0.102 af

Pond 39: Pre Westerly Point of Analysis Inflow=5.15 cfs 0.479 af
Primary=5.15 cfs 0.479 af

Pond 208: Post Depression Peak Elev=661.94' Storage=1,604 cf Inflow=0.75 cfs 0.060 af
Discarded=0.03 cfs 0.042 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.042 af

Pond 308: Post Basin 308 Peak Elev=654.76' Storage=6,784 cf Inflow=2.67 cfs 0.238 af
Discarded=0.10 cfs 0.142 af Primary=0.00 cfs 0.000 af Outflow=0.10 cfs 0.142 af

Pond 318: Post Basin 318 Peak Elev=647.72' Storage=4,137 cf Inflow=1.94 cfs 0.171 af
Discarded=0.11 cfs 0.143 af Primary=0.00 cfs 0.000 af Outflow=0.11 cfs 0.143 af

Pond 329: Post Westerly Point of Analysis Inflow=2.50 cfs 0.234 af
Primary=2.50 cfs 0.234 af

218-SKD-19 Oxbow Rd Oxford *Type III 24-hr 100 Year Rainfall=6.80"*
Prepared by S. J. Mullaney Engineering, Inc. Printed 3/23/2021

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 10: Pre Area Easterly to Runoff Area=3.500 ac 9.11% Impervious Runoff Depth=3.87"
Flow Length=690' Tc=11.0 min CN=74 Runoff=13.34 cfs 1.128 af

Subcatchment 20: Pre Area to Depression Runoff Area=1.046 ac 0.00% Impervious Runoff Depth=4.08"
Flow Length=405' Tc=8.3 min CN=76 Runoff=4.56 cfs 0.356 af

Subcatchment 30: Pre Area Westerly to Runoff Area=3.160 ac 7.09% Impervious Runoff Depth=3.66"
Flow Length=840' Tc=13.5 min CN=72 Runoff=10.58 cfs 0.964 af

Subcatchment 100: Post Area Easterly to Runoff Area=2.282 ac 13.98% Impervious Runoff Depth=3.87"
Flow Length=690' Tc=11.0 min CN=74 Runoff=8.70 cfs 0.736 af

Subcatchment 200: Post Area to depression Runoff Area=0.495 ac 0.00% Impervious Runoff Depth=3.15"
Flow Length=240' Tc=7.7 min CN=67 Runoff=1.69 cfs 0.130 af

Subcatchment 300: Post Area to Pond 308 Runoff Area=1.780 ac 0.00% Impervious Runoff Depth=3.35"
Flow Length=590' Tc=11.3 min CN=69 Runoff=5.81 cfs 0.497 af

Subcatchment 310: Post Area to Pond 318 Runoff Area=1.541 ac 0.00% Impervious Runoff Depth=2.95"
Flow Length=435' Tc=9.6 min CN=65 Runoff=4.59 cfs 0.379 af

Subcatchment 320: Post Area Westerly to Runoff Area=1.608 ac 13.93% Impervious Runoff Depth=3.56"
Flow Length=840' Tc=13.5 min CN=71 Runoff=5.23 cfs 0.476 af

Pond 28: Pre Depression Peak Elev=665.18' Storage=11,246 cf Inflow=4.56 cfs 0.356 af
Discarded=0.11 cfs 0.166 af Primary=0.00 cfs 0.000 af Outflow=0.11 cfs 0.166 af

Pond 39: Pre Westerly Point of Analysis Inflow=10.58 cfs 0.964 af
Primary=10.58 cfs 0.964 af

Pond 208: Post Depression Peak Elev=663.08' Storage=3,733 cf Inflow=1.69 cfs 0.130 af
Discarded=0.06 cfs 0.079 af Primary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.079 af

Pond 308: Post Basin 308 Peak Elev=656.62' Storage=15,991 cf Inflow=5.81 cfs 0.497 af
Discarded=0.14 cfs 0.204 af Primary=0.00 cfs 0.000 af Outflow=0.14 cfs 0.204 af

Pond 318: Post Basin 318 Peak Elev=648.97' Storage=11,139 cf Inflow=4.59 cfs 0.379 af
Discarded=0.14 cfs 0.213 af Primary=0.00 cfs 0.000 af Outflow=0.14 cfs 0.213 af

Pond 329: Post Westerly Point of Analysis Inflow=5.23 cfs 0.476 af
Primary=5.23 cfs 0.476 af

Summary for Subcatchment 10: Pre Area Easterly to Oxbow Rd

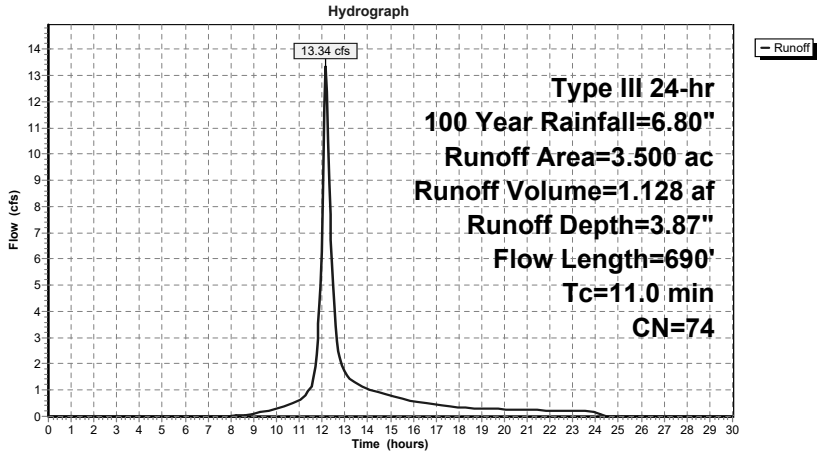
Runoff = 13.34 cfs @ 12.16 hrs, Volume= 1.128 af, Depth= 3.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.80"

Area (ac)	CN	Description
0.048	98	Roofs, HSG C
0.020	98	Paved parking, HSG B
0.251	98	Paved parking, HSG C
0.293	85	Gravel roads, HSG B
0.292	89	Gravel roads, HSG C
0.280	55	Woods, Good, HSG B
1.484	70	Woods, Good, HSG C
0.280	61	>75% Grass cover, Good, HSG B
0.552	74	>75% Grass cover, Good, HSG C
3.500	74	Weighted Average
3.181		90.89% Pervious Area
0.319		9.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.20"
1.9	210	0.1430	1.89		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
1.9	190	0.1150	1.70		**Shallow Concentrated Flow, CD** Woodland Kv= 5.0 fps
0.7	240	0.0700	5.37		**Shallow Concentrated Flow, DE** Paved Kv= 20.3 fps
11.0	690	Total			

Subcatchment 10: Pre Area Easterly to Oxbow Rd



Summary for Subcatchment 20: Pre Area to Depression

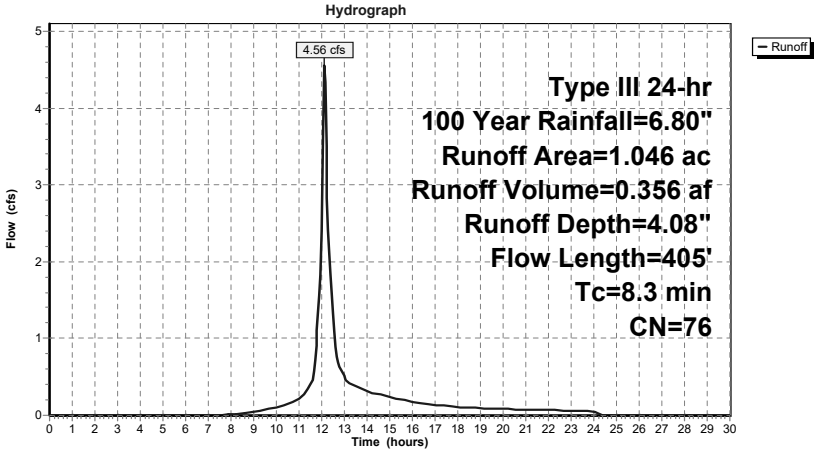
Runoff = 4.56 cfs @ 12.12 hrs, Volume= 0.356 af, Depth= 4.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.80"

Area (ac)	CN	Description
0.525	85	Gravel roads, HSG B
0.120	89	Gravel roads, HSG C
0.289	55	Woods, Good, HSG B
0.112	70	Woods, Good, HSG C
1.046	76	Weighted Average
1.046		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.20"
1.8	355	0.1100	3.32		**Shallow Concentrated Flow, BC** Nearly Bare & Untilled Kv= 10.0 fps
8.3	405	Total			

Subcatchment 20: Pre Area to Depression



Summary for Subcatchment 30: Pre Area Westerly to Oxbow Rd

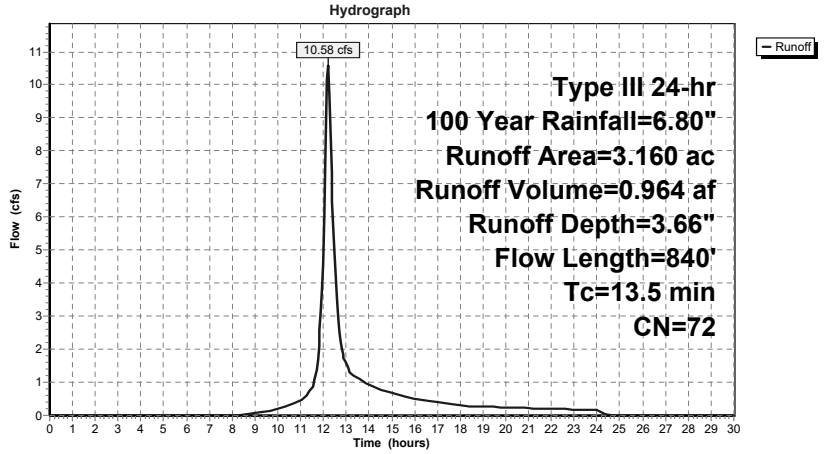
Runoff = 10.58 cfs @ 12.19 hrs, Volume= 0.964 af, Depth= 3.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.80"

Area (ac)	CN	Description
0.010	98	Roofs, HSG B
0.105	98	Paved roads w/curbs & sewers, HSG B
0.109	98	Paved roads w/curbs & sewers, HSG C
0.573	85	Gravel roads, HSG B
0.238	55	Woods, Good, HSG B
0.489	70	Woods, Good, HSG C
0.710	67	Brush, Poor, HSG B
0.389	77	Brush, Poor, HSG C
0.537	61	>75% Grass cover, Good, HSG B
3.160	72	Weighted Average
2.936		92.91% Pervious Area
0.224		7.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0250	0.11		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.20"
3.4	240	0.0290	1.19		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
2.6	550	0.0300	3.52		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
13.5	840	Total			

Subcatchment 30: Pre Area Westerly to Oxbow Rd



Summary for Subcatchment 100: Post Area Easterly to Oxbow Rd

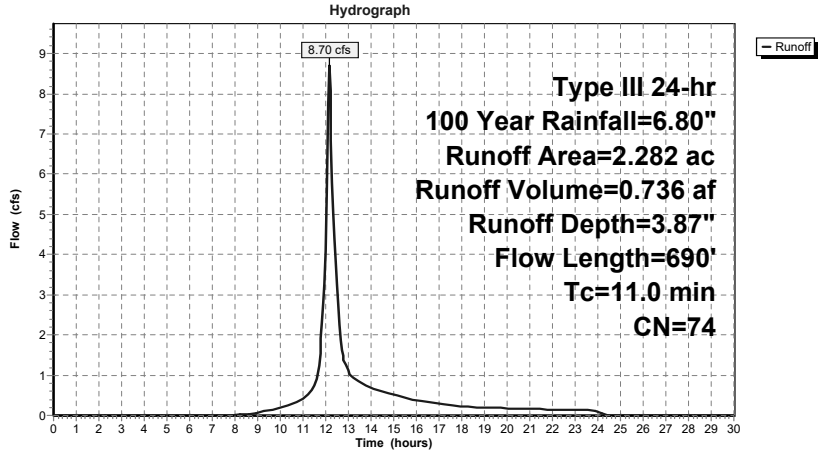
Runoff = 8.70 cfs @ 12.16 hrs, Volume= 0.736 af, Depth= 3.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.80"

Area (ac)	CN	Description
0.048	98	Roofs, HSG C
0.020	98	Paved parking, HSG B
0.251	98	Paved parking, HSG C
0.028	55	Woods, Good, HSG B
1.101	70	Woods, Good, HSG C
0.280	61	>75% Grass cover, Good, HSG B
0.554	74	>75% Grass cover, Good, HSG C
2.282	74	Weighted Average
1.963		86.02% Pervious Area
0.319		13.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.20"
1.9	210	0.1430	1.89		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
1.9	190	0.1150	1.70		**Shallow Concentrated Flow, CD** Woodland Kv= 5.0 fps
0.7	240	0.0700	5.37		**Shallow Concentrated Flow, DE** Paved Kv= 20.3 fps
11.0	690	Total			

Subcatchment 100: Post Area Easterly to Oxbow Rd



Summary for Subcatchment 200: Post Area to depression

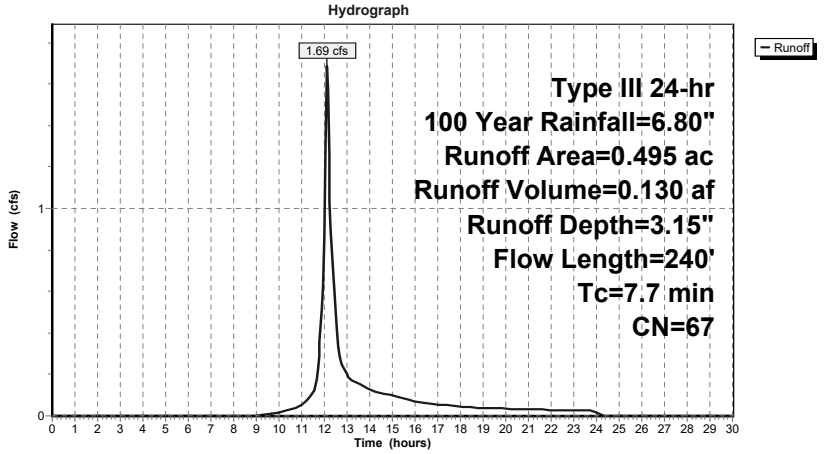
Runoff = 1.69 cfs @ 12.11 hrs, Volume= 0.130 af, Depth= 3.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.80"

Area (ac)	CN	Description
0.028	55	Woods, Good, HSG B
0.234	61	>75% Grass cover, Good, HSG B
0.233	74	>75% Grass cover, Good, HSG C
0.495	67	Weighted Average
0.495		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.20"
0.3	30	0.1330	1.82		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
0.2	65	0.5000	4.95		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.7	95	0.1000	2.21		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
7.7	240	Total			

Subcatchment 200: Post Area to depression



Summary for Subcatchment 300: Post Area to Pond 308

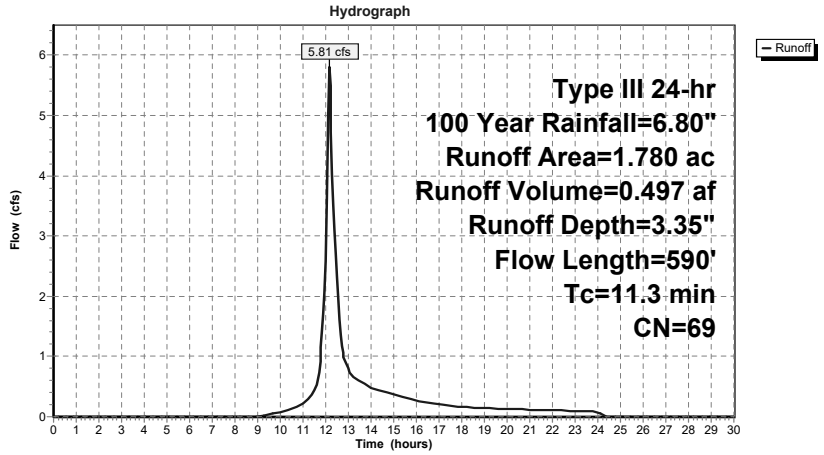
Runoff = 5.81 cfs @ 12.16 hrs, Volume= 0.497 af, Depth= 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.80"

Area (ac)	CN	Description
0.137	55	Woods, Good, HSG B
0.072	70	Woods, Good, HSG C
0.528	61	>75% Grass cover, Good, HSG B
1.043	74	>75% Grass cover, Good, HSG C
1.780	69	Weighted Average
1.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.1200	0.14		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.20"
0.6	70	0.1700	2.06		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
0.2	50	0.5000	4.95		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
4.5	420	0.0500	1.57		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
11.3	590	Total			

Subcatchment 300: Post Area to Pond 308



Summary for Subcatchment 310: Post Area to Pond 318

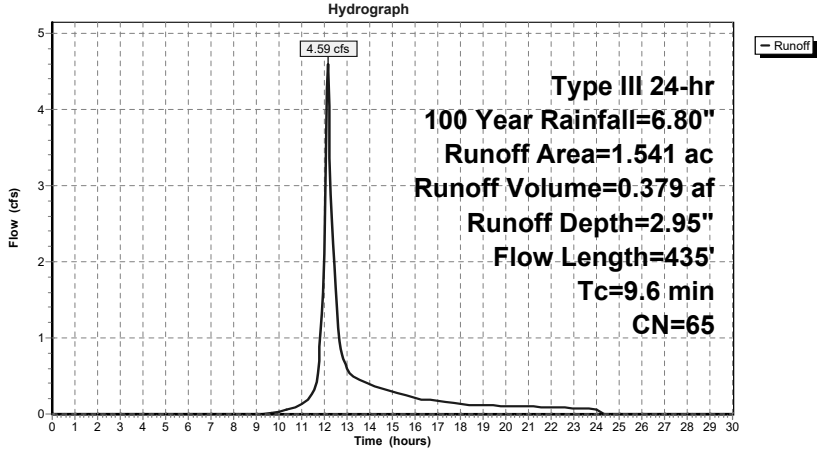
Runoff = 4.59 cfs @ 12.14 hrs, Volume= 0.379 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.80"

Area (ac)	CN	Description
0.054	89	Gravel roads, HSG C
0.138	70	Woods, Good, HSG C
1.105	61	>75% Grass cover, Good, HSG B
0.244	74	>75% Grass cover, Good, HSG C
1.541	65	Weighted Average
1.541		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.1200	0.14		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.20"
0.3	75	0.5000	4.95		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
3.3	310	0.0500	1.57		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
9.6	435	Total			

Subcatchment 310: Post Area to Pond 318



Summary for Subcatchment 320: Post Area Westerly to Oxbow Rd

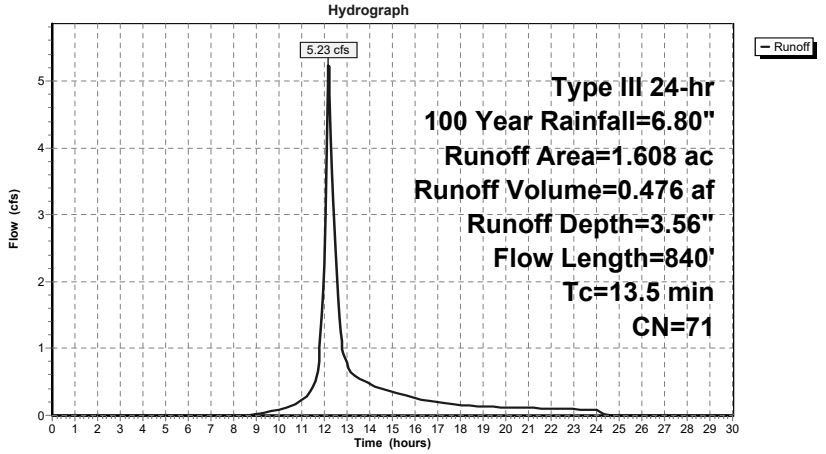
Runoff = 5.23 cfs @ 12.19 hrs, Volume= 0.476 af, Depth= 3.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=6.80"

Area (ac)	CN	Description
0.010	98	Roofs, HSG B
0.105	98	Paved roads w/curbs & sewers, HSG B
0.109	98	Paved roads w/curbs & sewers, HSG C
0.068	85	Gravel roads, HSG B
0.649	70	Woods, Good, HSG C
0.600	61	>75% Grass cover, Good, HSG B
0.067	74	>75% Grass cover, Good, HSG C
1.608	71	Weighted Average
1.384		86.07% Pervious Area
0.224		13.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0250	0.11		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.20"
3.4	240	0.0290	1.19		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
2.6	550	0.0300	3.52		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
13.5	840	Total			

Subcatchment 320: Post Area Westerly to Oxbow Rd



Summary for Pond 28: Pre Depression

Inflow Area = 1.046 ac, 0.00% Impervious, Inflow Depth = 4.08" for 100 Year event
Inflow = 4.56 cfs @ 12.12 hrs, Volume= 0.356 af
Outflow = 0.11 cfs @ 17.65 hrs, Volume= 0.166 af, Atten= 97%, Lag= 332.1 min
Discarded = 0.11 cfs @ 17.65 hrs, Volume= 0.166 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 665.18' @ 17.65 hrs Surf.Area= 4,860 sf Storage= 11,246 cf

Plug-Flow detention time= 529.3 min calculated for 0.166 af (47% of inflow)
Center-of-Mass det. time= 413.4 min (1,234.2 - 820.8)

Volume	Invert	Avail.Storage	Storage Description
#1	660.00'	52,371 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

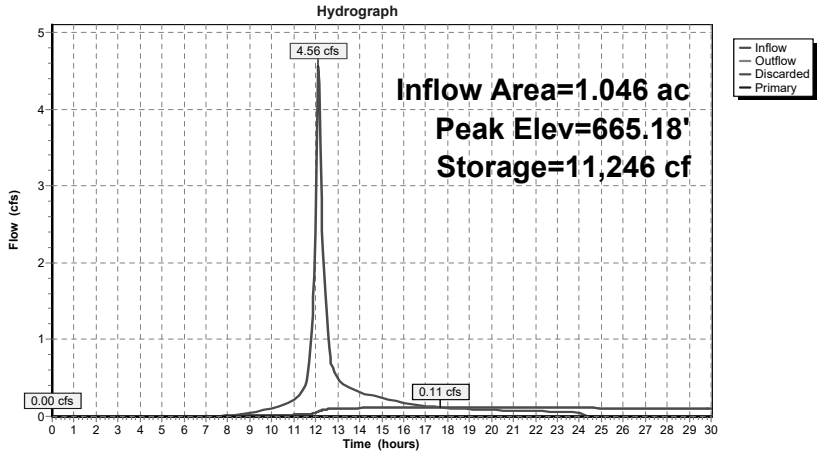
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
660.00	347	0	0
662.00	1,342	1,689	1,689
664.00	3,353	4,695	6,384
666.00	5,899	9,252	15,636
668.00	9,142	15,041	30,677
670.00	12,552	21,694	52,371

Device	Routing	Invert	Outlet Devices
#1	Primary	667.00'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	660.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.11 cfs @ 17.65 hrs HW=665.18' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=660.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 28: Pre Depression

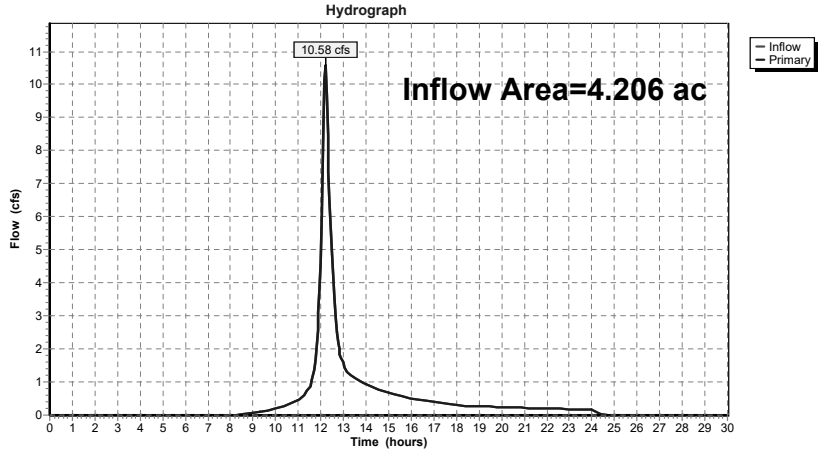


Summary for Pond 39: Pre Westerly Point of Analysis

Inflow Area = 4.206 ac, 5.33% Impervious, Inflow Depth = 2.75" for 100 Year event
Inflow = 10.58 cfs @ 12.19 hrs, Volume= 0.964 af
Primary = 10.58 cfs @ 12.19 hrs, Volume= 0.964 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 39: Pre Westerly Point of Analysis



Summary for Pond 208: Post Depression

Inflow Area = 0.495 ac, 0.00% Impervious, Inflow Depth = 3.15" for 100 Year event
Inflow = 1.69 cfs @ 12.11 hrs, Volume= 0.130 af
Outflow = 0.06 cfs @ 16.88 hrs, Volume= 0.079 af, Atten= 97%, Lag= 285.8 min
Discarded = 0.06 cfs @ 16.88 hrs, Volume= 0.079 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 663.08' @ 16.88 hrs Surf.Area= 2,431 sf Storage= 3,733 cf

Plug-Flow detention time= 498.2 min calculated for 0.079 af (61% of inflow)
Center-of-Mass det. time= 387.4 min (1,228.0 - 840.5)

Volume	Invert	Avail.Storage	Storage Description
#1	660.00'	35,859 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

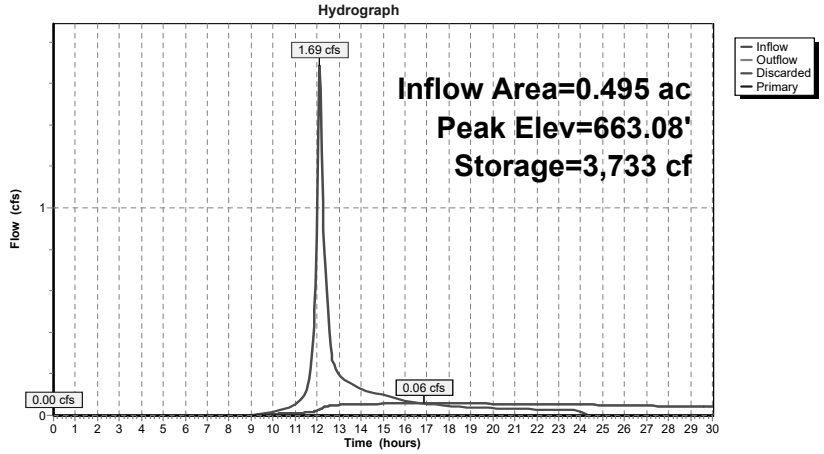
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
660.00	347	0	0
662.00	1,342	1,689	1,689
664.00	3,353	4,695	6,384
666.00	5,899	9,252	15,636
668.00	9,142	15,041	30,677
668.50	11,585	5,182	35,859

Device	Routing	Invert	Outlet Devices
#1	Primary	667.00'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	660.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.06 cfs @ 16.88 hrs HW=663.08' (Free Discharge)
↑└**2=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=660.00' (Free Discharge)
↑└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 208: Post Depression



Summary for Pond 308: Post Basin 308

Inflow Area = 1.780 ac, 0.00% Impervious, Inflow Depth = 3.35" for 100 Year event
Inflow = 5.81 cfs @ 12.16 hrs, Volume= 0.497 af
Outflow = 0.14 cfs @ 19.33 hrs, Volume= 0.204 af, Atten= 98%, Lag= 430.3 min
Discarded = 0.14 cfs @ 19.33 hrs, Volume= 0.204 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 656.62' @ 19.33 hrs Surf.Area= 5,891 sf Storage= 15,991 cf

Plug-Flow detention time= 528.5 min calculated for 0.203 af (41% of inflow)
Center-of-Mass det. time= 404.9 min (1,244.3 - 839.4)

Volume	Invert	Avail.Storage	Storage Description
#1	652.00'	29,160 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

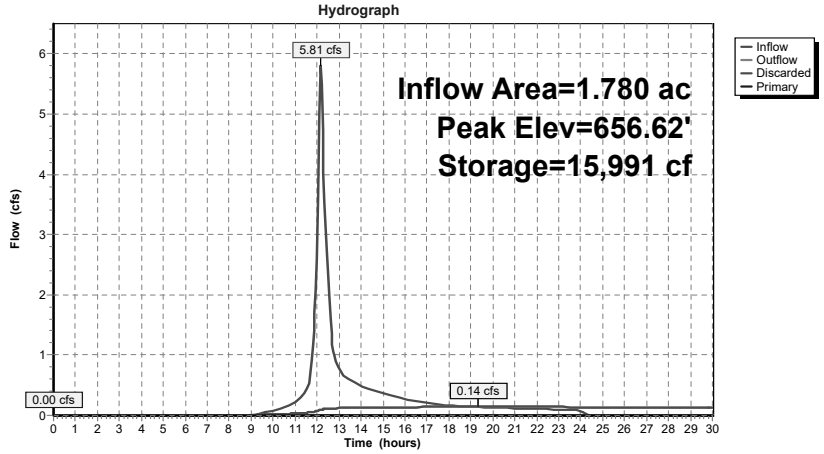
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
652.00	274	0	0
654.00	3,573	3,847	3,847
656.00	5,157	8,730	12,577
658.00	7,533	12,690	25,267
658.50	8,040	3,893	29,160

Device	Routing	Invert	Outlet Devices
#1	Primary	658.00'	**4.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	652.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.14 cfs @ 19.33 hrs HW=656.62' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=652.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 308: Post Basin 308



Summary for Pond 318: Post Basin 318

Inflow Area = 1.541 ac, 0.00% Impervious, Inflow Depth = 2.95" for 100 Year event
Inflow = 4.59 cfs @ 12.14 hrs, Volume= 0.379 af
Outflow = 0.14 cfs @ 17.68 hrs, Volume= 0.213 af, Atten= 97%, Lag= 332.1 min
Discarded = 0.14 cfs @ 17.68 hrs, Volume= 0.213 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 648.97' @ 17.68 hrs Surf.Area= 6,077 sf Storage= 11,139 cf

Plug-Flow detention time= 516.7 min calculated for 0.213 af (56% of inflow)
Center-of-Mass det. time= 399.3 min (1,246.1 - 846.8)

Volume	Invert	Avail.Storage	Storage Description
#1	646.00'	21,251 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

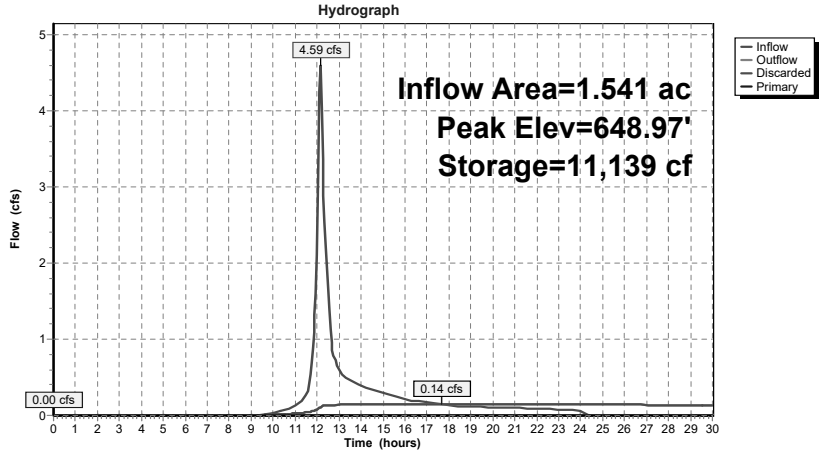
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
646.00	55	0	0
648.00	5,490	5,545	5,545
650.00	6,703	12,193	17,738
650.50	7,348	3,513	21,251

Device	Routing	Invert	Outlet Devices
#1	Primary	650.00'	**4.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	646.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.14 cfs @ 17.68 hrs HW=648.97' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=646.00' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 318: Post Basin 318

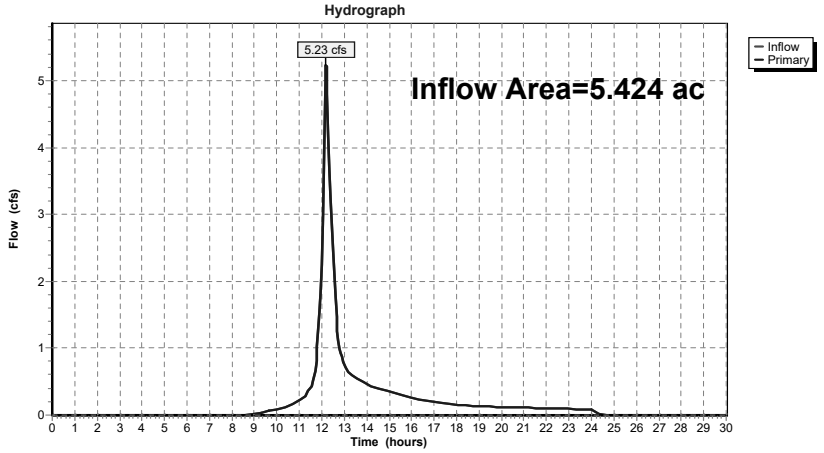


Summary for Pond 329: Post Westerly Point of Analysis

Inflow Area = 5.424 ac, 4.13% Impervious, Inflow Depth = 1.05" for 100 Year event
Inflow = 5.23 cfs @ 12.19 hrs, Volume= 0.476 af
Primary = 5.23 cfs @ 12.19 hrs, Volume= 0.476 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Pond 329: Post Westerly Point of Analysis



Summary for Pond 208: Post Depression

Inflow Area = 0.495 ac, 0.00% Impervious, Inflow Depth = 0.69" for 2 Year event
Inflow = 0.30 cfs @ 12.13 hrs, Volume= 0.028 af
Outflow = 0.02 cfs @ 16.02 hrs, Volume= 0.026 af, Atten= 93%, Lag= 233.4 min
Discarded = 0.02 cfs @ 16.02 hrs, Volume= 0.026 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 661.04' @ 16.02 hrs Surf.Area= 862 sf Storage= 626 cf

Plug-Flow detention time= 375.0 min calculated for 0.026 af (92% of inflow)
Center-of-Mass det. time= 333.2 min (1,221.8 - 888.6)

Volume	Invert	Avail.Storage	Storage Description
#1	660.00'	35,859 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
660.00	347	0	0
662.00	1,342	1,689	1,689
664.00	3,353	4,695	6,384
666.00	5,899	9,252	15,636
668.00	9,142	15,041	30,677
668.50	11,585	5,182	35,859

Device	Routing	Invert	Outlet Devices
#1	Primary	667.00'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	660.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 16.02 hrs HW=661.04' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=660.00' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

218-SKD-19 Oxbow Rd Oxford *Type III 24-hr 2 Year Rainfall=3.20"*
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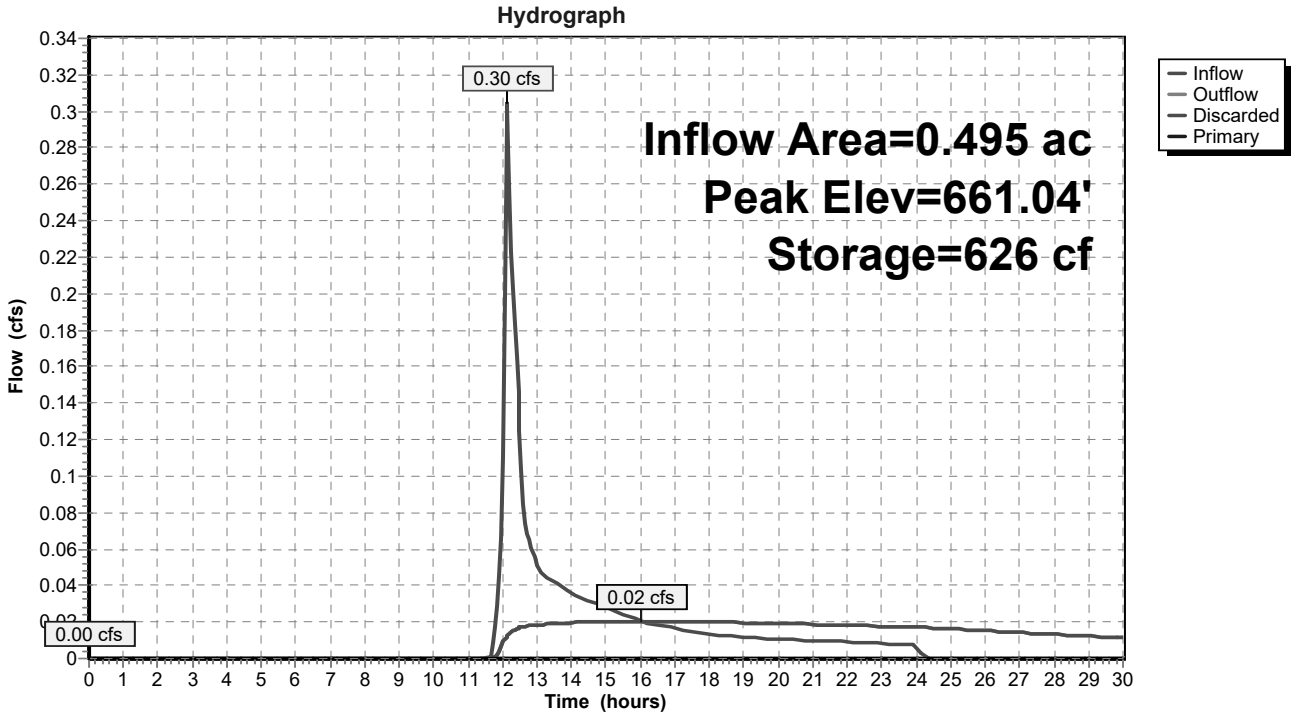
Pond 208: Post Depression



Summary for Pond 208: Post Depression

Inflow Area = 0.495 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10 Year event
Inflow = 0.75 cfs @ 12.12 hrs, Volume= 0.060 af
Outflow = 0.03 cfs @ 16.89 hrs, Volume= 0.042 af, Atten= 96%, Lag= 286.2 min
Discarded = 0.03 cfs @ 16.89 hrs, Volume= 0.042 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 661.94' @ 16.89 hrs Surf.Area= 1,310 sf Storage= 1,604 cf

Plug-Flow detention time= 477.4 min calculated for 0.042 af (70% of inflow)
Center-of-Mass det. time= 373.6 min (1,237.1 - 863.5)

Volume	Invert	Avail.Storage	Storage Description
#1	660.00'	35,859 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
660.00	347	0	0
662.00	1,342	1,689	1,689
664.00	3,353	4,695	6,384
666.00	5,899	9,252	15,636
668.00	9,142	15,041	30,677
668.50	11,585	5,182	35,859

Device	Routing	Invert	Outlet Devices
#1	Primary	667.00'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	660.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 16.89 hrs HW=661.94' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=660.00' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

218-SKD-19 Oxbow Rd Oxford *Type III 24-hr 10 Year Rainfall=4.50"*
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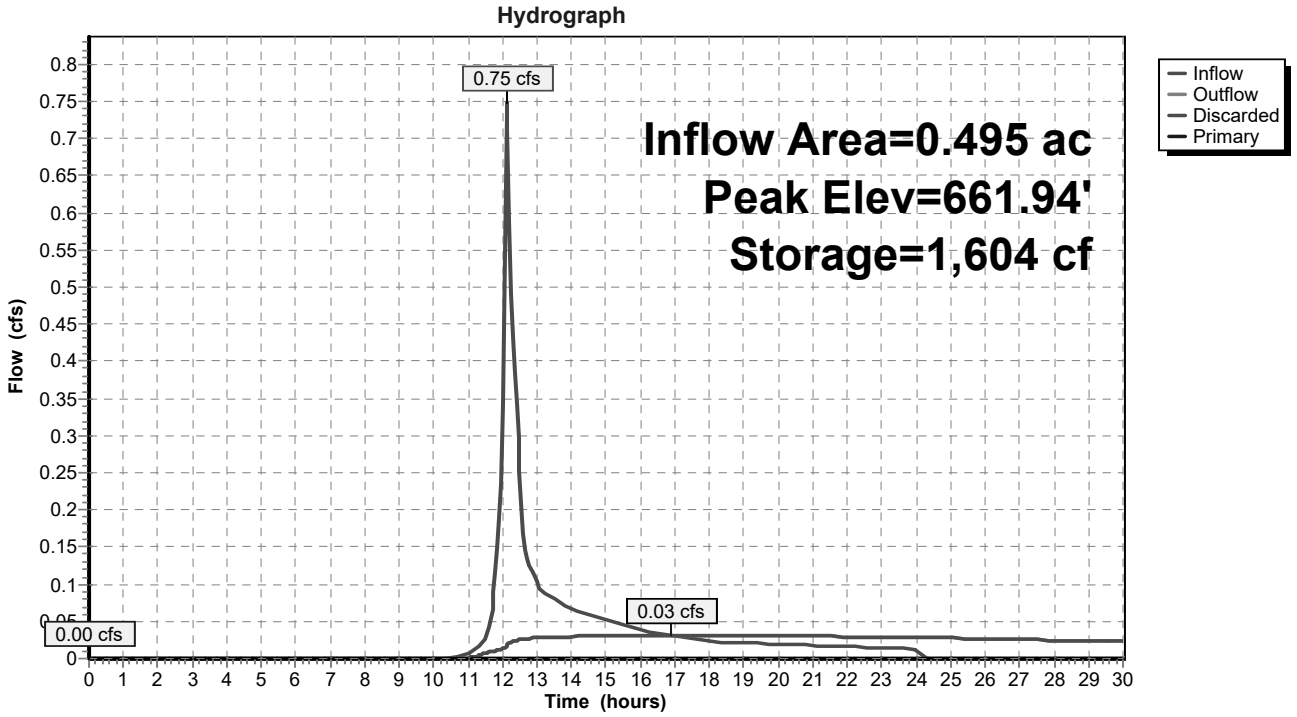
Pond 208: Post Depression



Summary for Pond 208: Post Depression

Inflow Area = 0.495 ac, 0.00% Impervious, Inflow Depth = 3.15" for 100 Year event
Inflow = 1.69 cfs @ 12.11 hrs, Volume= 0.130 af
Outflow = 0.06 cfs @ 16.88 hrs, Volume= 0.079 af, Atten= 97%, Lag= 285.8 min
Discarded = 0.06 cfs @ 16.88 hrs, Volume= 0.079 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 663.08' @ 16.88 hrs Surf.Area= 2,431 sf Storage= 3,733 cf

Plug-Flow detention time= 498.2 min calculated for 0.079 af (61% of inflow)
Center-of-Mass det. time= 387.4 min (1,228.0 - 840.5)

Volume	Invert	Avail.Storage	Storage Description
#1	660.00'	35,859 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
660.00	347	0	0
662.00	1,342	1,689	1,689
664.00	3,353	4,695	6,384
666.00	5,899	9,252	15,636
668.00	9,142	15,041	30,677
668.50	11,585	5,182	35,859

Device	Routing	Invert	Outlet Devices
#1	Primary	667.00'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	660.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.06 cfs @ 16.88 hrs HW=663.08' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=660.00' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

218-SKD-19 Oxbow Rd Oxford *Type III 24-hr 100 Year Rainfall=6.80"*
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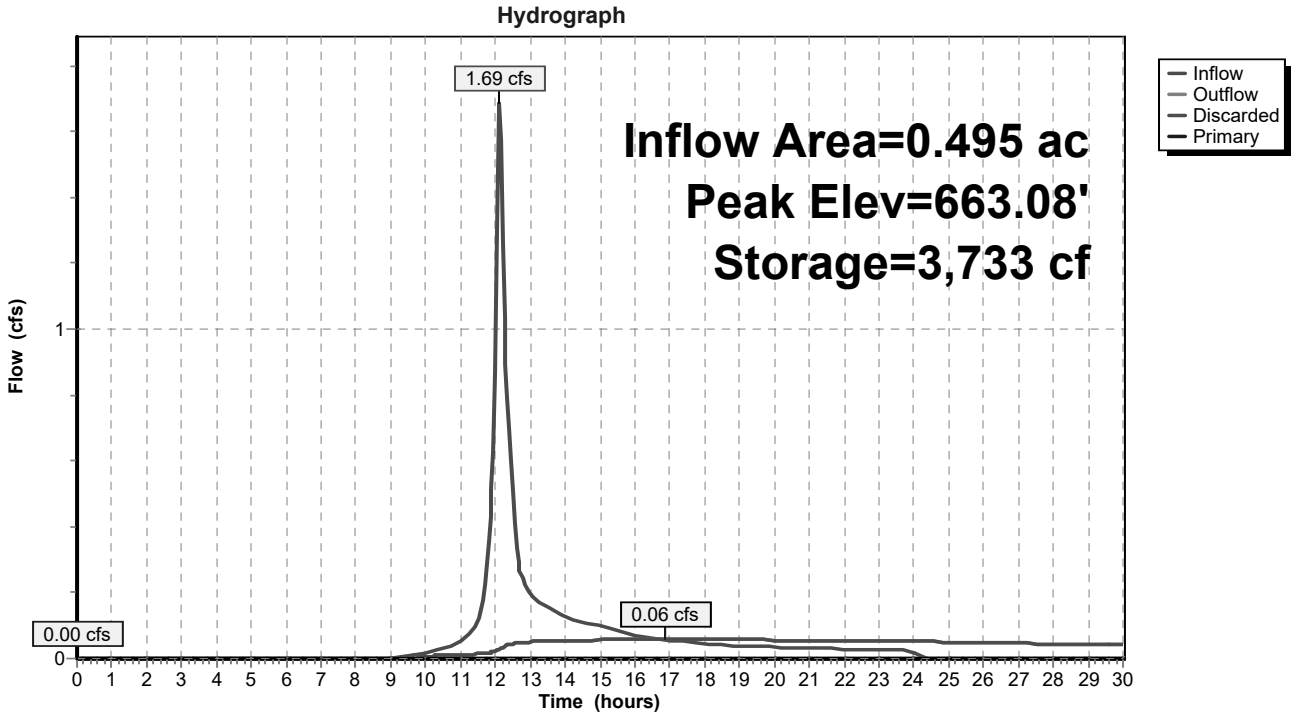
Pond 208: Post Depression



218-SKD-19 Oxbow Rd Oxford *Type III 24-hr 2 Year Rainfall=3.20"*
Prepared by S. J. Mullaney Engineering, Inc. Printed 3/23/2021

Summary for Pond 308: Post Basin 308

Inflow Area = 1.780 ac, 0.00% Impervious, Inflow Depth = 0.78" for 2 Year event
Inflow = 1.17 cfs @ 12.18 hrs, Volume= 0.116 af
Outflow = 0.07 cfs @ 16.52 hrs, Volume= 0.093 af, Atten= 94%, Lag= 260.3 min
Discarded = 0.07 cfs @ 16.52 hrs, Volume= 0.093 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 653.68' @ 16.52 hrs Surf.Area= 3,047 sf Storage= 2,792 cf

Plug-Flow detention time= 428.7 min calculated for 0.093 af (80% of inflow)
Center-of-Mass det. time= 347.6 min (1,231.8 - 884.3)

Volume	Invert	Avail.Storage	Storage Description
#1	652.00'	29,160 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
652.00	274	0	0
654.00	3,573	3,847	3,847
656.00	5,157	8,730	12,577
658.00	7,533	12,690	25,267
658.50	8,040	3,893	29,160

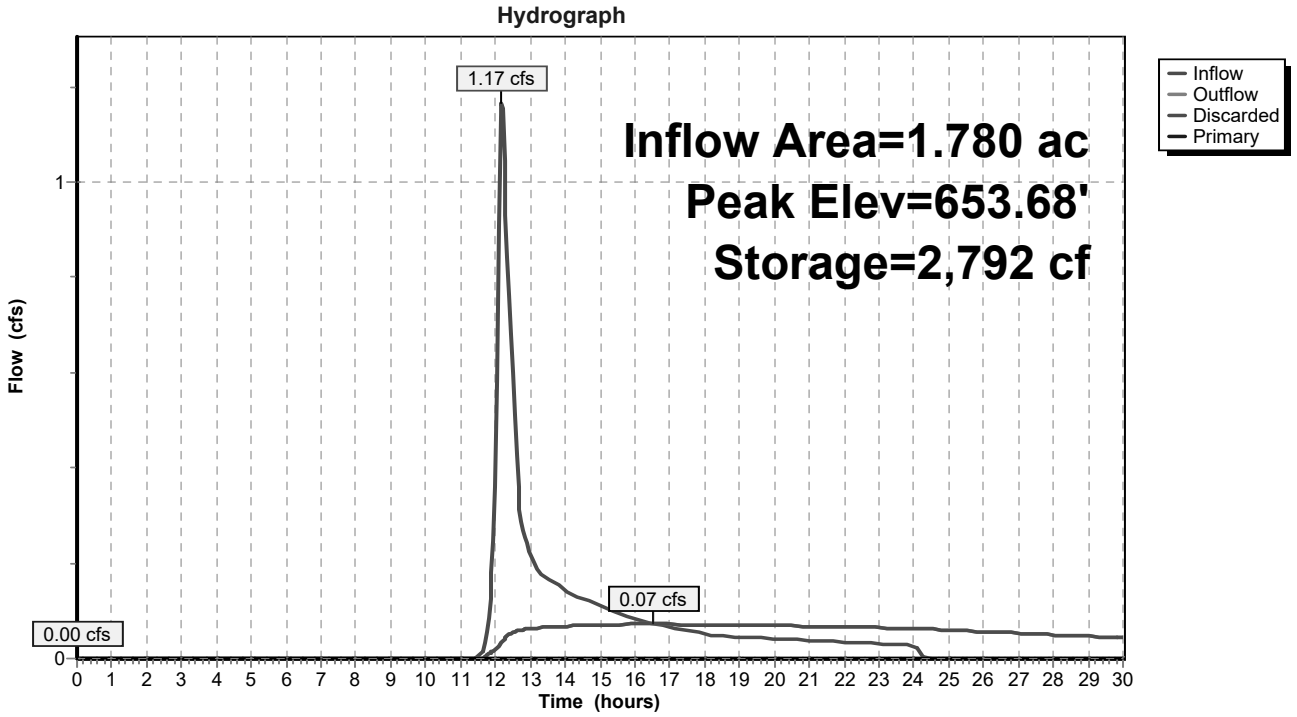
Device	Routing	Invert	Outlet Devices
#1	Primary	658.00'	**4.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	652.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.07 cfs @ 16.52 hrs HW=653.68' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=652.00' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

218-SKD-19 Oxbow Rd Oxford *Type III 24-hr 2 Year Rainfall=3.20"*
Prepared by S. J. Mullaney Engineering, Inc. Printed 3/23/2021

Pond 308: Post Basin 308



Summary for Pond 308: Post Basin 308

Inflow Area = 1.780 ac, 0.00% Impervious, Inflow Depth = 1.60" for 10 Year event
Inflow = 2.67 cfs @ 12.17 hrs, Volume= 0.238 af
Outflow = 0.10 cfs @ 17.69 hrs, Volume= 0.142 af, Atten= 96%, Lag= 331.4 min
Discarded = 0.10 cfs @ 17.69 hrs, Volume= 0.142 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 654.76' @ 17.69 hrs Surf.Area= 4,174 sf Storage= 6,784 cf

Plug-Flow detention time= 508.1 min calculated for 0.141 af (59% of inflow)
Center-of-Mass det. time= 390.1 min (1,251.2 - 861.2)

Volume	Invert	Avail.Storage	Storage Description
#1	652.00'	29,160 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
652.00	274	0	0
654.00	3,573	3,847	3,847
656.00	5,157	8,730	12,577
658.00	7,533	12,690	25,267
658.50	8,040	3,893	29,160

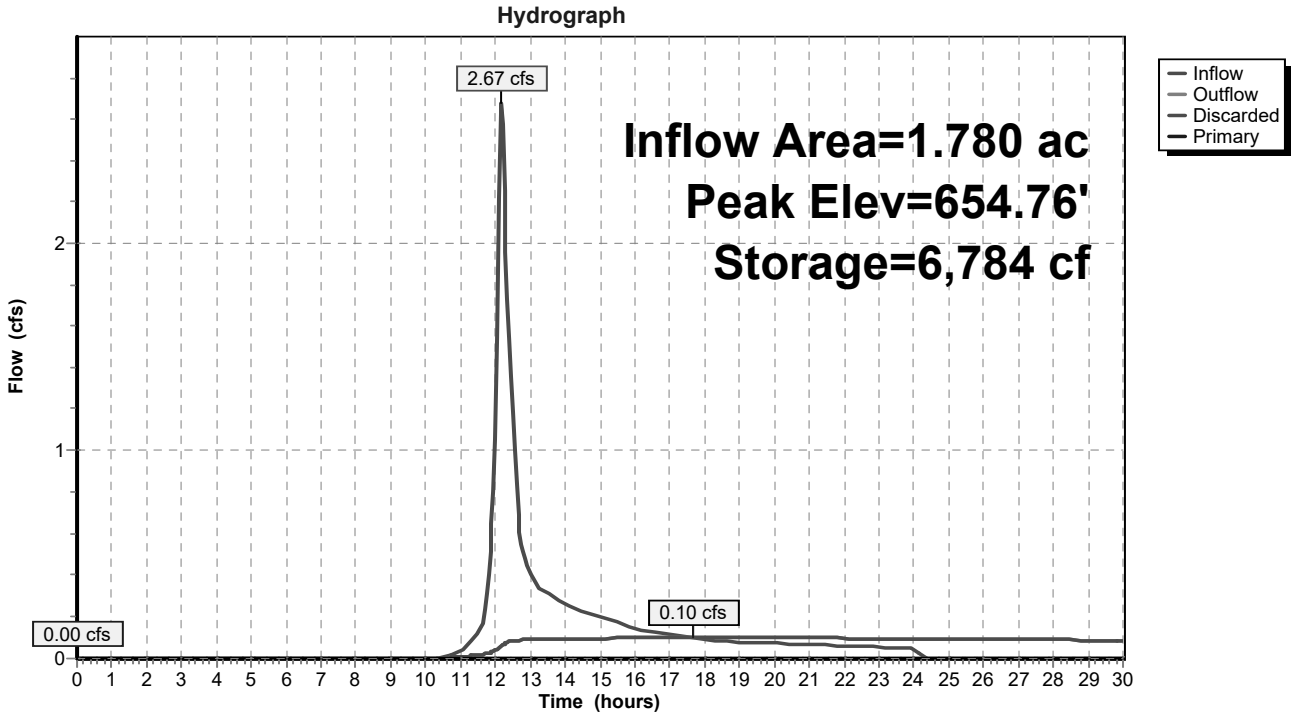
Device	Routing	Invert	Outlet Devices
#1	Primary	658.00'	**4.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	652.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.10 cfs @ 17.69 hrs HW=654.76' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=652.00' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

218-SKD-19 Oxbow Rd Oxford *Type III 24-hr 10 Year Rainfall=4.50"*
Prepared by S. J. Mullaney Engineering, Inc. Printed 3/23/2021
HydroCAD® 10.00-26 s/n 02755 © 2020 HydroCAD Software Solutions LLC

Pond 308: Post Basin 308



218-SKD-19 Oxbow Rd Oxford *Type III 24-hr 100 Year Rainfall=6.80"*
Prepared by S. J. Mullaney Engineering, Inc. Printed 3/23/2021

Summary for Pond 308: Post Basin 308

Inflow Area = 1.780 ac, 0.00% Impervious, Inflow Depth = 3.35" for 100 Year event
Inflow = 5.81 cfs @ 12.16 hrs, Volume= 0.497 af
Outflow = 0.14 cfs @ 19.33 hrs, Volume= 0.204 af, Atten= 98%, Lag= 430.3 min
Discarded = 0.14 cfs @ 19.33 hrs, Volume= 0.204 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 656.62' @ 19.33 hrs Surf.Area= 5,891 sf Storage= 15,991 cf

Plug-Flow detention time= 528.5 min calculated for 0.203 af (41% of inflow)
Center-of-Mass det. time= 404.9 min (1,244.3 - 839.4)

Volume	Invert	Avail.Storage	Storage Description
#1	652.00'	29,160 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
652.00	274	0	0
654.00	3,573	3,847	3,847
656.00	5,157	8,730	12,577
658.00	7,533	12,690	25,267
658.50	8,040	3,893	29,160

Device	Routing	Invert	Outlet Devices
#1	Primary	658.00'	**4.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	652.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.14 cfs @ 19.33 hrs HW=656.62' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=652.00' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

218-SKD-19 Oxbow Rd Oxford *Type III 24-hr 100 Year Rainfall=6.80"*
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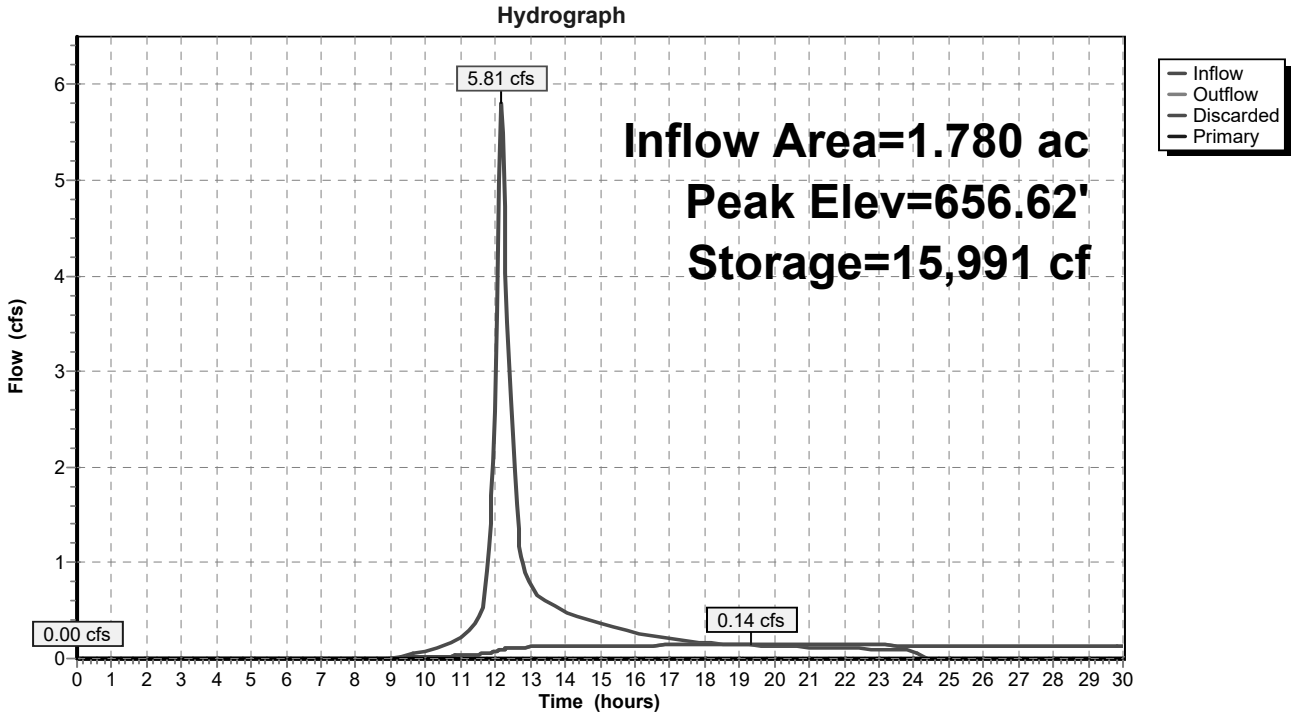
Pond 308: Post Basin 308



Summary for Pond 318: Post Basin 318

Inflow Area = 1.541 ac, 0.00% Impervious, Inflow Depth = 0.60" for 2 Year event
Inflow = 0.74 cfs @ 12.17 hrs, Volume= 0.077 af
Outflow = 0.07 cfs @ 15.62 hrs, Volume= 0.075 af, Atten= 91%, Lag= 207.0 min
Discarded = 0.07 cfs @ 15.62 hrs, Volume= 0.075 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 647.03' @ 15.62 hrs Surf.Area= 2,866 sf Storage= 1,511 cf

Plug-Flow detention time= 294.4 min calculated for 0.075 af (98% of inflow)
Center-of-Mass det. time= 281.8 min (1,180.5 - 898.7)

Volume	Invert	Avail.Storage	Storage Description
#1	646.00'	21,251 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

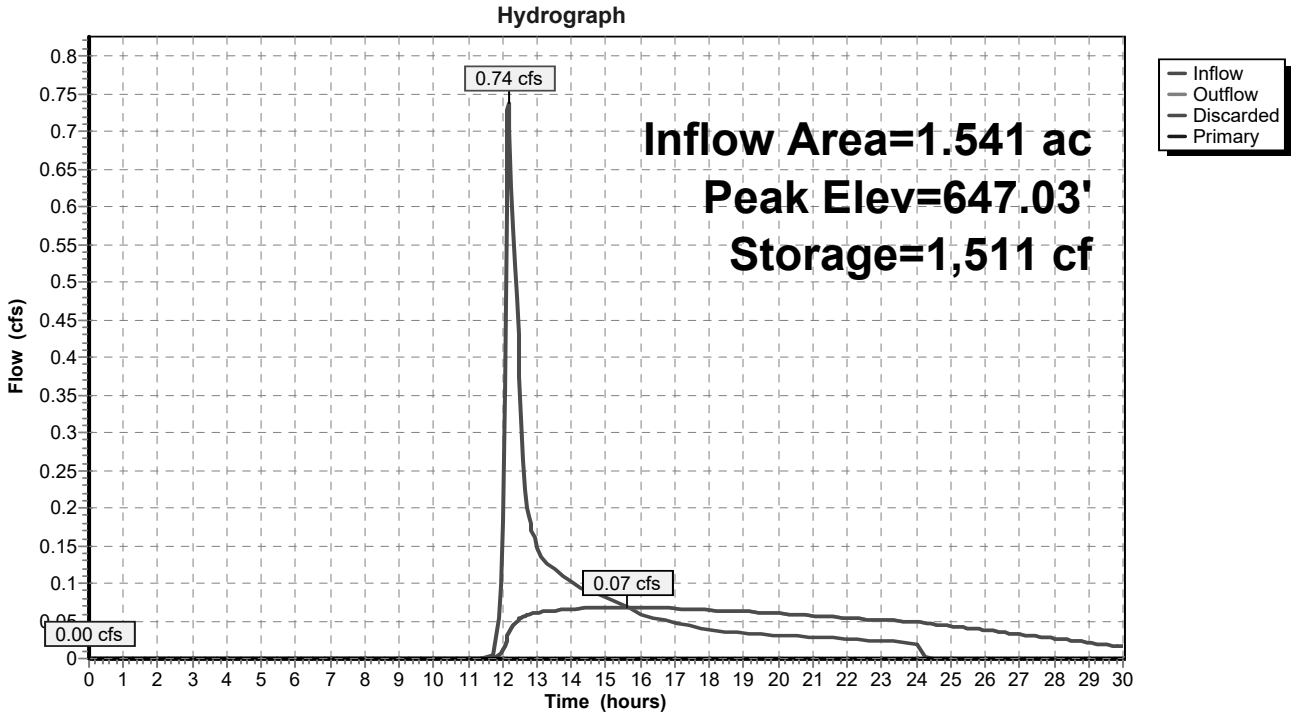
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
646.00	55	0	0
648.00	5,490	5,545	5,545
650.00	6,703	12,193	17,738
650.50	7,348	3,513	21,251

Device	Routing	Invert	Outlet Devices
#1	Primary	650.00'	**4.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	646.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.07 cfs @ 15.62 hrs HW=647.03' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=646.00' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 318: Post Basin 318



Summary for Pond 318: Post Basin 318

Inflow Area = 1.541 ac, 0.00% Impervious, Inflow Depth = 1.33" for 10 Year event
Inflow = 1.94 cfs @ 12.15 hrs, Volume= 0.171 af
Outflow = 0.11 cfs @ 15.99 hrs, Volume= 0.143 af, Atten= 94%, Lag= 230.6 min
Discarded = 0.11 cfs @ 15.99 hrs, Volume= 0.143 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 647.72' @ 15.99 hrs Surf.Area= 4,742 sf Storage= 4,137 cf

Plug-Flow detention time= 420.5 min calculated for 0.142 af (83% of inflow)
Center-of-Mass det. time= 348.9 min (1,219.9 - 871.0)

Volume	Invert	Avail.Storage	Storage Description
#1	646.00'	21,251 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
646.00	55	0	0
648.00	5,490	5,545	5,545
650.00	6,703	12,193	17,738
650.50	7,348	3,513	21,251

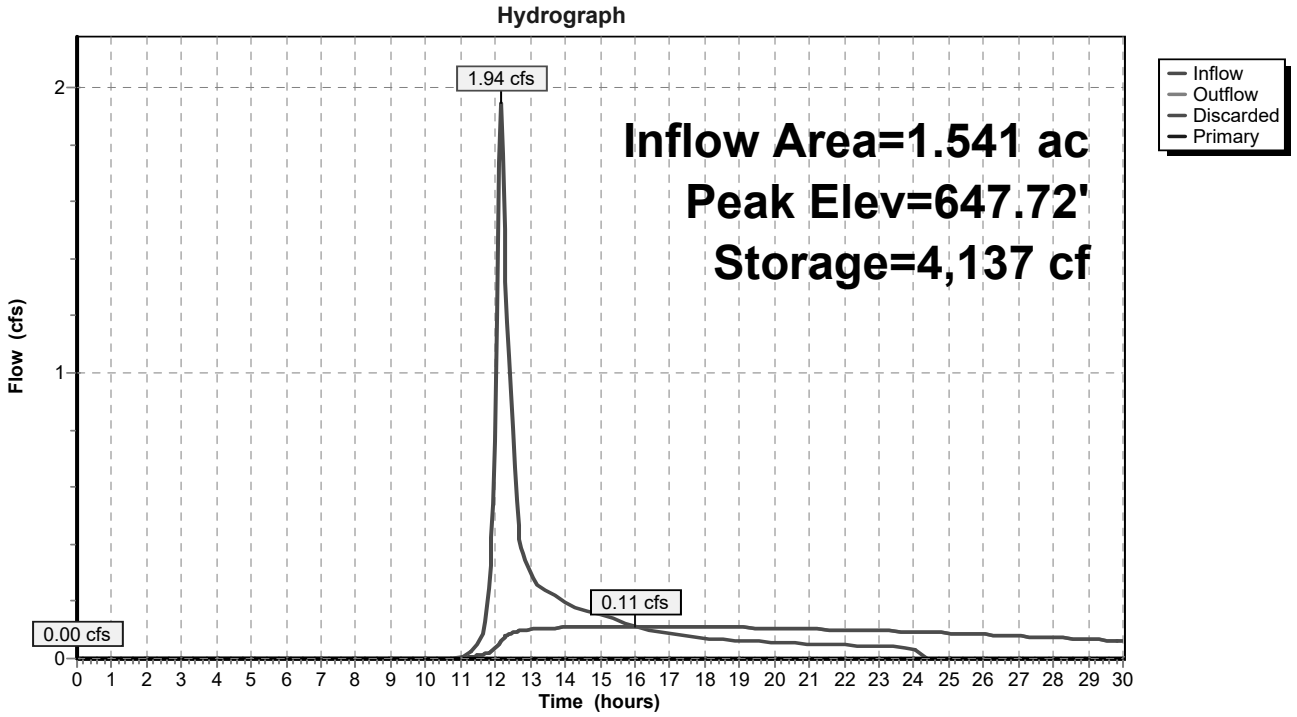
Device	Routing	Invert	Outlet Devices
#1	Primary	650.00'	**4.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	646.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.11 cfs @ 15.99 hrs HW=647.72' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=646.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

218-SKD-19 Oxbow Rd Oxford *Type III 24-hr 10 Year Rainfall=4.50"*
Prepared by S. J. Mullaney Engineering, Inc. Printed 3/23/2021

Pond 318: Post Basin 318



Summary for Pond 318: Post Basin 318

Inflow Area = 1.541 ac, 0.00% Impervious, Inflow Depth = 2.95" for 100 Year event
Inflow = 4.59 cfs @ 12.14 hrs, Volume= 0.379 af
Outflow = 0.14 cfs @ 17.68 hrs, Volume= 0.213 af, Atten= 97%, Lag= 332.1 min
Discarded = 0.14 cfs @ 17.68 hrs, Volume= 0.213 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 648.97' @ 17.68 hrs Surf.Area= 6,077 sf Storage= 11,139 cf

Plug-Flow detention time= 516.7 min calculated for 0.213 af (56% of inflow)
Center-of-Mass det. time= 399.3 min (1,246.1 - 846.8)

Volume	Invert	Avail.Storage	Storage Description
#1	646.00'	21,251 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

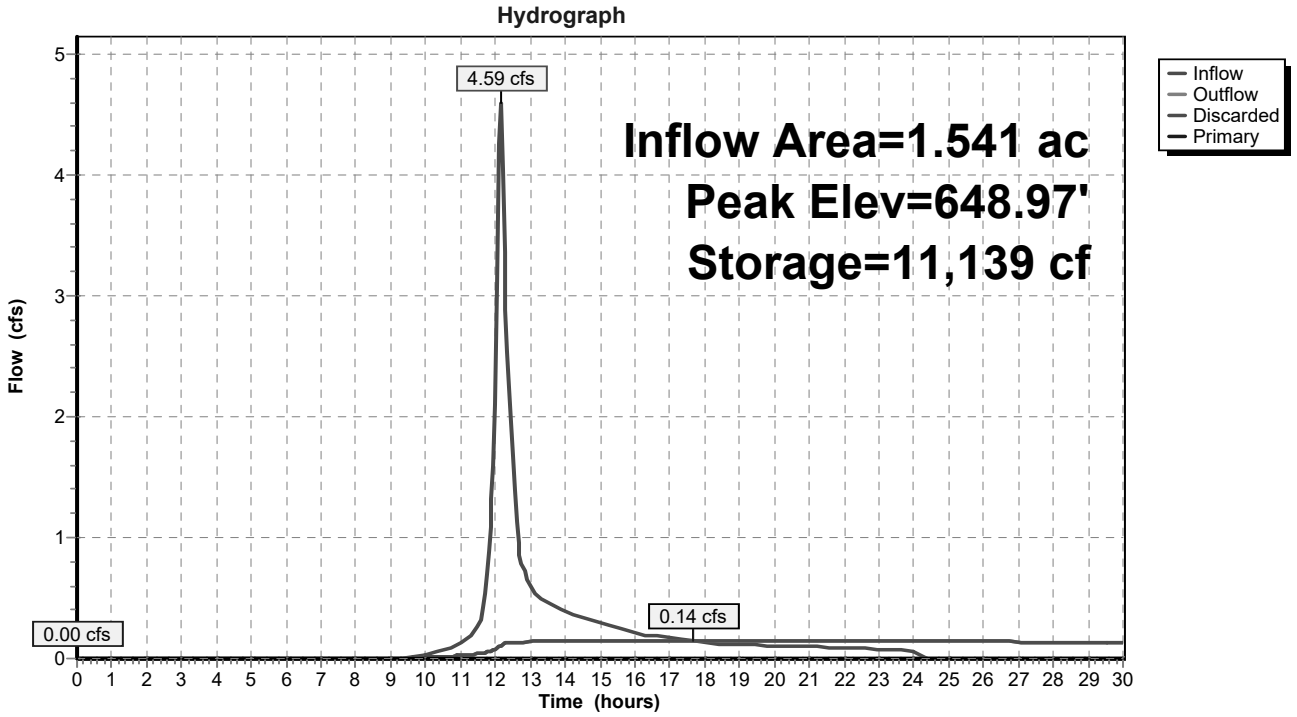
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
646.00	55	0	0
648.00	5,490	5,545	5,545
650.00	6,703	12,193	17,738
650.50	7,348	3,513	21,251

Device	Routing	Invert	Outlet Devices
#1	Primary	650.00'	**4.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	646.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.14 cfs @ 17.68 hrs HW=648.97' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=646.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 318: Post Basin 318



HydroCAD, TR-20, TR-55 Comparison

The following table summarizes the technical similarities and differences between these three programs. Note that HydroCAD combines the most-used capabilities of TR-20 and TR-55, plus many other techniques and features not provided by either program.

	HydroCAD	TR-20	TR-55
Runoff methodology	SCS unit hydrograph procedure (unlimited points)	SCS unit hydrograph procedure (301 points)	Tabular method derived from TR-20
Rainfall types	Extensive rainfall library plus user-defined storms	SCS type I, IA, II & III	SCS type I, IA, II & III
Unit hydrograph	SCS or Delmarva U.H., plus user defined curves	SCS Unit Hydrograph or user defined curve	SCS Unit Hydrograph only
Curve number entry	Automatic curve number lookup and weighting	Requires direct entry of composite curve number	Automatic curve number lookup and weighting
Curve number limitations	No restrictions	No restrictions	Reduced accuracy as CN differs from 75
Time of concentration calculations	All TR-55 methods plus common channel shapes, upland method, and CN method	Contains no Tc calculations: Requires direct entry of Tc	Calculates Tc for sheet, shallow concentrated, & channel flow
Tc limitations	No restrictions	Must be greater than zero	Limited to .1 to 2 hrs
Tc precision	1/10 minute or 1/600 hour	1/100 hour	Rounded to nearest step
Subarea limitations	None	None	Must not differ by more than factor of 5
Runoff accuracy	Within 1% of TR-20	"The standard"	Within ±25% of TR-20
Reach routing	Storage-indication method with optional routing delay (translation)	Modified Att-Kin procedure	No routing, separate tables for travel times of 0 to 3 hours
Pond routing	Storage-indication method, *dynamic* storage-indication method, or simultaneous routing	Storage-indication	None, only estimates ponding effects
Pond Sizing Estimate	Using actual inflow hydrograph	none	Using standard hydrograph shape
Detention Time	By plug-flow and center-of-mass methods	not calculated	not calculated
Stage-discharge hydraulics	Automatic calculation for simple *and* compound outlets	Must be entered directly, no calculations provided	n/a, no pond routing
Stage-storage curve	Automatic calculation from pond dimensions or surface areas, plus direct entry	Direct entry only	n/a, no pond routing
Flow diversions (split flows)	Automatic diversion of outflow from specified pond outlet(s)	Separate "Divert" procedure based on user-defined curve	n/a
Routing diagram	Interactive, on-screen, with labels and background image	none	none
Calculation procedure	Automatically calculated as required	"Batch mode" calculation of entire watershed	Manual initiation of each calculation
Graphics capabilities	Full graphics to screen or printer	none	none
Reports	Automatic reports with headings, graphics, etc.	Manual	Manual
Data Storage	Automatic by job name	Manual	Manual

Section 12 - HydroCAD Fundamentals

Understanding HydroCAD

HydroCAD provides a number of techniques for the generation and routing of hydrographs. It also provides many other related calculations, such as time of concentration, weighted curve numbers, pond volumes, stage-discharge curves, etc. This broad range of capabilities allows a large number of studies to be performed entirely within HydroCAD.

HydroCAD is a *hydrograph routing model.* It is designed specifically to handle *time varying flows*, as required for pond design and other volume-sensitive calculations.

Certain calculations, such as channel backwater or pressurized pipe networks, are often analyzed under *constant flow* conditions. This may require steady-state numerical techniques, rather than a hydrograph routing system such as HydroCAD. Some projects may require the use of HydroCAD to model the overall drainage system, combined with a steady-state analysis of specific components. This is an unavoidable consequence of the different methodologies.

Although HydroCAD's sequence of operations is *very* flexible, its power is most easily understood by viewing it in four phases.

Phase I - Construction of Routing Diagram

A diagram is constructed showing the functional components, or nodes, that make up the watershed. The diagram shows the location of each node and how water is routed from one node to another.

Phase II - Description of each Node

Each node is described in detail so that HydroCAD can calculate the outflow from each node once the inflow is known.

Phase III- Calculation of flow through each Node

Calculations occur automatically whenever a report is selected. Starting at the upstream end of the diagram and working downstream, HydroCAD calculates the outflow and other results for each node. Multiple inflows are summed automatically. A *minimal recalculation* feature automatically reuses the results of previous calculations where no changes have occurred.

Phase IV - Display and Examination of Results

Opening one or more report windows lets the user verify the behavior of the watershed. If any changes are required, the user may modify the watershed, causing the calculations and reports to be automatically updated.

In practice, it is generally recommended that these phases be completed for *each node* as it is added to the routing diagram. This allows the model to be fine-tuned at an early stage, while the calculations are relatively easy to understand. As the model becomes more complex, a single modeling error can have widespread consequences, making it more difficult to locate.

The Routing Diagram

The routing diagram shows the individual *nodes* that make up each project. The nodes are usually connected by arrows that indicate how their outflows are routed. Multiple inflows are summed automatically as required.[1]

Based on the routing diagram, HydroCAD is able to determine the correct sequence of calculations, and then calculate the flows throughout the project. Routing calculations are automatically updated as required. You can manipulate the diagram display with the main scroll bars, the tool bar, the main menu, the palette, and the mouse.

Watershed components

Each drainage system is represented by a network of the following types of *nodes*:

- **Subcatchment**: A relatively homogenous area of land that typically drains into a reach or pond. Each subcatchment generates a *runoff hydrograph*. A subcatchment may also be used to account for the rain falling directly on the surface of a pond. A subcatchment *cannot* be used to route an inflow hydrograph. Instead, use a subcatchment to calculate the runoff and a separate reach to perform the routing.

- **Pond**: A pond, swamp, dam, catch basin, manhole, drywell, or other impoundment that fills with water from one or more sources and empties in a manner determined by a weir, culvert, or other outlet device(s). The outflow of each pond is determined by a *hydrograph routing* calculation which attenuates and delays the peak flow. A pond may empty into a reach or into another pond. An optional *secondary* outflow may be used to *divert* the discharge from specific outlet devices and route them separately. A *discarded* outflow is also available for outflows that are not subject to further routing, such as exfiltration.

- **Catch Basin**: A special type of pond that provides an insignificant amount of storage, but otherwise has all the properties and capabilities of a pond. Since a catch basin has no storage capability, it cannot detain or attenuation its inflow. However, the routing calculations will determine the water surface level (headwater) at each point in time.

- **Reach**: A uniform stream, channel, or pipe that conveys water from one point to another and operates under *open channel flow*.[2] A reach may also be used to route an upstream hydrograph through a subcatchment.[3] The outflow of each reach is determined by a *hydrograph routing* calculation. This generally delays and attenuates the peak flow. A reach may be routed into a pond or into another reach.

- **Link**: A link may be used to 1) enter a hydrograph generated outside HydroCAD, 2) interconnect several routing diagrams, 3) scale a hydrograph, 4) split a hydrograph into two components for independent routing, or 5) define a tidal tailwater elevation.

---

[1] To sum multiple flows without performing a hydrograph routing, use an undescribed reach, pond, or link.

[2] To model a pipe under other flow conditions, including headwater and tailwater effects, use a *catch basin or pond with a culvert outlet.* This applies to most culverted road crossings, manholes, and other impoundments that feed a pipe.

[3] When a reach drains a subcatchment *along its length*, it may be best modeled as a component of the subcatchment's Tc calculation, rather than as an independent reach.

Appendix A2: Runoff Curve Numbers

Table 2-2a Runoff curve numbers for urban areas [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type and hydrologic condition	Average percent impervious area [2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

[1] Average runoff condition, and $I_a = 0.2S$.

[2] The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

[3] CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

[4] Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

[5] Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

This appendix reprinted from S.C.S. TR-55, revised 1986.

Appendix A2: Runoff Curve Numbers (continued)

Table 2-2b Runoff curve numbers for cultivated agricultural lands [1]

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment [2]	Hydrologic condition [3]	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T+ CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T+ CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

[1] Average runoff condition, and I_a=0.2S

[2] Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

[3] Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good ≥ 20%), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

This appendix reprinted from S.C.S. TR-55, revised 1986.

Appendix A2: Runoff Curve Numbers (continued)

Table 2-2c Runoff curve numbers for other agricultural lands [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4]	48	65	73
Woods—grass combination (orchard or tree farm). [5]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.

2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.

3 *Poor:* <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.

4 Actual curve number is less than 30; use CN = 30 for runoff computations.

5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

This appendix reprinted from S.C.S. TR-55, revised 1986.

Appendix A2: Runoff Curve Numbers (continued)

Table 2-2d Runoff curve numbers for arid and semiarid rangelands 1/

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition 2/	A 3/	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

1 Average runoff condition, and I_a = 0.2S. For range in humid regions, use table 2-2c.
2 Poor: <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: > 70% ground cover.
3 Curve numbers for group A have been developed only for desert shrub.

This appendix reprinted from S.C.S. TR-55, revised 1986.

SCS Synthetic Rainfall Distributions

The highest peak discharges from small watersheds in the United States are usually caused by intense, brief rainfalls that may occur as distinct events or as part of a longer storm. These intense rainstorms do not usually extended over a large area and intensities vary greatly. One common practice in rainfall-runoff analysis is to develop a synthetic rainfall distribution to use in lieu of actual storm events. This distribution includes maximum rainfall intensities for the selected design frequency arranged in a sequence that is critical for producing peak runoff.

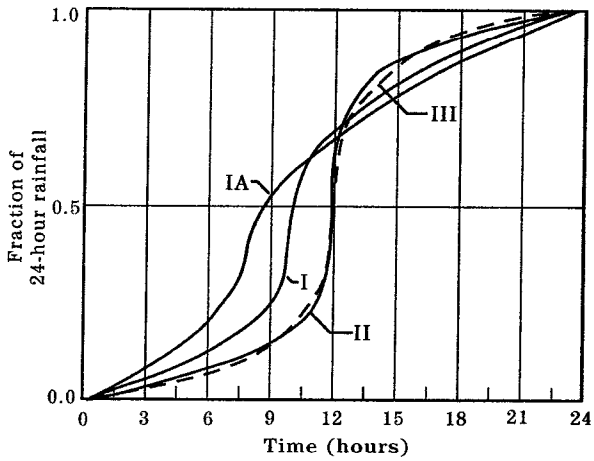
Synthetic rainfall distributions

The length of the most intense rainfall period contributing to the peak runoff rate is related to the time of concentration (T_c) for the watershed. In a hydrograph created with NRCS procedures, the duration of rainfall that directly contributes to the peak is about 170 percent of the T_c. For example, the most intense 8.5-minute rainfall period would contribute to the peak discharge for a watershed with a T_c of 5 minutes. The most intense 8.5-hour period would contribute to the peak for a watershed with a 5-hour T_c.

Different rainfall distributions can be developed for each of these watersheds to emphasize the critical rainfall duration for the peak discharges. However, to avoid the use of a different set of rainfall intensities for each drainage area size, a set of synthetic rainfall distributions having "nested" rainfall intensities was developed. The set "maximizes" the rainfall intensities by incorporating selected short duration intensities within those needed for longer durations at the same probability level.

For the size of the drainage areas for which NRCS usually provides assistance, a storm period of 24 hours was chosen the synthetic rainfall distributions. The 24-hour storm, while longer than that needed to determine peaks for these drainage areas, is appropriate for determining runoff volumes. Therefore, a single storm duration and associated synthetic rainfall distribution can be used to represent not only the peak discharges but also the runoff volumes for a range of drainage area sizes.

SCS 24-hour rainfall distributions



The intensity of rainfall varies considerably during a storm as well as geographic regions. To represent various regions of the United States, NRCS developed four synthetic 24-hour rainfall distributions (I, IA, II, and III) from available National Weather Service (NWS) duration-frequency data (Hershfield 1061; Frederick et al., 1977) or local storm data. Type IA is the least intense and type II the most intense short duration rainfall. The four distributions are shown in figure B-1, and figure B-2 shows their approximate geographic boundaries.

Types I and IA represent the Pacific maritime climate with wet winters and dry summers. Type III represents Gulf of Mexico and Atlantic coastal areas where tropical storms bring large 24-hour rainfall amounts. Type II represents the rest of the country. For more precise distribution boundaries in a state having more than one type, contact the NRCS State Conservation Engineer.

Additional rainfall information is available on the internet at www.hydrocad.net/rainfall.htm

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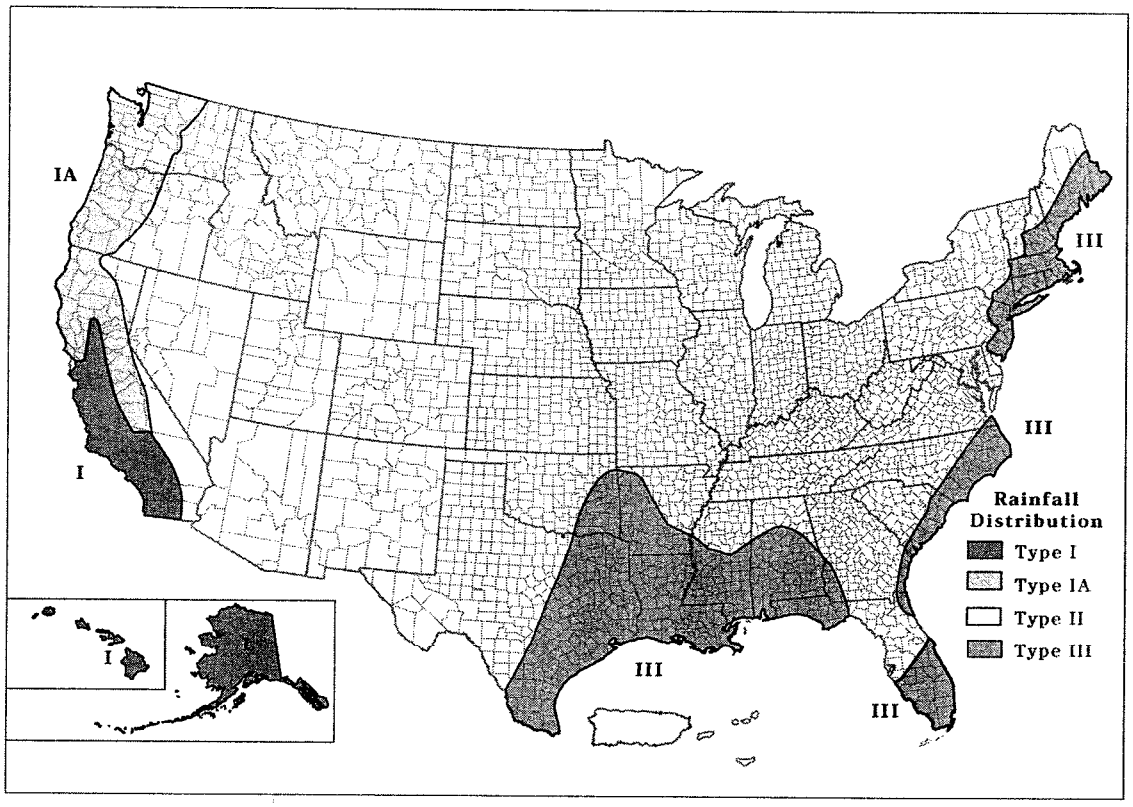

Rainfall data sources

This section lists the most current 24-hour rainfall data published by the National Weather Service (NWS) for various parts of the country. Because NWS Technical Paper 40 (TP-40) is out of print, the 24-hour rainfall maps for areas east of the 105th meridian are included here as figures B-3 through B-8. For the area generally west of the 105th meridian, TP-40 has been superseded by NOAA Atlas 2, the Precipitation-Frequency Atlas of the Western United States, published by the National Ocean and Atmospheric Administration.

East of 105th meridian

Hershfield, D.M. 1961. Rainfall frequency atlas of the United States for durations from 30 minutes to 24 hours and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 40. Washington, DC. 155 p.

West of 105th meridian

Miller, J.F., R.H. Frederick, and R.J. Tracey. 1973. Precipitation-frequency atlas of the Western United States. Vol. I Montana; Vol. II, Wyoming; Vol III, Colorado; Vol. IV, New Mexico; Vol V, Idaho; Vol. VI, Utah; Vol. VII, Nevada; Vol. VIII, Arizona; Vol. IX, Washington; Vol. X, Oregon; Vol. XI, California. U.S. Dept. of Commerce, National Weather Service, NOAA Atlas 2. Silver Spring, MD.

Alaska

Miller, John F. 1963. Probable maximum precipitation and rainfall-frequency data for Alaska for areas to 400 square miles, durations to 24 hours and return periods from 1 to 100 years. U.S. Dept. of Commerce, Weather Bur. Tech. Pap. No. 47. Washington, DC. 69 p.

Hawaii

Weather Bureau. 1962. Rainfall-frequency atlas of the Hawaiian Islands for areas to 200 square miles, durations to 24 hours and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 43. Washington, DC. 60 p.

Puerto Rico and Virgin Islands

Weather Bureau. 1961. Generalized estimates of probable maximum precipitation and rainfall-frequency data for Puerto Rico and Virgin Islands for areas to 400 square miles, durations to 24 hours, and return periods from 1 to 100 years. U.S. Dept. Commerce, Weather Bur. Tech. Pap. No. 42. Washington, DC. 94 P.

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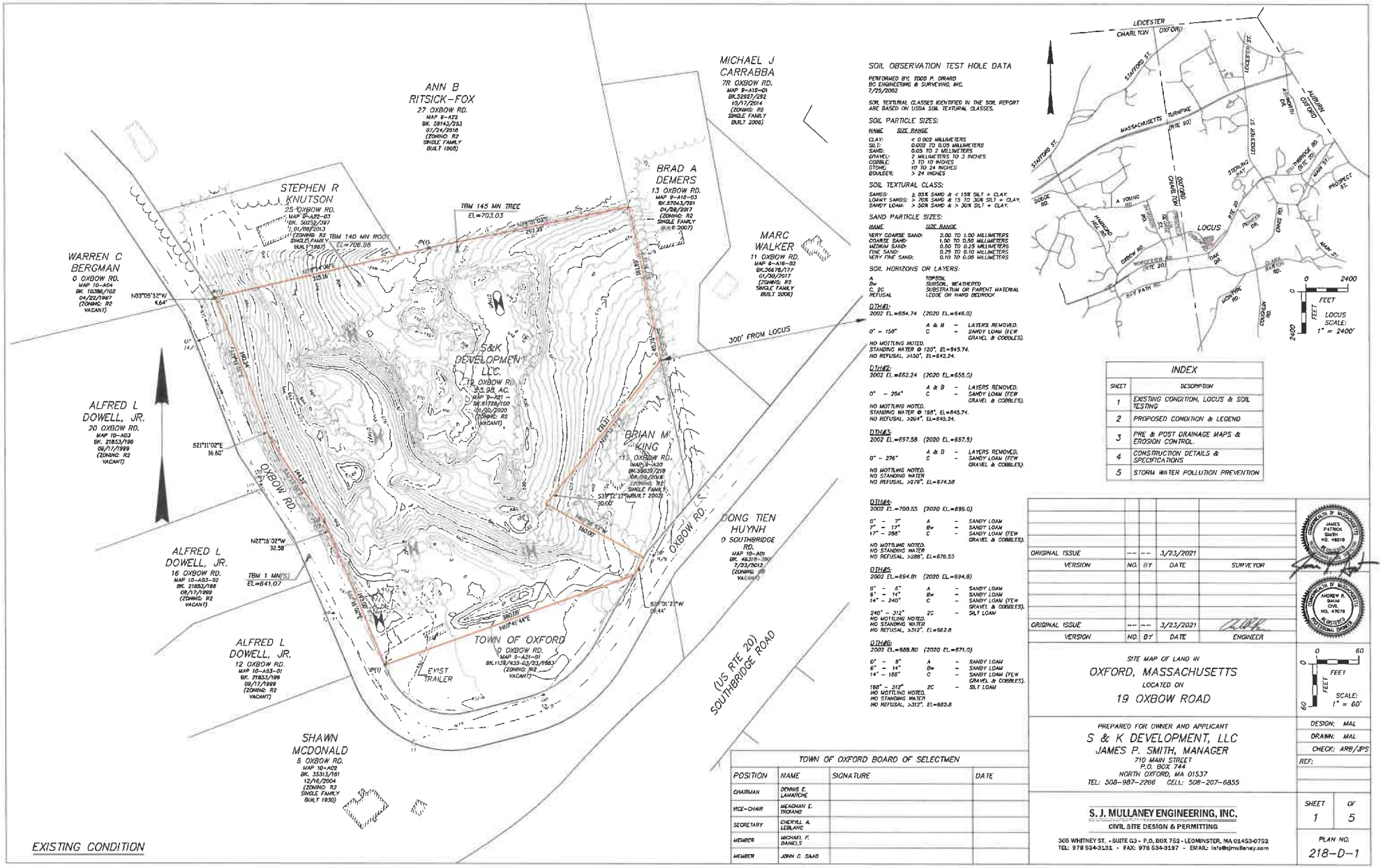


EXISTING CONDITION

SOIL OBSERVATION TEST HOLE DATA

PERFORMED BY: TODD P. GIRARD
SO ENGINEERING & SURVEYING, INC.
7/25/2002

SOIL TEXTURAL CLASSES IDENTIFIED IN THE SOIL REPORT ARE BASED ON USDA SOIL TEXTURAL CLASSES.

SOIL PARTICLE SIZES:

NAME	SIZE RANGE
CLAY:	< 0.002 MILLIMETERS
SILT:	0.002 TO 0.05 MILLIMETERS
SAND:	0.05 TO 2 MILLIMETERS
GRAVEL:	2 MILLIMETERS TO 3 INCHES
COBBLE:	3 TO 10 INCHES
STONE:	10 TO 24 INCHES
BOULDER:	> 24 INCHES

SOIL TEXTURAL CLASS:

SANDS: ≥ 85% SAND & < 15% SILT + CLAY.
LOAMY SANDS: > 70% SAND & ≤ 15 TO 30% SILT + CLAY.
SANDY LOAM: > 50% SAND & > 20% SILT + CLAY.

SAND PARTICLE SIZES:

NAME	SIZE RANGE
VERY COARSE SAND:	2.00 TO 1.00 MILLIMETERS
COARSE SAND:	1.00 TO 0.50 MILLIMETERS
MEDIUM SAND:	0.50 TO 0.25 MILLIMETERS
FINE SAND:	0.25 TO 0.10 MILLIMETERS
VERY FINE SAND:	0.10 TO 0.05 MILLIMETERS

SOIL HORIZONS OR LAYERS:

A	TOPSOIL
Bw	SUBSOIL, WEATHERED
C, 2C	SUBSTRATUM OR PARENT MATERIAL
REFUSAL	LEDGE OR HARD BEDROCK

DTH#1:
2002 EL.=654.74 (2020 EL.=646.0)

	A & B	-	LAYERS REMOVED.
0" - 150"	C	-	SANDY LOAM (FEW GRAVEL & COBBLES).

NO MOTTLING NOTED.
STANDING WATER @ 120", EL=645.74.
NO REFUSAL, >150", EL=642.24.

DTH#2:
2002 EL.=662.24 (2020 EL.=655.0)

	A & B	-	LAYERS REMOVED.
0" - 204"	C	-	SANDY LOAM (FEW GRAVEL & COBBLES).

NO MOTTLING NOTED.
STANDING WATER @ 198", EL=645.74.
NO REFUSAL, >204", EL=645.24.

DTH#3:
2002 EL.=697.58 (2020 EL.=687.5)

	A & B	-	LAYERS REMOVED.
0" - 276"	C	-	SANDY LOAM (FEW GRAVEL & COBBLES).

NO MOTTLING NOTED.
NO STANDING WATER
NO REFUSAL >276", EL=674.58

DTH#4:
2002 EL.=700.55 (2020 EL.=699.0)

0" - 7"	A	-	SANDY LOAM
7" - 17"	Bw	-	SANDY LOAM
17" - 288"	C	-	SANDY LOAM (FEW GRAVEL & COBBLES).

NO MOTTLING NOTED.
NO STANDING WATER
NO REFUSAL >288", EL=676.55

DTH#5:
2002 EL.=694.81 (2020 EL.=694.8)

0" - 6"	A	-	SANDY LOAM
6" - 14"	Bw	-	SANDY LOAM
14" - 240"	C	-	SANDY LOAM (FEW GRAVEL & COBBLES).
240" - 312"	2C	-	SILT LOAM

NO MOTTLING NOTED.
NO STANDING WATER
NO REFUSAL, >312", EL=662.8

DTH#6:
2002 EL.=688.80 (2020 EL.=671.0)

0" - 8"	A	-	SANDY LOAM
8" - 14"	Bw	-	SANDY LOAM
14" - 168"	C	-	SANDY LOAM (FEW GRAVEL & COBBLES).
168" - 312"	2C	-	SILT LOAM

NO MOTTLING NOTED.
NO STANDING WATER
NO REFUSAL, >312", EL=662.8

INDEX

SHEET	DESCRIPTION
1	EXISTING CONDITION, LOCUS & SOIL TESTING
2	PROPOSED CONDITION & LEGEND
3	PRE & POST DRAINAGE MAPS & EROSION CONTROL.
4	CONSTRUCTION DETAILS & SPECIFICATIONS
5	STORM WATER POLLUTION PREVENTION

VERSION	NO.	BY	DATE	SURVEYOR
ORIGINAL ISSUE	--	--	3/23/2021	

VERSION	NO.	BY	DATE	ENGINEER
ORIGINAL ISSUE	--	--	3/23/2021	

COMMONWEALTH OF MASSACHUSETTS
JAMES PATRICK SMITH
NO. 49310
REGISTERED PROFESSIONAL SURVEYOR

COMMONWEALTH OF MASSACHUSETTS
ANDREW R. BAHM
CIVIL
NO. 47678
REGISTERED PROFESSIONAL ENGINEER

SITE MAP OF LAND IN
OXFORD, MASSACHUSETTS
LOCATED ON
19 OXBOW ROAD

0 60
FEET
SCALE:
1" = 60'

PREPARED FOR OWNER AND APPLICANT
S & K DEVELOPMENT, LLC
JAMES P. SMITH, MANAGER
710 MAIN STREET
P.O. BOX 744
NORTH OXFORD, MA 01537
TEL: 508-987-2266 CELL: 508-207-6855

TOWN OF OXFORD BOARD OF SELECTMEN

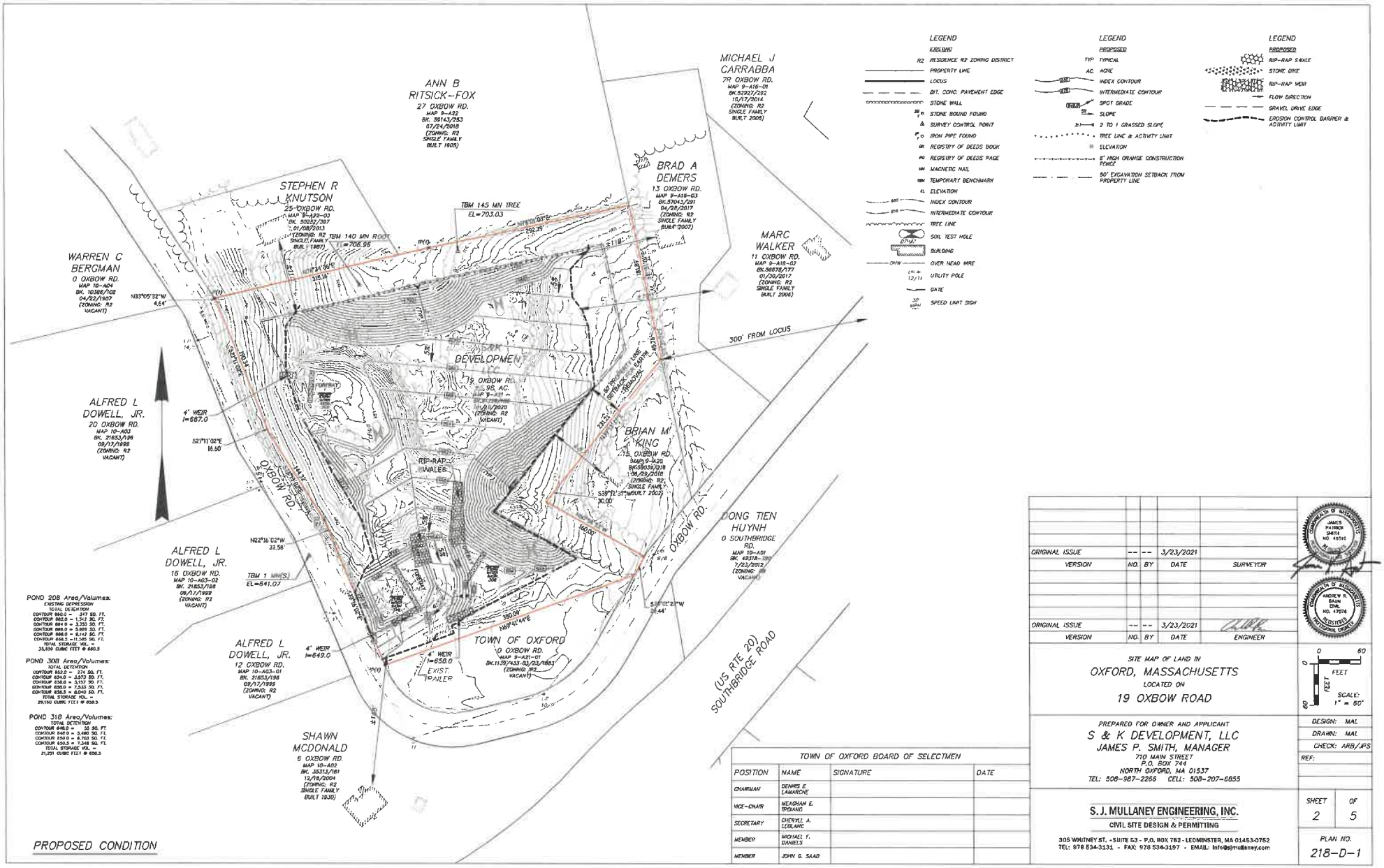
POSITION	NAME	SIGNATURE	DATE
CHAIRMAN	DENNIS E. LAMARCHE		
VICE-CHAIR	MEAGHAN E. TROIANO		
SECRETARY	CHERYLL A. LEBLANC		
MEMBER	MICHAEL F. DANIELS		
MEMBER	JOHN C. SAAD		

S. J. MULLANEY ENGINEERING, INC.
CIVIL SITE DESIGN & PERMITTING
305 WHITNEY ST. - SUITE G3 - P.O. BOX 752 - LEOMINSTER, MA 01453-0752
TEL: 978 534-3131 - FAX: 978 534-3197 - EMAIL: info@sjmullaney.com

DESIGN: MAL
DRAWN: MAL
CHECK: ARB/JPS
REF:

SHEET 1 OF 5

PLAN NO. 218-D-1



TOWN OF OXFORD BOARD OF SELECTMEN			
POSITION	NAME	SIGNATURE	DATE
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SECRETARY	CHERYLL A. LEBLANC		
MEMBER	MICHAEL F. DANIELS		
MEMBER	JOHN G. SAAD		

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ORIGINAL ISSUE	--	--	3/23/2021	

VERSION	NO.	BY	DATE	ENGINEER
ORIGINAL ISSUE	--	--	3/23/2021	

JAMES PATRICK SMITH NO. 40510 REGISTERED PROFESSIONAL SURVEYOR COMMONWEALTH OF MASSACHUSETTS

ANDREW R. BRAUN CIVIL NO. 47076 REGISTERED PROFESSIONAL ENGINEER COMMONWEALTH OF MASSACHUSETTS

SITE MAP OF LAND IN
OXFORD, MASSACHUSETTS
LOCATED ON
19 OXBOW ROAD

0 60 FEET
SCALE: 1" = 60'

PREPARED FOR OWNER AND APPLICANT
S & K DEVELOPMENT, LLC
JAMES P. SMITH, MANAGER
710 MAIN STREET
P.O. BOX 744
NORTH OXFORD, MA 01537
TEL: 508-987-2266 CELL: 508-207-6855

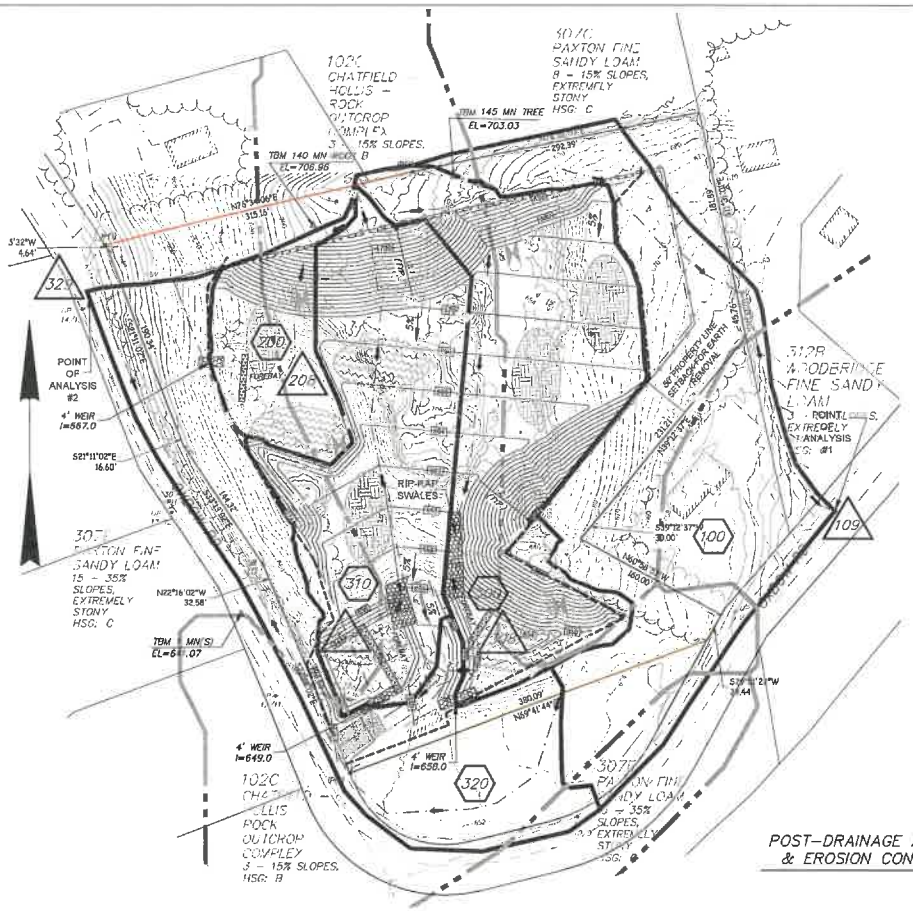
DESIGN: MAL
DRAWN: MAL
CHECK: ARB/JPS
REF:

S.J. MULLANEY ENGINEERING, INC.
CIVIL SITE DESIGN & PERMITTING
305 WHITNEY ST. - SUITE 63 - P.O. BOX 762 - LEOMINSTER, MA 01453-0762
TEL: 978 534-3131 - FAX: 978 534-3197 - EMAIL: info@sjmulleney.com

SHEET 2 OF 5

PLAN NO. 218-D-1

PRE-DRAINAGE AREAS



POST-DRAINAGE AREAS
& EROSION CONTROL

LEGEND

- STORMWATER
- SOIL MAP UNIT DIVIDE
- SOIL MAP UNIT PER WORCESTER COUNTY SOIL SURVEY
- HSG: HYDROLOGIC SOIL GROUP
- 10 HYDROCAD SUBCATCHMENT DESIGNATION
- SUBCATCHMENT LIMIT
- CONCENTRATION TIME FLOW PATH
- 18 HYDROCAD DRAINAGE POND DESIGNATION
- EROSION CONTROL BARRIER & ACTIVITY LIMIT
- TEMPORARY CONSTRUCTION ENTRANCE
- TEMPORARY DEWATERING AREA, SETTLING BASIN, OR SWALE
- STOCKPILE & STAGING AREA

TOWN OF OXFORD BOARD OF SELECTMEN			
POSITION	NAME	SIGNATURE	DATE
CHAIRMAN	DENNIS E. LAMARCHE		
VICE-CHAIR	MEAGHAN C. TROIANO		
SECRETARY	CHERYLL A. LEBLANC		
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VERSION	NO.	BY	DATE	ENGINEER

COMMONWEALTH OF MASSACHUSETTS
JAMES PATRICK SMITH
NO. 46340
REGISTERED PROFESSIONAL ENGINEER

COMMONWEALTH OF MASSACHUSETTS
ANDREW R. BAUM
CIVIL
NO. 47078
REGISTERED PROFESSIONAL ENGINEER

SITE MAP OF LAND IN
OXFORD, MASSACHUSETTS
LOCATED ON
19 OXBOW ROAD

PREPARED FOR OWNER AND APPLICANT
S & K DEVELOPMENT, LLC
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TEL: 978 534-3131 - FAX: 978 534-3197 - EMAIL: info@sjmullaney.com

0 60
0 FEET
60 FEET
SCALE: 1" = 60'

DESIGN: MAL
DRAWN: MAL
CHECK: ARB/JPS
REF:

SHEET 3 OF 5

PLAN NO.
218-D-1

NOTES & SPECIFICATIONS:

A. EXISTING CONDITIONS:

1. THE LOCUS PROPERTY AT 19 OXBOW ROAD IS IDENTIFIED BY THE OXFORD ASSESSORS' AS MAP 9, PARCEL A21, AND CONTAINS ±5.98 AC. THE PROPERTY IS RECORDED IN THE WORCESTER COUNTY REGISTRY OF DEEDS BOOK 61728 PAGE 117.
2. ZONING DISTRICT: SUBURBAN (R2).
3. THE LOCUS PROPERTY LINES, CONTOURS AND SITE FEATURES ARE THE RESULT OF AN INSTRUMENT SURVEY BY NEW ENGLAND LAND SURVEY, INC. SUPPLIED BY ELECTRONIC MAIL ON 10/13/2020, FILE: OXBOW-BOUNDARY AND EXIST TOPO.DWG.
4. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
5. ABUTTING PARCELS, STRUCTURES AND SOIL DATA WERE DOWNLOADED ON 2/17/2021 FROM THE ONLINE DATALAYERS OF THE OFFICE OF GEOGRAPHIC INFORMATION (MASSGIS), COMMONWEALTH OF MASSACHUSETTS INFORMATION TECHNOLOGY DIVISION.
6. UTILITIES SHOWN ARE FROM RECORD INFORMATION AND ARE NOT WARRANTEED TO BE EXACT OR COMPLETE. THE ABSENCE OF SUBSURFACE STRUCTURES, UTILITIES, ETC. IS NOT INTENDED OR IMPLIED.
7. THE OXFORD CONSERVATION COMMISSION ISSUED A NEGATIVE DETERMINATION OF APPLICABILITY FOR THE LOCUS PROPERTY ON 11/14/2002 FOR THE PROPOSED EARTH REMOVAL PROJECT.
8. NO PORTION OF THIS SITE CONTAINS A MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP) PUBLIC WATER SUPPLY OR AQUIFER PROTECTIVE ZONE, PER MASSGIS DATALAYERS AS OF 03/19/2021.
9. NO PORTION OF THIS SITE IS WITHIN THE GRAPHICAL FEMA FLOOD ZONE A (AREA OF 100 YEAR FLOOD), PER THE FEMA FLOOD INSURANCE RATE MAPS FOR THE TOWN OF OXFORD, COMMUNITY-PANEL NO. 25027C0782E, EFFECTIVE 7/4/2011.
10. NO PORTION OF THIS SITE CONTAINS CERTIFIED VERNAL POOLS PER THE MASSACHUSETTS NATURAL HERITAGE & ENDANGERED SPECIES PROGRAM (NHESP) ATLAS 14TH EDITION EFFECTIVE 8/1/2017.
11. NO PORTION OF THIS SITE LIES WITHIN NHESP PRIORITY HABITAT OF RARE SPECIES NOR CONTAINS ANY SPECIES OF SPECIAL CONCERN PER THE ATLAS NOTED ABOVE.
12. NO PORTION OF THIS SITE IS WITHIN AN AREA OF CRITICAL ENVIRONMENTAL CONCERN.
13. THE PROPERTY CONTAINS AN INCOMPLETE EARTH REMOVAL PROJECT. THE PREVIOUS PROPERTY OWNER WAS ISSUED A SPECIAL PERMIT FOR EARTH REMOVAL BY THE OXFORD BOARD OF SELECTMAN 5/7/2003. THE PERMIT WAS REVOKED IN 2004. THE BOARD OF SELECTMEN ISSUED A VIOLATION LETTER DATED 6/1/2004 NOTING FOLLOWING VIOLATIONS:
   1.) CONDUCTING OPERATIONS OUTSIDE OF THE SPECIFIED DAYS AND TIMES.
   2.) NO QUARTERLY REPORTS HAVE BEEN RECEIVED BY THE TOWN SINCE THE PROJECT'S INCEPTION.
   3.) NO SANITARY FACILITIES ON THE SITE.
   4.) NO GATES OR FENCING TO SECURE THE SITE.

B. CONSTRUCTION METHODOLOGIES

1. ALL WORK, MATERIALS, AND APPURTENANCES SHALL BE IN ACCORDANCE WITH COMMONWEALTH OF MASSACHUSETTS AND TOWN OF OXBORD REQUIREMENTS.
2. THE CONTRACTOR SHALL CALL DIG SAFE (811) AND OBTAIN A DIG SAFE NUMBER A MINIMUM OF 72 HOURS IN ADVANCE OF SUBSURFACE SITE EXPLORATION OR INITIATION OF CONSTRUCTION, AS REQUIRED BY LAW.
3. CONSTRUCTION ACTIVITIES SHALL NOT RESULT IN THE INTERRUPTION OF UTILITIES OR ACCESS TO ADJACENT SITES.
4. PRIOR TO CONSTRUCTION, EXISTING OFF-SITE AREAS (DRAINAGE, PAVEMENT, VEGETATION) SHOULD BE INSPECTED AND THEIR CONDITIONS NOTED AND/OR PHOTOGRAPHED.
5. THE TOWN OF OXFORD FIRE CHIEF SHALL BE NOTIFIED OF ANY PROPOSED BLASTING. ALL BLASTING SHALL BE PERFORMED BY A LICENSED BLASTER IN ACCORDANCE WITH COMMONWEALTH OF MASSACHUSETTS AND TOWN OF OXFORD REGULATIONS.
6. OWNER ACCEPTS RESPONSIBILITY FOR WORK AND MATERIALS WITHIN THE SCOPE OF THIS PLAN.

C. PROPOSED CONDITIONS

1. THE OWNER/APPLICANT PROPOSES TO COMPLETE THE EARTH REMOVAL OPERATION STARTED BY THE PREVIOUS PROPERTY OWNER. PER THE TOWN OF OXFORD ZONING BYLAW CHAPTER XVIII (EARTH REMOVAL) A SPECIAL PERMIT IS REQUIRED FROM THE BOARD OF SELECTMEN FOR EARTH REMOVAL. THE CURRENT OWNER / APPLICANT INTENDS TO ADDRESS THE VIOLATIONS REFERENCED IN EXISTING CONDITIONS NOTE A.13 ABOVE.
2. THE PROPOSED GRADING DEPICTED RESULTS IN THE REMOVAL OF ±75,000 C.Y. EARTHEN MATERIAL.
3. PER THE EXEMPTION SPECIFIED IN TOWN OF OXFORD ZONING BYLAWS, CHAPTER XVIII §9.0, AN EARTH REMOVAL PERMIT IS NOT REQUIRED FOR THE REMOVAL OF NOT MORE THAN 500 C.Y. OF EARTH FROM A LOT FOR THE PURPOSE OF CONSTRUCTING A BUILDING, STRUCTURE AND ASSOCIATED FACILITES ON SUCH LOT IN ACCORDANCE WITH A BUILDING PERMIT.
4. THE FOLLOWING THE EARTH REMOVAL THE PROPERTY IS INTENDED TO BE DEVELOPED AS RESIDENTIAL DWELLINGS. THE FUTURE DEVELOPMENT WILL REQUIRE ADDITIONAL SOIL EVALUATION TESTING..
5. THIS PLAN PROPOSES 3.70 AC. OF SITE ALTERATION. DISTURBANCE OF MORE THAN ONE ACRE REQUIRES THE SUBMITTAL TO THE U.S. EPA OF A "NOTICE OF INTENT FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY UNDER A NATIONAL POLLUTION DISCHARGE SYSTEM (NPDES) GENERAL PERMIT."

D. UTILITIES:

1. S. J. MULLANEY ENGINEERING, INC. HAS PERFORMED HYDROLOGIC AND HYDRAULIC CALCULATIONS TO ANALYZE EXISTING AND PROPOSED STORM DRAINAGE CONDITIONS. STORMWATER RUNOFF CALCULATIONS HAVE BEEN PREPARED IN ACCORDANCE WITH MASSACHUSETTS STORMWATER MANAGEMENT POLICY REQUIREMENTS.
2. ALL STRUCTURES SHALL BE CAPABLE OF AASHTO HS-20 LOADING FOR THE CONDITION SHOWN.
3. THE DRAINAGE SYSTEM SHALL BE INSTALLED FROM THE DOWNSTREAM END UP. SEDIMENT SHALL NOT BE ALLOWED TO ENTER OFF SITE AREAS. WATER SHALL NOT BE ALLOWED TO RUNOFF THE SITE FROM UNSTABILIZED SURFACES.

E. LANDSCAPING:

1. IMMEDIATELY FOLLOWING GRADING, ALL DISTURBED AREAS SHALL BE LOAMED AND SEEDED. LANDSCAPING SHALL OCCUR AS SOON AS POSSIBLE TO PROVIDE PERMANENT STABILIZATION OF DISTURBED SURFACES.
2. FINISHED SIDE SLOPES SHALL NOT EXCEED A SLOPE OF TWO FEET HORIZONTAL TO ONE FOOT VERTICAL.
3. BANKINGS WITH SLOPES GREATER THAN 3:1 SHALL BE PLANTED WITH WELL-ROOTED, LOW-GROWING PLANTS.
4. WHEN PERMANENT STABILIZATION IS NOT IMMEDIATELY POSSIBLE DUE TO THE SEASON, TEMPORARY STABILIZATION SHALL BE PROVIDED USING METHODS SUCH AS TACKIFIED WOOD CHIPS OR HAY MULCH WEIGHTED WITH BRANCHES AND SEEDING WITH A RAPIDLY GERMINATING GRASS SPECIES. HAY USED FOR MULCH MUST BE FREE OF WEED SEED.
5. A MINIMUM OF 4" TOPSOIL SHALL BE PLACED AND ITS SURFACE SMOOTHED TO THE SPECIFIED GRADES.
6. CONTRACTOR SHALL UTILIZE A VARIETY OF SLOPE STABILIZATION METHODS AND MATERIALS, WHICH SHALL BE ADJUSTED TO THE SITE CONDITIONS. EROSION CONTROL BLANKETS OR MIRAFI MIRAMAT (OR SIMILAR PRODUCTS) SHALL BE AVAILABLE ON SITE.
7. TO ENSURE A DENSE, SUCCESSION GROWTH, SEED MIXTURE TYPE "C" IS REQUIRED ON ALL DISTURBED SURFACES.
8. FERTILIZER SHOULD BE USED IN THE AMOUNTS PRESCRIBED ON THE BAG. FERTILIZER IS CRITICAL IN ESTABLISHING PROPER VEGETATIVE COVER. YET, CARE SHOULD BE TAKEN TO PREVENT OVER APPLICATION.
9. THE USE OF HERBICIDES IS STRONGLY DISCOURAGED.
10. CONTRACTOR SHALL PROVIDE SUFFICIENT WATER AND/OR IRRIGATION FOR A MINIMUM OF TWO WEEKS FROM THE DATE OF PLANTING AND AS REQUIRED TO OBTAIN THE MINIMUM STANDARDS FOR LAWN SURFACE STABILIZATION.

F. GRASS AND SLOPE COVER:

1. ALL DISTURBED AREAS, INCLUDING SLOPES AND THE STORM WATER BASINS, SHALL BE GRADED AND STABILIZED BY PLANTING OR OTHER METHOD AS SHOWN OR SPECIFIED ON THE SITE PLANS.
2. LOAM ACIDITY SHALL BE CHECKED AND ADJUSTED TO A PH OF 6.5. APPLY LIME AT A MINIMUM RATE OF 50 LBS. PER 1,000 SQUARE FEET, IF NECESSARY.
3. ORGANIC-SLOW RELEASE FERTILIZER OF A TYPE 5-2-2 APPLIED AT A RATE OF 50 LBS. PER 500 SQUARE FEET.
4. RAKE A SEED BED USING A YORK RAKE OR HAND RAKING TO A MINIMUM DEPTH OF 3", THOROUGHLY INCORPORATING LIME AND FERTILIZER.
5. SEEDING MAY BE PERFORMED BY HAND, OR BY MECHANICAL OR TRACTOR MOUNTED SPREADER. HYDRO SEEDING IS RECOMMENDED.
6. AREAS SEEDED BEFORE APRIL 15 OR AFTER NOVEMBER 1 SHALL BE REAPPLIED BETWEEN THESE DATES IF A MINIMUM GERMINATION OF 90% COVERAGE, DETERMINED BY SURFACE AREA, HAS NOT OCCURRED OR IF THE SURFACE AREA HAS ERODED OR BECOME UNSTABILIZED.

G. HAND SEEDING:

1. SEED SHALL BE APPLIED BY HAND OR BY BROADCAST SPREADER, TO PROVIDE A UNIFORM DISTRIBUTION OF SEED.
2. SEED SHALL BE LIGHTLY RAKED INTO A DEPTH OF 1/2" - 1", WITH ALL RAKING TO BE PERPENDICULAR TO THE SLOPE.
3. SEED IS TO BE ROLLED WITH A WATER BALLAST ROLLER TO ENSURE CONTACT OF SEED WITH SOIL. DO NOT COMPACT SOIL.
4. AREA SHALL BE MULCHED USING SEED-FREE STRAW TO ADEQUATELY COVER THE AREA TO A DEPTH OF 1/2" - 1", ENSURING A UNIFORM COVER OF 75% OF THE SURFACE AREA.
5. MULCH SHALL BE SECURED BY MEANS OF SECURED LANDSCAPE FABRIC, EROSION CONTROL NETTING (3/4" - 1" MESH), OR OTHER BIODEGRADABLE MATERIAL, WHICH WILL ENSURE ADEQUATE COVER UNTIL THE SURFACE HAS GROWN TO 90% GERMINATION OR ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

H. HYDRO SEEDING:

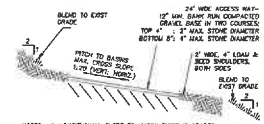
1. HYDRO SEEDING IS ENCOURAGED FOR ALL AREAS. ESPECIALLY FOR LARGE AREAS AND STEEP SLOPES.
2. HYDRO SEEDING SHALL BE PERFORMED IN A SINGLE UNIFORM LAYER.
3. A TRACK EQUIPPED MACHINE SHALL TRAVEL PERPENDICULAR TO ANY SLOPE TO PROVIDE COMPACTED SURFACE DEPRESSIONS FOR HYDRO SEEDING TO CATCH. SUCH TRACKS SHALL BE A MINIMUM OF THREE (3') FEET ON CENTER FOR THE TOTAL LENGTH OF THE SLOPE.
4. APPLICATION RATES ON SLOPES GREATER THAN 3:1 (HORIZONTAL TO VERTICAL) SHALL HAVE A MINIMUM SEEDING RATE OF 4 LBS. / 1000 S.F.
5. A LATEX OR FIBER TACKIFIER SHALL BE USED ON ALL AREAS AT THE RATE RECOMMENDED BY THE MANUFACTURER AND ON ALL SLOPES IDENTIFIED ABOVE (NO. 4). A MINIMUM RATE OF 50 LBS. OF TACKIFIER PER 500 GALS. OF WATER SHALL BE USED.
6. FERTILIZER AND LIME MAY BE INCORPORATED INTO THE HYDRO SEED MIXTURE IN THE QUANTITIES AND TYPE IDENTIFIED PREVIOUSLY (IF PERMITTED BY THE ORDERS OF CONDITIONS ONLY).

I. SEED MIXTURE TYPE "C"

1. SEED MIXTURES FOR SLOPED AREAS SHALL CONSIST OF A STANDARD CONSERVATION MIX CONFORMING TO THE RECOMMENDATIONS OF THE U.S. NATURAL RESOURCES CONSERVATION SERVICE (NRCS) GUIDELINES.
2. MINIMUM SEED COMPOSITION, BY TOTAL WEIGHT OF MIX, SHALL INCLUDE: 20% ANNUAL RYE, 15% RED TOP FESCUE, 10% WHITE CLOVER, 5% LADINA CLOVER, AND 5% CROWN VETCH.
3. NO MORE THAN 40% OF THE TOTAL MIX, BY WEIGHT, SHALL CONSIST OF ANNUAL RYE OR OTHER ANNUAL SPECIES.
4. SEED SHALL BE APPLIED AT A RATE OF 4 LBS. PER 1,000 SQUARE FEET.
5. ALL SEED SHALL BE OF THE PREVIOUS YEAR'S CROP AND SHALL HAVE A QUANTIFIED MIXTURE ANALYSIS ATTACHED.
6. NO MORE THAN 10% OF TOTAL MIXTURE SHALL CONSIST OF WEED SEED SPECIES.

J. CRITERIA FOR EVALUATION

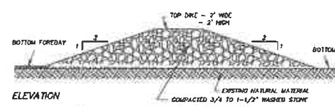
1. PER THE TOWN OF OXFORD ZONING BYLAWS XVIII (EARTH REMOVAL) §5.4, FOR EARTH REMOVAL OPERATIONS WITHIN 200 FEET OF A WAY OR WITHIN 250 FEET OF A BUILDING THE BOARD OF SELECTMEN NEEDS TO BE REASONABLY SATISFIED THAT SUCH OPERATIONS WILL NOT UNDERMINE SUCH WAY OR BUILDING. THE PREVIOUS EARTH REMOVAL PERMIT REFERENCED IN NOTE A.13 CONTAINED OPERATIONS WITHIN THE DISTANCES ABOVE. THE PROPOSED GRADING DEPICTED ON THIS PLAN IS IN KEEPING WITH THE SETBACKS ON THE PREVIOUS PERMIT.



NOTES: 1. LONGITUDINAL SLOPE TO MATCH EXISTING GRADES.
2. CONSTRUCTION FOR ACCESS DRIVE TO BASIN.

GRAVEL ACCESS WAY — NOT TO SCALE

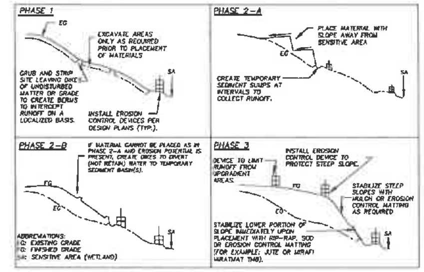
STA 13+50 TO END OF DRIVE



NOTE: THE 2' HIGH STONE DIKE IS INTENDED TO DIVIDE PONDS 308 AND 318 INTO TWO APPROXIMATELY EQUAL HALVES. ONE HALF BEING FOREBAY AND THE OTHER RECHARGE BASIN. POND 208 THE STONE DIKE IS ADJACENT TO THE WEIR.

FOREBAY DIKE DETAIL

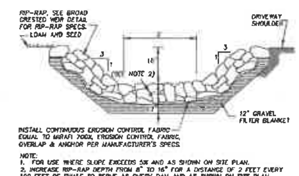
NOT TO SCALE



REFERENCE SEE: AASHTO DIVISION 200 EARTHWORK; SECTION 201-208. AASHTO DIVISION 600 MISCELLANEOUS CONSTRUCTION, SECTION 619 EROSION MATS AND BALES. AASHTO DIVISION 700 MATERIAL REQUIREMENTS, SECTION 713.07, EROSION CONTROL NET MATERIAL.

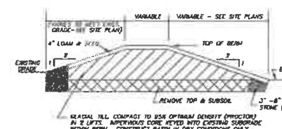
FILL SEQUENCE

NOT TO SCALE



NOTE:
1. FOR USE WHERE SLOPE EXCEEDS 5% AND AS SHOWN ON SITE PLAN.
2. INCREASE RIP-RAP DEPTH FROM 8" TO 16" FOR A DISTANCE OF 2 FEET EVERY 100 FEET OF SWALE TO SERVE AS CHECK DAM AND AS SHOWN ON SITE PLAN.

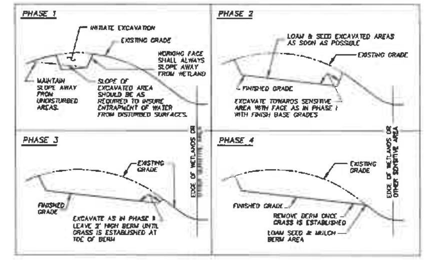
REINFORCED RIP-RAP SWALE — NOT TO SCALE



GLACIAL TILL COMPACT TO 95% OPTIMUM DENSITY (PROCTOR) IN 8" LIFTS. IMPERVIOUS CORE KEYED INTO EXISTING SUBGRADE WITHIN BERM. CONSTRUCT BASIN IN DRY CONDITIONS ONLY.
PLEASE NOTE THE BERM DETAIL ABOVE IS ONLY NEEDED ON POND 318 ALONG OXBOW ROAD AS THE PONDS ARE PRIMARILY EXCAVATED BASINS OR EXISTING DEPRESSIONS.

STORMWATER BASIN LINER/BERM

NOT TO SCALE



EXCAVATION SEQUENCE

NOT TO SCALE

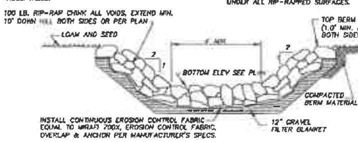
100LB. RIP-RAP SPECIFICATIONS:

1. ALL STONE SHALL BE CLEAN DURABLE ANGULAR STONE MEETING THE FOLLOWING SPECIFICATIONS:

STONE SIZE	% OF WEIGHT SMALLER THAN GIVEN SIZE
100 LB.	100%
60 LB.	75%
25 LB.	50%
2 LB.	NOT TO EXCEED 10%

ROUNDED STONES, BOULDERS, SANDSTONE OR SIMILAR STONE OR RELATIVELY THIN SLAB SHALL NOT BE ACCEPTABLE.

2. THE RIP-RAP SHALL BE UNDERLAYED WITH A FILTER BLANKET CONSISTING OF CLEAN, COARSE GRAVEL WITH NO STONES OVER 4" IN LONGEST DIMENSION AND NO FEWER THAN 10% OF TOTAL VOLUME PASSING A 200# SIEVE.
3. THE FILTER BLANKET NEED NOT BE COMPACTED, BUT SHALL BE GRADED TO A UNIFORM THICKNESS OF 12".
4. THE FILTER BLANKET SHALL BE OVERLAID WITH A STRUCTURAL/EROSION CONTROL FABRIC OF THE TYPE SPECIFIED. SUCH FABRIC SHALL BE CONTINUOUS IN LENGTHS, EITHER PARALLEL OR PERPENDICULAR TO THE SLOPE AND MUST BE UNDER ALL RIP-RAPPED SURFACES.



REINFORCED OVERFLOW BROAD-CRESTED WEIR

NOT TO SCALE

ORIGINAL ISSUE	--	--	3/23/2021	
VERSION	NO.	BY	DATE	SURVEYOR
ORIGINAL ISSUE	--	--	3/23/2021	
VERSION	NO.	BY	DATE	ENGINEER

COMMONWEALTH OF MASSACHUSETTS — JAMES PATRICK SMITH NO. 46510

COMMONWEALTH OF MASSACHUSETTS — ANDREW R. BAUM CIVIL NO. 47076 REGISTERED PROFESSIONAL ENGINEER

SITE MAP OF LAND IN

OXFORD, MASSACHUSETTS

LOCATED ON

19 OXBOW ROAD

SCALE: 1" = 60'

PREPARED FOR OWNER AND APPLICANT

S & K DEVELOPMENT, LLC

JAMES P. SMITH, MANAGER

710 MAIN STREET
P.O. BOX 744
NORTH OXFORD, MA 01537
TEL: 508-987-2266 CELL: 508-207-6855

DESIGN: MAL
DRAWN: MAL
CHECK: ARB/JPS
REF:

TOWN OF OXFORD BOARD OF SELECTMEN			
POSITION	NAME	SIGNATURE	DATE
CHAIRMAN	DENNIS E. LAMARCHE		
VICE-CHAIR	MEAGHAN E. TROIANO		
SECRETARY	CHERYLL A. LEBLANC		
MEMBER	MICHAEL F. DANIELS		
MEMBER	JOHN G. SAAD		

S. J. MULLANEY ENGINEERING, INC.
CIVIL SITE DESIGN & PERMITTING

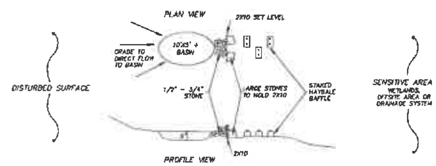
305 WHITNEY ST. - SUITE G3 - P.O. BOX 752 - LEOMINSTER, MA 01453-0752
TEL: 978 534-3131 - FAX: 978 534-3197 - EMAIL: info@sjmullaney.com

SHEET 4 OF 5

PLAN NO. 218-D-1

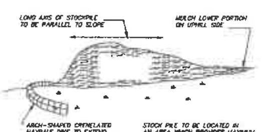
PROPOSED CONDITION

TOWN OF OXFORD BOARD OF SELECTMEN			
POSITION	NAME	SIGNATURE	DATE
CHAIRMAN	DENNIS E. LAMARCHE		
VICE-CHAIR	MEAGHAN E. TROIANO		
SECRETARY	CHERYLL A. LEBLANC		
MEMBER	MICHAEL F. DANIELS		
MEMBER	JOHN G. SAAD		



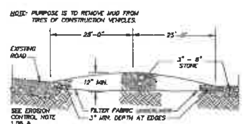
TEMPORARY DEWATERING AREA / TEMPORARY SETTLING BASIN

NOT TO SCALE



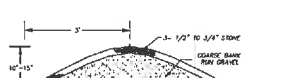
TEMPORARY STOCKPILE

NOT TO SCALE



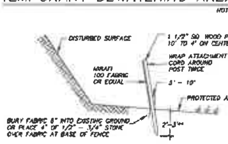
TEMPORARY CONSTRUCTION ENTRANCE

NOT TO SCALE



ARMORED DIKE

NOT TO SCALE

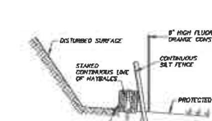


* STEEL POST MAY BE SUBSTITUTED. DISTANCE BETWEEN POSTS TO VARY AS REQUIRED BY TRIBUTARY AREA: 10' FOR 100 SF/LF FENCE 8' FOR 500 SF/LF FENCE

** DEPTH TO VARY WITH TRIBUTARY AREA: 2' FOR 100 SF ETC. IF POST IS TO BE SET IN PEAT OR UNSTABLE SOILS, THEN 3' OR DEPTH NECESSARY TO PROVIDE A STABLE POST FOR LOADED FENCE CONDITIONS

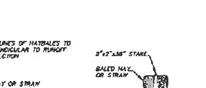
SILT FENCE DETAIL

NOT TO SCALE



SILTATION BARRIER

NOT TO SCALE



PLAN SECTION

HAYBALE DIKE

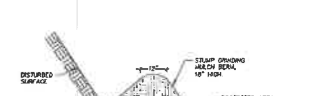
NOT TO SCALE

NOTE:
1) FILTER SOCKS MAY BE UTILIZED AS EROSION CONTROL BARRIER IN LIEU OF SILT FENCE AND/OR HAYBALES.
2) FILTER SOCK SHALL BE A MESH TUBE FILLED WITH COMPOST. FILTER SOCK SHALL BE FILTREXX 'SILTSOXX' OR EQUAL. SEE WWW.FILTREXX.COM. ENDS OF FILTER SOCK TO BE TIED AND DIRECTED UP SLOPE.
3) COMPOST MATERIAL SHALL BE DERIVED FROM FROM WELL-DECOMPOSED ORGANIC MATTER FREE OF WEEDS. COMPOST MATERIAL SHALL BE RELATIVELY FREE OF INERT OR MAN MADE MATERIALS. PARTICLE SIZE: 99% PASSING A 2" SIEVE AND A MINIMUM OF 60% GREATER THAN THE 3/8" SIEVE. PH RANGE: 5.0-8.0 WITH A MOISTURE CONTENT OF LESS THAN 60%.
4) FILTER SOCK SHALL ALSO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

FILTER SOCK DETAIL

NOT TO SCALE

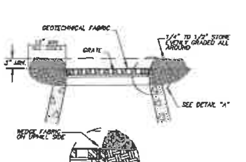
NOTE: SEVERAL TYPES OF EROSION CONTROL BARRIERS ARE SHOWN TO ALLOW THE CONTRACTOR FLEXIBILITY OF SELECTING BARRIERS THAT MAY BE MORE READILY AVAILABLE DURING THE TIME OF CONSTRUCTION.



NOTE:
1) STUMP GRINDINGS MAY BE UTILIZED AS EROSION CONTROL BARRIER IN LIEU OF SILT FENCE AND/OR HAYBALES IN AREAS OUTSIDE OF STREAM CHANNELS AND AREAS OF CHANNELIZED FLOW.

STUMP GRINDING EROSION CONTROL DETAIL

NOT TO SCALE



FILTERED CATCHBASIN INLET

NOT TO SCALE

I. STORM WATER POLLUTION PREVENTION AND EROSION & SEDIMENTATION CONTROL PLAN

A. EROSION CONTROL MEASURES:

1. THE CONTRACTOR AND PROPERTY OWNER ARE RESPONSIBLE FOR ENSURING THAT EROSION AND SEDIMENTATION ARE CONTROLLED. THIS PLAN SHALL BE ADAPTED TO FIT THE CONTRACTOR'S EQUIPMENT, WEATHER CONDITIONS AND CONDITIONS ISSUED BY PERMITTING AUTHORITIES.
2. THE CONTRACTOR SHALL LIMIT THE EXTENT OF DISTURBANCE AND STABILIZE SURFACES AS SOON AS POSSIBLE. THE CONTRACTOR SHALL LIMIT THE SIZE AND LENGTH OF THE TRIBUTARY DRAINAGE AREA TO THE WORK SITE AND DRAINAGE STRUCTURES.
3. THE EXISTING SOIL CONDITIONS PROVIDE RUNOFF FROM AREAS WITH A HIGH WATER TABLE AND EROSION POTENTIAL. THE CONTRACTOR MUST ANTICIPATE HEAVY RUNOFF FROM THE HILLSIDE DURING ANY SPRING CONSTRUCTION OR DURING AND AFTER ANY INCLEMENT WEATHER.
4. THE CONTRACTOR SHALL CONSTRUCT TEMPORARY DIVERSION SWALES AND SETTLING BASINS IN AREAS OF FUTURE CONSTRUCTION. CONSTRUCTION IS PERMITTED BEYOND THE LIMIT OF DISTURBANCE ONLY WHEN ADDITIONAL DRAINAGE MEASURES OR STABILIZATION MEASURES ARE NEEDED AND SHALL BE SUBJECT TO APPROVAL BY THE OXFORD CONSERVATION COMMISSION PRIOR TO WORK OUTSIDE OF THE DESIGNATED LIMIT OF DISTURBANCE LINE, IF WITHIN THE 100-FT. WETLANDS BUFFER ZONE.
5. ALL DISTURBED SURFACES SHALL BE STABILIZED AS SOON AS PRACTICABLE WHERE PORTIONS OF THE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN 14 DAYS.
6. THE CONTRACTOR SHALL REGULARLY INSPECT, MAINTAIN AND REPAIR ALL EROSION CONTROL DEVICES ON-SITE. ANY SEDIMENTS REMOVED FROM THE CONTROL DEVICES SHALL BE DISPOSED OF OUTSIDE OF THE 100-FT. WETLANDS BUFFER ZONE.
7. TEMPORARY STABILIZATION SHALL BE PROVIDED USING METHODS SUCH AS TACKIFIED WOOD CHIPS OR HAY MULCH WEIGHTED WITH BRANCHES AND SEEDING WITH A RAPIDLY GERMINATING GRASS SPECIES. HAY USED FOR MULCH MUST BE FREE OF WEED SEED.
8. CONTRACTOR SHALL UTILIZE A VARIETY OF SLOPE STABILIZATION METHODS AND MATERIALS, WHICH SHALL BE ADJUSTED TO THE SITE CONDITIONS.
9. AT NO TIME SHALL SILT-LADEN WATER BE ALLOWED TO ENTER SENSITIVE AREAS (WETLANDS, OFF-SITE AREAS AND DRAINAGE SYSTEMS). RUNOFF FROM DISTURBED SURFACES SHALL BE DIRECTED THROUGH SETTLING BASINS, FILTERED CATCH BASIN INLETS AND/OR TEMPORARY DEWATERING AREAS, AND EROSION CONTROL BARRIERS PRIOR TO ENTERING SENSITIVE AREAS.
10. TEMPORARY DEWATERING AREAS AND/OR SEDIMENT BASINS (DEBRIS BASINS, DE-SILTING BASINS OR SILT TRAPS) SHALL BE INSTALLED AND MAINTAINED WHERE NECESSARY TO REMOVE FROM RUNOFF WATERS ANY SEDIMENT FROM LAND UNDERGOING DEVELOPMENT.
11. TEMPORARY SETTLING BASINS MUST HAVE A MINIMUM CAPACITY OF 3,600 CU. FT. STORAGE FOR EVERY ACRE DRAINED. MULTIPLE SMALLER BASINS PROVIDING THE SAME CAPACITY SHALL BE USED WHERE LARGE BASINS ARE NOT FEASIBLE.

B. GENERAL CONSTRUCTION REQUIREMENTS:

1. REFUELING OF CONSTRUCTION VEHICLES AND EQUIPMENT SHALL TAKE PLACE OUTSIDE OF THE 100-FT. BUFFER ZONE TO THE WETLANDS AND SHALL NOT BE CONDUCTED IN PROXIMITY TO SEDIMENTATION BASINS OR DIVERSION SWALES.
2. NO ON-SITE DISPOSAL OF SOLID WASTE, INCLUDING BUILDING MATERIALS, IS ALLOWED IN THE 100-FT. BUFFER ZONE. IT IS RECOMMENDED THAT LOCATIONS OF STUMP DUMPS GREATER THAN 50-C.Y. BE COORDINATED WITH THE OXFORD BOARD OF HEALTH.
3. NO MATERIALS SHALL BE DISPOSED OF INTO THE WETLANDS OR EXISTING OR PROPOSED DRAINAGE SYSTEMS. ALL CONTRACTORS, INCLUDING: CONCRETE SUPPLIERS, PAINTERS AND PLASTERERS, SHALL BE INFORMED THAT THE CLEANING OF EQUIPMENT IS PROHIBITED IN AREAS WHERE THE WASH-WATER WILL DRAIN DIRECTLY TO THE WETLANDS OR DRAINAGE SYSTEMS.
4. CONTRACTOR IS RESPONSIBLE FOR DUST CONTROL WHICH SHALL INCLUDE STREET SWEEPING OF ALL PAVED SURFACES WITHIN THE SITE AND OFF-SITE AREAS THAT ARE IMPACTED BY SITE CONSTRUCTION ON A REGULAR BASIS, AS NEEDED.
5. ALL SITE WORK SHALL BE STABILIZED AT THE END OF THE WORK DAY OR PRIOR TO ANTICIPATED CONDITIONS WHICH COULD CAUSE EROSION OR AIR-BORNE SEDIMENT PROBLEMS (I.E., RAIN, HIGH WINDS, EXPOSED SURFACES OR STEEP SLOPES).
6. SITE OPERATIONS IN THE AREA OF DISTURBANCE SHALL BE CONDUCTED IN SUCH A MANNER TO MAINTAIN OR CREATE GRADES AND SURFACES WHICH SLOPE AWAY FROM ABUTTING PROPERTIES.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT ABUTTING PROPERTIES ARE KEPT CLEAR OF CONSTRUCTION RELATED DEBRIS. ALL MATERIALS TRACKED ONTO SUCH AREAS SHALL BE PROMPTLY REMOVED.
8. THE OWNER/APPLICANT IS RESPONSIBLE FOR IMPLEMENTING THESE CONTROL MEASURES UNLESS AND UNTIL AN OUTSIDE CONTRACTOR IS RETAINED.

C. PRE-CONSTRUCTION:

1. AN EROSION CONTROL BARRIER (SILT FENCE, HAY BALE DIKE OR SILTATION BARRIER) SHALL BE INSTALLED TO LIMIT THE AREA OF DISTURBANCE. THIS IS ESPECIALLY IMPORTANT DOWNGRADIENT OF SITE ACTIVITY AND ON PORTIONS OF THE SITE ADJACENT TO SENSITIVE AREAS SUCH AS WETLANDS. THESE BARRIERS SHALL REMAIN IN PLACE UNTIL ALL TRIBUTARY SURFACES HAVE BEEN FULLY STABILIZED. THE EROSION CONTROL BARRIERS AS SHOWN ON THE SITE PLAN ARE THE MINIMUM REQUIRED TO PROTECT THE WETLANDS.
2. A TEMPORARY STONE ACCESS AREA SHALL BE ESTABLISHED AT THE ENTRANCE TO EACH STREET AND LOT DRIVEWAY TO COLLECT ENTRAPPED SOILS AND SEDIMENT FROM CONSTRUCTION AND SERVICE VEHICLES ENTERING AND LEAVING THE SITE. THIS ACCESS AREA SHALL BE THE SINGULAR ACCESS FOR ALL CONSTRUCTION VEHICLES. THE STONE SHALL BE REPLACED REGULARLY AS WELL AS WHEN THE STONE IS SILT LADEN. EACH CONSTRUCTION ENTRANCE SHALL BE LEFT IN PLACE UNTIL THE BINDER PAVEMENT SURFACE IS INSTALLED.
3. ONLY THE MINIMUM AREA SHALL BE DISTURBED FOR ALL CONSTRUCTION. ANY SPECIMEN TREES TO BE SAVED AND THE EXACT LIMITS OF CLEARING SHOULD BE MARKED IN ADVANCE.
4. THE CONTRACTOR SHALL ESTABLISH STAGING AREAS WITHIN THE AREA OF DISTURBANCE, OUTSIDE THE 100-FT. BUFFER ZONE, FOR THE OVERNIGHT STORAGE OF EQUIPMENT AND STOCKPILING OF MATERIALS.
5. CONSTRUCTION MATERIALS SHALL BE PILED SO AS NOT TO CONCENTRATE RUNOFF.
6. IN THE STAGING AREAS, THE CONTRACTOR SHALL HAVE STOCKPILES OF MATERIALS REQUIRED TO CONTROL EROSION ON-SITE TO BE USED TO SUPPLEMENT OR REPAIR EROSION CONTROL DEVICES. THESE MATERIALS SHALL INCLUDE, BUT ARE NOT LIMITED TO, HAY BALES, SILT FENCE AND CRUSHED STONE.
7. THE CONTRACTOR IS RESPONSIBLE FOR EROSION CONTROL ON SITE AND SHALL UTILIZE EROSION CONTROL MEASURES WHERE NEEDED, REGARDLESS OF WHETHER THE MEASURES ARE SPECIFIED HEREIN OR IN CONDITIONS ISSUED BY PERMITTING AUTHORITIES.

D. PRELIMINARY SITE WORK:

1. THE STORM WATER BASINS SHALL BE CONSTRUCTED PRIOR TO ANY ROUGH GRADING ON THE SITE. IT IS RECOMMENDED THAT THE BASINS BE CONSTRUCTED LARGER AND DEEPER THAN REQUIRED ON THE FINAL PLANS TO ALLOW ADDITIONAL CAPACITY FOR SEDIMENTATION DURING CONSTRUCTION. ARMORED DIKES AND SILT FENCES SHALL BE PLACED AT THE OUTLETS TO PROVIDE ADDITIONAL FILTRATION OF RUNOFF.
2. MATERIAL REMOVED SHOULD BE STOCKPILED, SEPARATING THE TOPSOIL FOR FUTURE USE ON THE SITE. WOOD CHIPS GENERATED ON SITE AS A RESULT OF LAND CLEARING OPERATIONS SHOULD REMAIN ON SITE FOR USE AS MULCH. EROSION CONTROLS SHALL BE UTILIZED ALONG THE DOWNSLOPE SIDE OF THE PILES IF THE PILES ARE TO REMAIN MORE THAN THREE WEEKS. RUNOFF SHALL BE DIRECTED AWAY FROM STOCKPILES.
3. STOCKPILES SHALL BE LOCATED WITHIN THE LIMITS OF DISTURBANCE, IN AREAS OF MINIMAL IMPACT, OUTSIDE OF THE 100-FT. WETLANDS BUFFER, UNLESS ALLOWED BY ORDERS OF CONDITIONS.
4. NO EARTHEN MATERIAL SHALL LEAVE THE SITE EXCEPT IN ACCORDANCE WITH THE TOWN OF OXFORD ZONING BYLAWS - CHAPTER XVIII - EARTH REMOVAL.
5. GRUBBING AND STRIPPING ON SLOPES LEADING TO WETLANDS SHALL NOT OCCUR DURING HEAVY RAIN.
6. IF INTENSE RAINFALL IS ANTICIPATED, SUPPLEMENTAL HAY BALE DIKES, SILT FENCES, OR ARMORED DIKES SHALL BE INSTALLED.
7. ROUGH GRADING OF THE DRIVEWAY SHOULD BE CONDUCTED IN SUCH A MANNER AS TO MAINTAIN OR CREATE GRADES SLOPING AWAY FROM OFF SITE AREAS AND INTO TEMPORARY DETENTION BASINS WHEREVER POSSIBLE.

E. DRAINAGE SYSTEM:

1. THE DRAINAGE SYSTEM SHALL BE INSTALLED FROM THE DOWNSTREAM END UP. SEDIMENT SHALL NOT BE ALLOWED TO ENTER ABUTTING PROPERTIES. PRETREATMENT OF STORMWATER RUNOFF FROM UNSTABILIZED SURFACES SHALL REQUIRED PRIOR TO LEAVING THE SITE.
2. RIP RAP SHALL BE INSTALLED AT THE PIPE INLETS AND OUTLETS IMMEDIATELY UPON THE PLACEMENT OF THE PIPE. SILT FENCES SHALL BE INSTALLED AT THE OUTFALLS OF ALL TEMPORARY BASINS AND SWALES. THEY SHALL REMAIN IN PLACE UNTIL ALL TRIBUTARY AREAS ARE STABILIZED.
3. UNTIL TRIBUTARY AREAS ARE STABILIZED, ARMORED DIKES INLETS SHALL COVER THE INLETS AND OUTLETS TO THE STORM WATER BASINS TO MINIMIZE SILTATION IN THE DRAINAGE STRUCTURES. IF INTENSE RAINFALL (SUCH AS A HURRICANE) IS PREDICTED BEFORE ALL TRIBUTARY AREAS ARE STABILIZED, THE ARMORED DIKES SHALL BE REINFORCED FOR THE DURATION OF THE STORM. DOWNSTREAM AREAS SHALL BE INSPECTED AND ANY SEDIMENTS REMOVED AT THE END OF THE STORM.
4. IF UNSTABLE AREAS ARE ENCOUNTERED DUE TO NATURAL SPRINGS OR GROUNDWATER BREAKOUT, INTERCEPTOR DRAINS SHALL BE INSTALLED TO DIRECT THE RUNOFF INTO THE DRAINAGE SYSTEM.
5. ALL SWALES MUST BE MAINTAINED AND KEPT FREE OF OBSTRUCTIONS, TO ALLOW UNIMPEDED FLOW.
6. ALL SURFACES SHOULD BE RAPIDLY AND THOROUGHLY STABILIZED TO THEIR FINAL CONDITION TO AVOID SEDIMENTS LEAVING THE PROPERTY.
7. AT THE COMPLETION OF WORK, THE DRAINAGE SYSTEM SHALL BE OPENED AND INSPECTED. ANY FOREIGN MATERIAL PRESENT SHALL BE REMOVED.

F. UTILITIES: (NONE PROPOSED)

1. UTILITY TRENCHES SHALL NOT CHANNELIZE RUNOFF TOWARD WETLANDS OR OFF-SITE AREAS.
2. TRENCH EXCAVATIONS SHALL BE LIMITED TO THE MINIMUM LENGTH REQUIRED FOR DAILY UTILITY INSTALLATION. ALL TRENCHES SHALL BE BACKFILLED AS SOON AS POSSIBLE. THE ENDS OF PIPES SHALL BE CLOSED NIGHTLY WITH PLYWOOD.
3. WHEN EXCAVATING EACH UTILITY LINE, TRENCH EXCAVATION SHOULD BEGIN AT THE LOW END AND PROCEED UPHILL.

G. ILLICIT DISCHARGES:

ILLICIT DISCHARGES TO THE STORM WATER MANAGEMENT SYSTEM, I.E., DISCHARGES THAT ARE NOT ENTIRELY COMPRISED OF STORM WATER, ARE PROHIBITED. NOTWITHSTANDING THE FOREGOING, AN ILLICIT DISCHARGE DOES NOT INCLUDE DISCHARGES FROM THE FOLLOWING ACTIVITIES OR FACILITIES: FIREFIGHTING, WATER LINE FLUSHING, LANDSCAPE IRRIGATION, UNCONTAMINATED GROUND WATER, POTABLE WATER SOURCES, FOUNDATION DRAINS, AIR CONDITIONING CONDENSATION, FOOTING DRAINS, INDIVIDUAL RESIDENT CAR WASHING, FLOWS FROM RIPARIAN HABITATS AND WETLANDS, DECHLORINATED WATER FROM SWIMMING POOLS, WATER USED FOR STREET WASHING AND WATER USED TO CLEAN RESIDENTIAL BUILDINGS WITHOUT DETERGENTS.

II. NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES):

A. APPLICABILITY

1. THIS PLAN IS INTENDED TO MEET THE REQUIREMENTS OF THE NATIONAL STORM WATER POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES) OF SECTION 402 OF THE FEDERAL CLEAN WATER ACT. THE PROPOSED EARTH REMOVAL WILL RESULT IN MORE THAN ONE (1) ACRE OF TOTAL DISTURBED AREA (3.70 ACRES PROPOSED), REQUIRING A STORM WATER POLLUTION PREVENTION PLAN (SWPPP).
2. THE SITE AS DESIGNED IS ANTICIPATED TO MEET THE CRITERIA FOR A NPDES CONSTRUCTION GENERAL PERMIT (CGP). THE SUBMISSION OF THE NPDES NOTICE OF INTENT (NPDES NOI) TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY MUST OCCUR A MINIMUM OF 14 DAYS PRIOR TO THE INITIATION OF ANY SITE DISTURBANCE OR CONSTRUCTION.
3. THIS PLAN IS ALSO INTENDED TO PROVIDE GUIDANCE AND INSTRUCTION TO THE OWNER AND CONTRACTOR(S) IN THE PREVENTION OF EROSION AND SEDIMENTATION ON AND OFF-SITE. THIS PLAN IS INTENDED TO ALLOW ANY ORDERS OF CONDITIONS TO BE MORE SPECIFIC IN ADDRESSING ITEMS OF CONCERN. IF, UPON ISSUANCE OF ORDERS BY PERMITTING AUTHORITIES, ANY ITEMS SPECIFIED HEREIN CONFLICT WITH THE ORDERS, SAID ORDERS SHALL SUPERSEDE THE REQUIREMENTS SPECIFIED HEREIN.

B. NPDES RECORD REQUIREMENTS:

1. A COPY OF THE NPDES SUBMITTAL AND THIS PLAN MUST BE KEPT ON-SITE IN A WEATHER-PROOF ENCLOSURE AT THE SITE CONSTRUCTION TRAILER OR AT THE CONSTRUCTION ENTRANCE AT ALL TIMES DURING CONSTRUCTION AND SHALL BE MADE AVAILABLE TO ALL INTERESTED PARTIES.
2. RECORDS MUST BE MAINTAINED BY THE PERMITTEE AT ITS PHYSICAL ADDRESS OF RECORD FOR A PERIOD OF THREE (3) YEARS FROM THE DATE OF STABILIZATION OF THE SITE. STABILIZATION OCCURS WHEN THE SITE HAS OVER 70% VEGETATIVE GROWTH AND/OR MECHANICAL STABILIZATION THROUGHOUT. RECORDS SHOULD INCLUDE DATES WHEN MAJOR GRADING ACTIVITIES OCCUR, WHEN CONSTRUCTION ACTIVITIES CEASE (TEMPORARILY AND PERMANENTLY) AND WHEN STABILIZATION (TEMPORARY AND PERMANENT) IS INITIATED AND COMPLETED.

C. NPDES INSPECTION REQUIREMENTS:

1. ALL INSPECTIONS SHALL BE CONDUCTED BY QUALIFIED PERSONNEL WHO SHALL PRODUCE SIGNED WRITTEN QUANTITATIVE AND QUALITATIVE REPORTS ON THE METHODS, SUITABILITY OF STRUCTURES AND THE GENERAL CONSTRUCTION. QUALIFIED PERSONNEL INCLUDE CONSULTANTS, ENGINEERS OR CONTRACTORS LICENSED IN SITE DEVELOPMENT RELATED FIELDS. INSPECTORS MUST INCLUDE ALL ITEMS IN PART 3.10.E. AND G. OF THE CGP.
2. INSPECTIONS ARE REQUIRED DURING SITE ALTERATIONS A MINIMUM OF ONCE EVERY FOURTEEN (14) DAYS WHILE SURFACES ARE UNSTABILIZED.
3. INSPECTIONS ARE REQUIRED WITHIN 24-HOURS OF STORMS WHICH PRODUCE 0.25" OF PRECIPITATION OR GREATER AND OCCURRENCES OF DISCHARGE FROM SNOW MELT SUFFICIENT TO CAUSE DISCHARGE.
4. WHEN THE SITE IS FULLY STABILIZED, INSPECTIONS SHALL BE CONDUCTED AT MONTHLY INTERVALS FOR A PERIOD OF 3 YEARS.
5. IF EXISTING BEST MANAGEMENT PRACTICES (BMPS) NEED MODIFICATION OR ADDITIONAL BMPS ARE NECESSARY, IMPLEMENTATION MUST BE COMPLETED BEFORE THE NEXT STORM EVENT IF PRACTICABLE AND THE SWPPP MUST BE AMENDED TO DOCUMENT CHANGES MADE IN BMPS.
6. THE SWPPP AND SITE PLAN MUST BE AMENDED OR MODIFIED WHENEVER THERE IS A CHANGE IN DESIGN, CONSTRUCTION, OPERATION OR MAINTENANCE OR IF BMPS ARE INEFFECTIVE IN MINIMIZING POLLUTANTS IN STORM WATER RUNOFF TO SURFACE WATERS.
7. OPERATIONS AND MAINTENANCE RECORDS SHALL BE KEPT ON THE PREMISES AND BE MADE AVAILABLE TO PERMITTING AUTHORITIES OR THEIR AGENTS FOR INSPECTION, UPON REQUEST.

III. DRAINAGE SYSTEM OPERATIONS & MAINTENANCE PLAN

A. STORM WATER COLLECTION SYSTEM:

1. THE STORM WATER COLLECTION SYSTEM SERVING THIS SITE IS INTENDED TO BOTH COLLECT STORM WATER RUNOFF AND TO PROVIDE TREATMENT OF THE STORM WATER PRIOR TO ITS DISCHARGE DOWNGRADIENT. THE STORM WATER DRAINAGE SYSTEM COLLECTS RUNOFF GENERATED FROM THE SITE THROUGH RIP-RAP SWALES. THE SWALES DISCHARGE INTO A SEDIMENT FOREBAY WHICH FLOWS INTO A STORMWATER BASIN. THE SWALES AND FOREBAYS COLLECT SEDIMENT AND DEBRIS. WHEN THESE TWO BASIC CONTROL MECHANISMS ARE FUNCTIONING PROPERLY, THEY PROVIDE FOR A REDUCTION OF CONTAMINANTS AND DEBRIS ENTERING DOWNSTREAM AREAS.
2. STORM WATER RUNOFF IS CONVEYED BY SWALES TO UPLAND STORM WATER BASINS THAT COLLECT SEDIMENT, ATTENUATE AND RECHARGE GENERATED RUNOFF. THE BASINS WILL BE GRASSED, WHICH WILL AID IN SEDIMENT REMOVAL AND POLLUTANT UPTAKE.
3. THE ABOVE-DESCRIBED SYSTEMS RELY UPON PROPER MONITORING, OPERATIONS AND MAINTENANCE TO FUNCTION AS DESIGNED AND INTENDED. THE ACTIVITIES DESCRIBED BELOW ARE TO BE IMPLEMENTED BEGINNING DURING CONSTRUCTION OF THE PROJECT AS APPROPRIATE.

B. MONITORING AND OPERATION:

1. THE OWNER SHALL BE RESPONSIBLE FOR OPERATION AND MAINTENANCE OF THE STORM WATER BASINS.
2. THE DRAINAGE SYSTEM IS REQUIRED TO BE MONITORED BY THE OWNER, WHO SHALL DIRECT AN INDIVIDUAL ENTITY TO ACT AS THE PROJECT SITE MANAGER.
3. OPERATIONS AND MAINTENANCE RECORDS SHALL BE KEPT ON THE PREMISES AND BE MADE AVAILABLE TO PERMITTING AUTHORITIES OR THEIR AGENTS FOR INSPECTION, UPON REQUEST.
4. MONITORING AND OPERATION DURING CONSTRUCTION AND PRIOR TO TOWN ACCEPTANCE SHALL CONSIST OF THE FOLLOWING:
5. THE OUTLETS FROM THE SWALES AND THE STORM WATER BASINS SHALL BE INSPECTED ON A REGULAR BASIS TO ENSURE THAT NO EROSION IS OCCURRING AT THE OUTLETS, THAT ALL OUTLETS ARE FREE-FLOWING AND THAT NO DAMAGE HAS OCCURRED AS PART OF SITE MAINTENANCE OR ACTIVITIES.
6. AT THE PROJECT COMPLETION, THE STORM WATER DRAINAGE SYSTEM SHALL BE INSPECTED AND CLEANED OF ANY MATERIAL INHIBITING STORM WATER FLOW.

C. OPERATIONS:

1. ALL MATERIALS STORED ON SITE SHALL BE STORED IN A NEAT, ORDERLY MANNER.
2. ONSITE VEHICLES AND PARKING AREAS SHALL BE REGULARLY MONITORED FOR LEAKS AND RECEIVE REGULAR PREVENTIVE MAINTENANCE TO PREVENT LEAKAGE.
3. PETROLEUM PRODUCTS SHALL BE STORED UNDER COVER AND SHALL BE IN TIGHTLY SEALED CONTAINERS WHICH ARE CLEARLY LABELED.
4. FERTILIZERS SHALL ONLY BE USED IN THE MINIMUM AMOUNTS AS RECOMMENDED BY THE MANUFACTURER.
5. THE CONTENTS OF ANY UNUSED FERTILIZER SHALL BE TRANSFERRED TO A CLEARLY LABELED, SEALABLE PLASTIC BIN, TO AVOID SPILLAGE.
6. SPILLS OF TOXIC OR HAZARDOUS MATERIAL OR NATURE WILL BE REPORTED TO THE APPROPRIATE STATE, LOCAL OR FEDERAL AGENCY, AS REQUIRED BY LAW.
7. THE USE OF SODIUM CHLORIDE FOR ICE CONTROL SHALL BE MINIMIZED CONSISTENT WITH THE PUBLIC HIGHWAY SAFETY REQUIREMENTS.

D. MAINTENANCE:

1. EXISTING STREET GUTTERS ALONG THE PROJECTS FRONTAGE SHALL BE SWEPT CLEAN OF DEBRIS AND ACCUMULATION OF SOIL AND SILT ON A REGULAR BASIS. AT A MINIMUM, A SPRING AND FALL CLEANING SCHEDULE IS RECOMMENDED.
2. COORDINATE WITH THE OXFORD DEPARTMENT OF PUBLIC WORKS THE CLEANING OF EXISTING CATCH BASIN(S) ALONG THE PROJECT FRONTAGE. IT IS RECOMMENDED TO HAVE THE SUMPS CLEANED AT ANY TIME OF THE YEAR WHEN 2 FT. OR LESS SPACE EXISTS BELOW THE OUTLET INVERT, OR A MINIMUM OF ONCE PER YEAR, REGARDLESS OF SUMP ACCUMULATION. ALL DEBRIS FROM THE CLEANING SHALL BE DISPOSED OF OFFSITE AND IN A MANNER AS PRESCRIBED BY LAW. CATCH BASIN(S) SHALL BE CLEANED AT THE COMPETITION OF THE PROJECT.
3. ANY EXISTING CATCHBASIN(S) CLEANED SHALL ALSO HAVE THEIR OIL & GREASE TRAPS (IF INSTALLED) CHECKED FOR PHYSICAL INTEGRITY AND SEAL IMMEDIATELY AFTER EACH CATCH BASIN CLEANING.
4. OIL ABSORBING PILLOWS OR OTHER MEANS SHALL BE USED TO REMOVE ACCUMULATIONS OF HYDROCARBONS (OIL / GREASE) FROM EXISTING CATCH BASIN(S) THAT ARE REGULARLY OBSERVED TO CONTAIN HYDROCARBONS WHICH DO NOT EVAPORATE BETWEEN INSPECTIONS.
5. ALL BROKEN, LEAKING OR OTHERWISE DAMAGED STRUCTURES SHALL BE REPAIRED PROMPTLY UPON DISCOVERY.
6. ALL EROSION AT OUTLETS SHALL BE REPAIRED. THE REPLACEMENT OF ANY PIPE OR DRAINAGE STRUCTURE SHALL MATCH THE ORIGINAL DESIGN SPECIFICATIONS.
7. THE CONSERVATION COMMISSION SHALL BE CONSULTED PRIOR TO THE INITIATION OF ANY REPAIRS INVOLVING THE USE OF HEAVY EQUIPMENT OR DISTURBANCE WITHIN THE 100-FT. BUFFER ZONE. A REQUEST FOR DETERMINATION OF APPLICABILITY OR A NOTICE OF INTENT MAY BE REQUIRED.

E. STORM WATER BASIN MAINTENANCE:

1. IN ACCORDANCE WITH TOWN OF OXFORD RULES AND REGULATIONS GOVERNING THE ISSUANCE OF SPECIAL PERMITS FOR EARTH REMOVAL (DATED 4/23/1991) A STORMWATER DRAINAGE DESIGN HAS BEEN PREPARED. SINCE SPECIFIC DESIGN STANDARDS FOR STORMWATER ARE NOT NOTED IN THE RULES AND REGULATIONS, THE STORMWATER SYSTEM HAS BEEN DESIGNED CONSISTENT WITH THE MASSACHUSETTS STORMWATER MANAGEMENT POLICY STANDARDS. BASINS DEPICTED ON THE SITE PLAN ARE DESIGNED TO MITIGATE THE PEAK RATE OF RUNOFF FOR THE CALCULATED STORM EVENTS BY HOLDING STORM WATER AND SIMULTANEOUSLY RELEASING STORM WATER, THROUGH OVERFLOW WEIRS AND OR INFILTRATION, AT THE SAME RATE THAT STORM WATER WOULD HAVE PASSED OVER THE BOUNDARIES BEFORE DEVELOPMENT. SIMULTANEOUSLY, THE BASINS WILL ACT TO ENTRAP SEDIMENTS AND HYDROCARBONS PRIOR TO ENTERING THE RESOURCE AREA. IN DOING SO, THE BASINS WILL ACCUMULATE THESE MATERIALS AS DEPOSITED DEBRIS, SEDIMENT LAYERS AND EXCESSIVE VEGETATIVE GROWTH WITHIN THE BASINS. THESE MATERIALS WILL BE REQUIRED TO BE REMOVED ON A REGULAR BASIS TO ENSURE THE CONTINUING FUNCTION OF THE BASINS. THE BASINS ARE INTENDED TO FUNCTION AS PREVENTATIVE AND MITIGATIVE SYSTEMS, NOT TO BECOME PROTECTED RESOURCE AREAS. BASED UPON THE ABOVE, THE FOLLOWING MAINTENANCE CONDITIONS SHALL APPLY AND BE PART OF ANY CONTINUANCE OF THE PROPOSED DEVELOPMENT:
2. WEEDS AND WETLANDS PLANTS SHALL BE REMOVED ON A REGULAR BASIS, BUT NOT LESS THAN ONCE PER YEAR IN THE LATE SUMMER. REMOVAL SHALL BE BY HAND, OR BY APPLICATION OF HERBICIDES IF PLANT GROWTH IS TOO PROLIFIC TO MANAGE BY HAND METHODS.
3. SIMILARLY, THE STORM WATER BASIN EMBANKMENTS SHALL BE INSPECTED AT LEAST ONCE PER YEAR FOR TREE AND BRUSH GROWTH. IF NEEDED, REMOVAL OF THIS GROWTH SHALL BE BY HAND (I.E., CHAINSAW, BRUSH CUTTERS OR MOWERS) BUT SHALL NOT BE REMOVED BY HEAVY MACHINERY OR OTHER METHOD THAT WOULD MAKE THE BASIN BERMS UNSTABLE. DURING ANY REMOVAL OR TRIMMING OPERATIONS, CARE SHALL BE TAKEN TO LEAVE THE GRASS/GROUNDCOVER OF THE BERMS INTACT TO PREVENT THE POSSIBILITY OF EROSION.
4. THE STORM WATER BASINS SHALL BE INSPECTED FOR SEDIMENT ACCUMULATION A MINIMUM OF ONCE PER YEAR. ACCUMULATED SEDIMENTS SHALL BE REMOVED AS REQUIRED BUT AT A MINIMUM OF ONCE EVERY FIVE YEARS AND AT THE COMPLETION OF THE PROJECT. HEAVY MACHINERY MAY BE USED; HOWEVER, ALL AREAS WHICH WERE STABILIZED WITH GRASS / GROUNDCOVER SHALL BE PROMPTLY RE-ESTABLISHED IF DISTURBED. SEDIMENTS ENTRAPPED IN AREAS OF RIP-RAP AND INLET/OUTLET SWALES AND PIPES SHALL ALSO BE REMOVED, BY HAND IF NECESSARY. ANY RIP-RAP OR TURF DISTURBED SHALL BE RE-ESTABLISHED IN ACCORDANCE WITH THE ORIGINAL CONSTRUCTION SPECIFICATIONS.
5. ALL EROSION AT OUTLETS SHALL BE REPAIRED AND/OR THE REPLACEMENT OF ANY PIPE OR DRAINAGE STRUCTURE SHALL MATCH THE ORIGINAL DESIGN SPECIFICATIONS.
6. ALL SPOILS, STUMPS AND DEBRIS SHALL BE DISPOSED OF OUTSIDE THE 100-FT. BUFFER ZONE. THIS MATERIAL'S CONTENTS SHALL BE ASSESSED AND SHALL BE DISPOSED OF PROMPTLY AND IN ACCORDANCE WITH ALL APPLICABLE LAWS AND REGULATIONS IN EFFECT AT THE TIME.

STORM WATER POLLUTION PREVENTION PLAN

REVISION	NO.	BY	DATE	ENGINEER
ORIGINAL ISSUE	--	--	03/23/2021	

COMMONWEALTH OF MASSACHUSETTS — ANDREW R. BAUM — CIVIL — NO. 47075 — REGISTERED PROFESSIONAL ENGINEER

COMMONWEALTH OF MASSACHUSETTS — JAMES PATRICK SMITH — NO. 46310 — REGISTERED PROFESSIONAL ENGINEER

SITE PLAN OF LAND IN
OXFORD, MASSACHUSETTS
LOCATED AT
19 OXBOW ROAD

FEET FEET SCALE: AS NOTED

PREPARED FOR OWNER AND APPLICANT
S & K DEVELOPMENT, LLC
JAMES P. SMITH, MANAGER
710 MAIN STREET
P.O. BOX 744
NORTH OXFORD, MA 01537
TEL: 508-987-2266 CELL: 508-207-6855

DESIGN: MAL
DRAWN: MAL
CHECK: ARB
REF:

S. J. MULLANEY ENGINEERING, INC.
CIVIL SITE DESIGN & PERMITTING
305 WHITNEY ST. - SUITE G3 - P.O. BOX 752 - LEOMINSTER, MA 01453-0752
TEL: 978 534-3131 - FAX: 978 534-3197 - EMAIL: info@sjmullaney.com

SHEET	OF
5	5

PLAN NO. 218-D-1

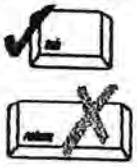
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 2 – Determination of Applicability

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

A. General Information

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



From:

Oxford
Conservation Commission

To: Applicant

Alfred Dowell
Name

83 Colburn Ave.
Mailing Address

Charlton | MA | 01507
City/Town | State | Zip Code

Property Owner (if different from applicant):

Name

Mailing Address

City/Town | State | Zip Code

1. Title and Date (or Revised Date if applicable) of Final Plans and Other Documents:

Earth removal — Title — 08/30/02 — Date

Title — Date

Title — Date

2. Date Request Filed:

October 30, 2002

B. Determination

Pursuant to the authority of M.G.L. c. 131, § 40, the Conservation Commission considered your Request for Determination of Applicability, with its supporting documentation, and made the following Determination.

Project Description (if applicable):

Earth removal

Project Location:

19 Oxbow Road — Street Address — Oxford,

09. A21 — Assessors Map/Plat Number — Parcel/Lot Number

B. Determination (cont.)

The following Determination(s) is/are applicable to the proposed site and/or project relative to the Wetlands Protection Act and regulations:

Positive Determination
Note: No work within the jurisdiction of the Wetlands Protection Act may proceed until a final Order of Conditions (issued following submittal of a Notice of Intent or Abbreviated Notice of Intent) has been received from the issuing authority (i.e., Conservation Commission or the Department of Environmental Protection).

☐ 1. The area described on the referenced plan(s) is an area subject to protection under the Act. Removing, filling, dredging, or altering of the area requires the filing of a Notice of Intent.

☐ 2a. The boundary delineations of the following resource areas described on the referenced plan(s) are confirmed as accurate. Therefore, the resource area boundaries confirmed in this Determination are binding as to all decisions rendered pursuant to the Wetlands Protection Act and its regulations regarding such boundaries for as long as this Determination is valid.

_____

_____

_____

☐ 2b. The boundaries of resource areas listed below are not confirmed by this Determination, regardless of whether such boundaries are contained on the plans attached to this Determination or to the Request for Determination.

_____

_____

_____

☐ 3. The work described on referenced plan(s) and document(s) is within an area subject to protection under the Act and will remove, fill, dredge, or alter that area. Therefore, said work requires the filing of a Notice of Intent.

☐ 4. The work described on referenced plan(s) and document(s) is within the Buffer Zone and will alter an Area subject to protection under the Act. Therefore, said work requires the filing of a Notice of Intent.

☐ 5. The area and/or work described on referenced plan(s) and document(s) is subject to review and approval by:

_____
Name of Municipality

Pursuant to the following municipal wetland ordinance or bylaw:

_____
Name Ordinance or Bylaw Citation

B. Determination (cont.)

☐ 6. The following area and/or work, if any, is subject to a municipal ordinance or bylaw but not subject to the Massachusetts Wetlands Protection Act:

☐ 7. If a Notice of Intent is filed for the work in the Riverfront Area described on referenced plan(s) and document(s), which includes all or part of the work described in the Request, the applicant must consider the following alternatives. (Refer to the wetland regulations at 10.58(4)c. for more information about the scope of alternatives requirements):

- ☐ Alternatives limited to the lot on which the project is located.
- ☐ Alternatives limited to the lot on which the project is located, the subdivided lots, and any adjacent lots formerly or presently owned by the same owner.
- ☐ Alternatives limited to the original parcel on which the project is located, the subdivided parcels, any adjacent parcels, and any other land which can reasonably be obtained within the municipality.
- ☐ Alternatives extend to any sites which can reasonably be obtained within the appropriate region of the state.

Negative Determination

Note: No further action under the Wetlands Protection Act is required by the applicant. However, if the Department is requested to issue a Superseding Determination of Applicability, work may not proceed on this project unless the Department fails to act on such request within 35 days of the date the request is post-marked for certified mail or hand delivered to the Department. Work may then proceed at the owner's risk only upon notice to the Department and to the Conservation Commission. Requirements for requests for Superseding Determinations are listed at the end of this document.

☒ 1. The area described in the Request is not an area subject to protection under the Act or the Buffer Zone.

☐ 2. The work described in the Request is within an area subject to protection under the Act, but will not remove, fill, dredge, or alter that area. Therefore, said work does not require the filing of a Notice of Intent.

☐ 3. The work described in the Request is within the Buffer Zone, as defined in the regulations, but will not alter an Area subject to protection under the Act. Therefore, said work does not require the filing of a Notice of Intent, subject to the following conditions (if any).

☐ 4. The work described in the Request is not within an Area subject to protection under the Act (including the Buffer Zone). Therefore, said work does not require the filing of a Notice of Intent, unless and until said work alters an Area subject to protection under the Act.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 2 – Determination of Applicability

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

B. Determination (cont.)

☐ 5. The area described in the Request is subject to protection under the Act. Since the work described therein meets the requirements for the following exemption, as specified in the Act and the regulations, no Notice of Intent is required:

Exempt Activity (site applicable statuatory/regulatory provisions)

☐ 6. The area and/or work described in the Request is not subject to review and approval by:

Name of Municipality

Pursuant to a municipal wetlands ordinance or bylaw.

Name

Ordinance or Bylaw Citation

C. Authorization

This Determination is issued to the applicant and delivered as follows:

☐ by hand delivery on

Date

☒ by certified mail, return receipt requested on

11/14/02
Date

This Determination is valid for **three years** from the date of issuance (except Determinations for Vegetation Management Plans which are valid for the duration of the Plan). This Determination does not relieve the applicant from complying with all other applicable federal, state, or local statutes, ordinances, bylaws, or regulations.

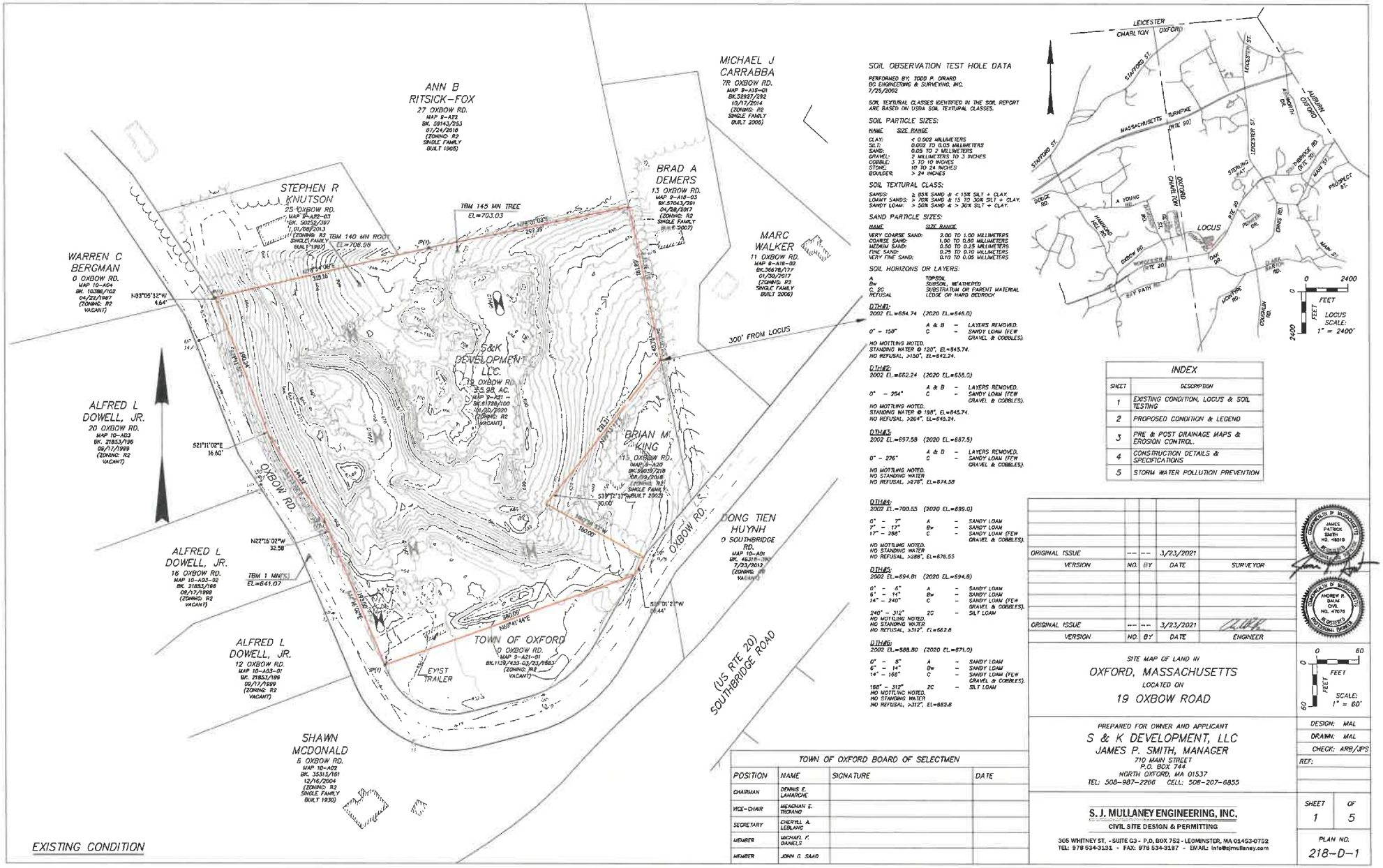
This Determination must be signed by a majority of the Conservation Commission. A copy must be sent to the appropriate DEP Regional Office (see Appendix A) and the property owner (if different from the applicant). Signatures:

Bernard [illegible]
Cheryl Eagle
[illegible]
[illegible]

11/14/02
Date

D. Appeals

The applicant, owner, any person aggrieved by this Determination, any owner of land abutting the land upon which the proposed work is to be done, or any ten residents of the city or town in which such land is located, are hereby notified of their right to request the appropriate Department of Environmental Protection Regional Office (see Appendix A) to issue a Superseding Determination of Applicability. The request must be made by certified mail or hand delivery to the Department, with the appropriate filing fee and Fee Transmittal Form (see Appendix E: Request for Departmental Action Fee Transmittal Form) as provided in 310 CMR 10.03(7) within ten business days from the date of issuance of this Determination. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant if he/she is not the appellant. The request shall state clearly and concisely the objections to the Determination which is being appealed. To the extent that the Determination is based on a municipal ordinance or bylaw and not on the Massachusetts Wetlands Protection Act or regulations, the Department of Environmental Protection has no appellate jurisdiction.



EXISTING CONDITION

SOIL OBSERVATION TEST HOLE DATA

PERFORMED BY: TODD P. GIRARD
SO ENGINEERING & SURVEYING, INC.
7/25/2002

SOIL TEXTURAL CLASSES IDENTIFIED IN THE SOIL REPORT ARE BASED ON USDA SOIL TEXTURAL CLASSES.

SOIL PARTICLE SIZES:

NAME	SIZE RANGE
CLAY:	< 0.002 MILLIMETERS
SILT:	0.002 TO 0.05 MILLIMETERS
SAND:	0.05 TO 2 MILLIMETERS
GRAVEL:	2 MILLIMETERS TO 3 INCHES
COBBLE:	3 TO 10 INCHES
STONE:	10 TO 24 INCHES
BOULDER:	> 24 INCHES

SOIL TEXTURAL CLASS:

SANDS: ≥ 85% SAND & < 15% SILT + CLAY.
LOAMY SANDS: > 70% SAND & ≤ 15 TO 30% SILT + CLAY.
SANDY LOAM: > 50% SAND & > 20% SILT + CLAY.

SAND PARTICLE SIZES:

NAME	SIZE RANGE
VERY COARSE SAND:	2.00 TO 1.00 MILLIMETERS
COARSE SAND:	1.00 TO 0.50 MILLIMETERS
MEDIUM SAND:	0.50 TO 0.25 MILLIMETERS
FINE SAND:	0.25 TO 0.10 MILLIMETERS
VERY FINE SAND:	0.10 TO 0.05 MILLIMETERS

SOIL HORIZONS OR LAYERS:

A	TOPSOIL
Bw	SUBSOIL, WEATHERED
C, 2C	SUBSTRATUM OR PARENT MATERIAL
REFUSAL	LEDGE OR HARD BEDROCK

DTH#1:
2002 EL.=654.74 (2020 EL.=646.0)

	A & B	-	LAYERS REMOVED.
0" - 150"	C	-	SANDY LOAM (FEW GRAVEL & COBBLES).

NO MOTTLING NOTED.
STANDING WATER @ 120", EL=645.74.
NO REFUSAL, >150", EL=642.24.

DTH#2:
2002 EL.=662.24 (2020 EL.=655.0)

	A & B	-	LAYERS REMOVED.
0" - 204"	C	-	SANDY LOAM (FEW GRAVEL & COBBLES).

NO MOTTLING NOTED.
STANDING WATER @ 198", EL=645.74.
NO REFUSAL, >204", EL=645.24.

DTH#3:
2002 EL.=697.58 (2020 EL.=687.5)

	A & B	-	LAYERS REMOVED.
0" - 276"	C	-	SANDY LOAM (FEW GRAVEL & COBBLES).

NO MOTTLING NOTED.
NO STANDING WATER
NO REFUSAL >276", EL=674.58

DTH#4:
2002 EL.=700.55 (2020 EL.=699.0)

0" - 7"	A	-	SANDY LOAM
7" - 17"	Bw	-	SANDY LOAM
17" - 288"	C	-	SANDY LOAM (FEW GRAVEL & COBBLES).

NO MOTTLING NOTED.
NO STANDING WATER
NO REFUSAL >288", EL=676.55

DTH#5:
2002 EL.=694.81 (2020 EL.=694.8)

0" - 6"	A	-	SANDY LOAM
6" - 14"	Bw	-	SANDY LOAM
14" - 240"	C	-	SANDY LOAM (FEW GRAVEL & COBBLES).
240" - 312"	2C	-	SILT LOAM

NO MOTTLING NOTED.
NO STANDING WATER
NO REFUSAL, >312", EL=662.8

DTH#6:
2002 EL.=688.80 (2020 EL.=671.0)

0" - 8"	A	-	SANDY LOAM
8" - 14"	Bw	-	SANDY LOAM
14" - 168"	C	-	SANDY LOAM (FEW GRAVEL & COBBLES).
168" - 312"	2C	-	SILT LOAM

NO MOTTLING NOTED.
NO STANDING WATER
NO REFUSAL, >312", EL=662.8

INDEX

SHEET	DESCRIPTION
1	EXISTING CONDITION, LOCUS & SOIL TESTING
2	PROPOSED CONDITION & LEGEND
3	PRE & POST DRAINAGE MAPS & EROSION CONTROL.
4	CONSTRUCTION DETAILS & SPECIFICATIONS
5	STORM WATER POLLUTION PREVENTION

VERSION	NO.	BY	DATE	SURVEYOR
ORIGINAL ISSUE	--	--	3/23/2021	

VERSION	NO.	BY	DATE	ENGINEER
ORIGINAL ISSUE	--	--	3/23/2021	

COMMONWEALTH OF MASSACHUSETTS
JAMES PATRICK SMITH
NO. 49310
REGISTERED PROFESSIONAL SURVEYOR

COMMONWEALTH OF MASSACHUSETTS
ANDREW R. BAHM
CIVIL
NO. 47678
REGISTERED PROFESSIONAL ENGINEER

SITE MAP OF LAND IN
OXFORD, MASSACHUSETTS
LOCATED ON
19 OXBOW ROAD

0 60
FEET
SCALE:
1" = 60'

PREPARED FOR OWNER AND APPLICANT
S & K DEVELOPMENT, LLC
JAMES P. SMITH, MANAGER
710 MAIN STREET
P.O. BOX 744
NORTH OXFORD, MA 01537
TEL: 508-987-2266 CELL: 508-207-6855

TOWN OF OXFORD BOARD OF SELECTMEN

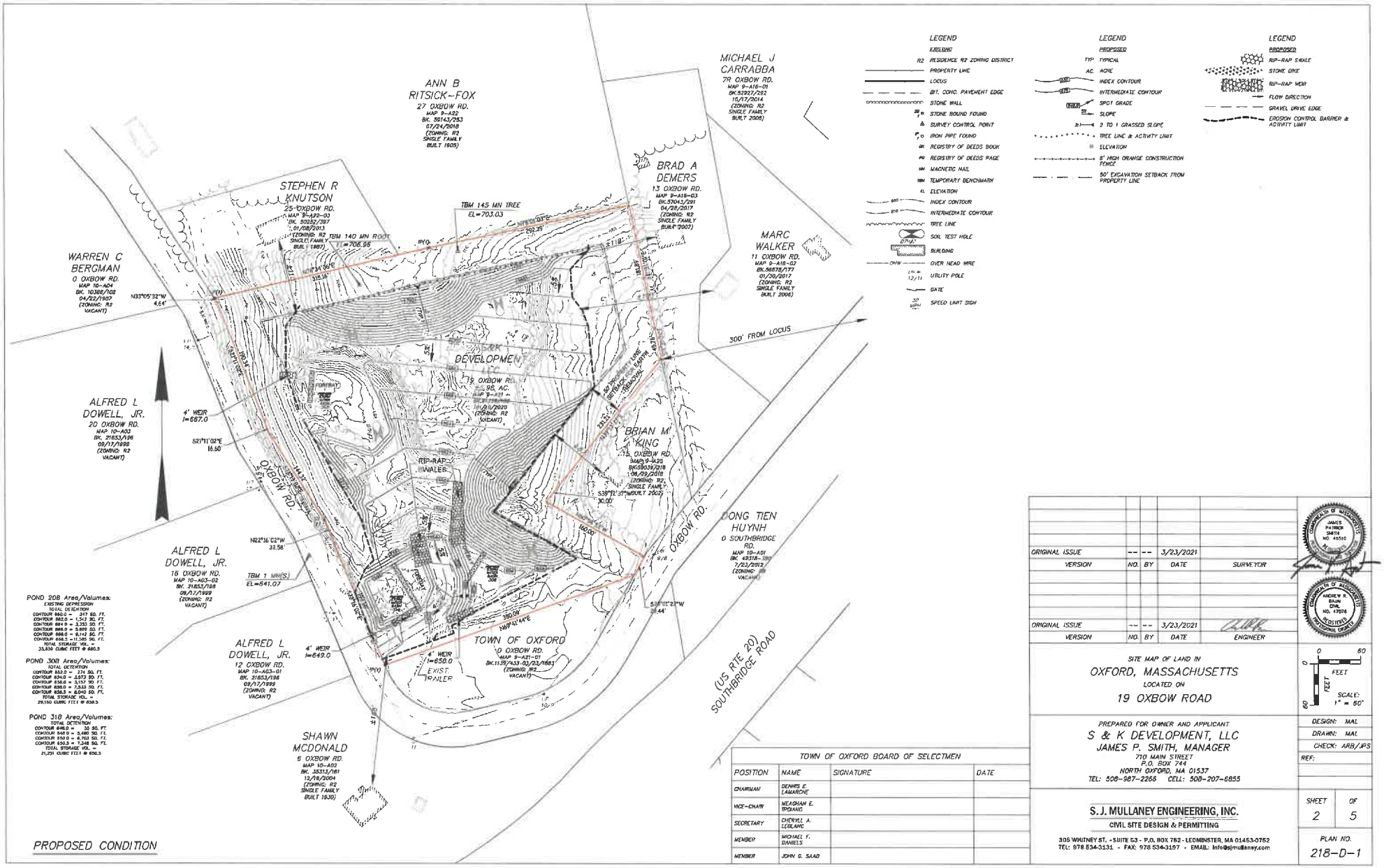
POSITION	NAME	SIGNATURE	DATE
CHAIRMAN	DENNIS E. LAMARCHE		
VICE-CHAIR	MEAGHAN E. TROIANO		
SECRETARY	CHERYLL A. LEBLANC		
MEMBER	MICHAEL F. DANIELS		
MEMBER	JOHN C. SAAD		

S. J. MULLANEY ENGINEERING, INC.
CIVIL SITE DESIGN & PERMITTING
305 WHITNEY ST. - SUITE G3 - P.O. BOX 752 - LEOMINSTER, MA 01453-0752
TEL: 978 534-3131 - FAX: 978 534-3197 - EMAIL: info@sjmullaney.com

DESIGN: MAL
DRAWN: MAL
CHECK: ARB/JPS
REF:

SHEET 1 OF 5

PLAN NO. 218-D-1



TOWN OF OXFORD BOARD OF SELECTMEN			
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MEMBER	JOHN G. SAAD		

VERSION	NO.	BY	DATE	SURVEYOR
ORIGINAL ISSUE	--	--	3/23/2021	

VERSION	NO.	BY	DATE	ENGINEER
ORIGINAL ISSUE	--	--	3/23/2021	

JAMES PATRICK SMITH NO. 40510 REGISTERED PROFESSIONAL SURVEYOR COMMONWEALTH OF MASSACHUSETTS

ANDREW R. BRAUN CIVIL NO. 47076 REGISTERED PROFESSIONAL ENGINEER COMMONWEALTH OF MASSACHUSETTS

SITE MAP OF LAND IN
OXFORD, MASSACHUSETTS
LOCATED ON
19 OXBOW ROAD

0 60 FEET
SCALE: 1" = 60'

PREPARED FOR OWNER AND APPLICANT
S & K DEVELOPMENT, LLC
JAMES P. SMITH, MANAGER
710 MAIN STREET
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TEL: 508-987-2266 CELL: 508-207-6855

DESIGN: MAL
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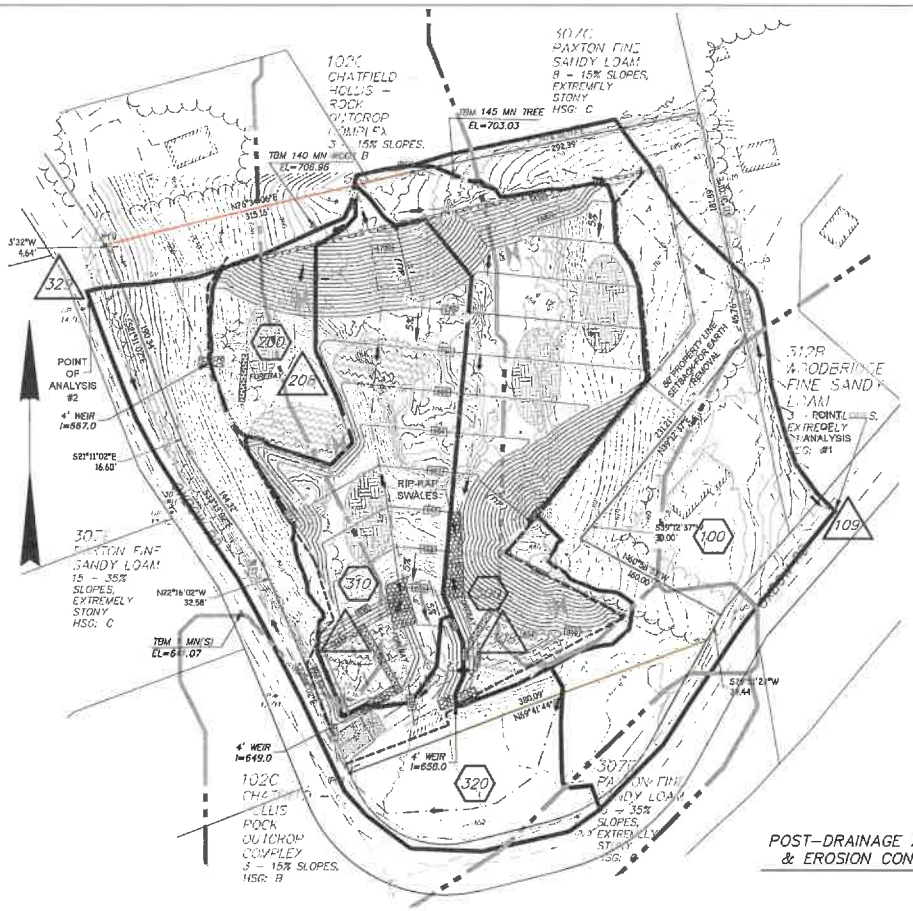
REF:

S.J. MULLANEY ENGINEERING, INC.
CIVIL SITE DESIGN & PERMITTING
305 WHITNEY ST. - SUITE 63 - P.O. BOX 762 - LEOMINSTER, MA 01453-0762
TEL: 978 534-3131 - FAX: 978 534-3197 - EMAIL: info@sjmulleney.com

SHEET 2 OF 5

PLAN NO. 218-D-1

PRE-DRAINAGE AREAS



POST-DRAINAGE AREAS
& EROSION CONTROL

LEGEND

- STORMWATER
- SOIL MAP UNIT DIVIDE
- SOIL MAP UNIT PER WORCESTER COUNTY SOIL SURVEY
- HSG: HYDROLOGIC SOIL GROUP
- 10 HYDROCAD SUBCATCHMENT DESIGNATION
- SUBCATCHMENT LIMIT
- CONCENTRATION TIME FLOW PATH
- 18 HYDROCAD DRAINAGE POND DESIGNATION
- EROSION CONTROL BARRIER & ACTIVITY LIMIT
- TEMPORARY CONSTRUCTION ENTRANCE
- TEMPORARY DEWATERING AREA, SETTLING BASIN, OR SWALE
- STOCKPILE & STAGING AREA

TOWN OF OXFORD BOARD OF SELECTMEN			
POSITION	NAME	SIGNATURE	DATE
CHAIRMAN	DENNIS E. LAMARCHE		
VICE-CHAIR	MEAGHAN C. TROIANO		
SECRETARY	CHERYLL A. LEBLANC		
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COMMONWEALTH OF MASSACHUSETTS
JAMES PATRICK SMITH
NO. 46340
REGISTERED PROFESSIONAL ENGINEER

COMMONWEALTH OF MASSACHUSETTS
ANDREW R. BAUM
CIVIL
NO. 47078
REGISTERED PROFESSIONAL ENGINEER

SITE MAP OF LAND IN
OXFORD, MASSACHUSETTS
LOCATED ON
19 OXBOW ROAD

PREPARED FOR OWNER AND APPLICANT
S & K DEVELOPMENT, LLC
JAMES P. SMITH, MANAGER
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0 60
0 FEET
60 FEET
SCALE: 1" = 60'

DESIGN: MAL
DRAWN: MAL
CHECK: ARB/JPS
REF:

SHEET 3 OF 5

PLAN NO.
218-D-1

NOTES & SPECIFICATIONS:

A. EXISTING CONDITIONS:

1. THE LOCUS PROPERTY AT 19 OXBOW ROAD IS IDENTIFIED BY THE OXFORD ASSESSORS' AS MAP 9, PARCEL A21, AND CONTAINS ±5.98 AC. THE PROPERTY IS RECORDED IN THE WORCESTER COUNTY REGISTRY OF DEEDS BOOK 61728 PAGE 117.
2. ZONING DISTRICT: SUBURBAN (R2).
3. THE LOCUS PROPERTY LINES, CONTOURS AND SITE FEATURES ARE THE RESULT OF AN INSTRUMENT SURVEY BY NEW ENGLAND LAND SURVEY, INC. SUPPLIED BY ELECTRONIC MAIL ON 10/13/2020, FILE: OXBOW-BOUNDARY AND EXIST TOPO.DWG.
4. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
5. ABUTTING PARCELS, STRUCTURES AND SOIL DATA WERE DOWNLOADED ON 2/17/2021 FROM THE ONLINE DATALAYERS OF THE OFFICE OF GEOGRAPHIC INFORMATION (MASSGIS), COMMONWEALTH OF MASSACHUSETTS INFORMATION TECHNOLOGY DIVISION.
6. UTILITIES SHOWN ARE FROM RECORD INFORMATION AND ARE NOT WARRANTEED TO BE EXACT OR COMPLETE. THE ABSENCE OF SUBSURFACE STRUCTURES, UTILITIES, ETC. IS NOT INTENDED OR IMPLIED.
7. THE OXFORD CONSERVATION COMMISSION ISSUED A NEGATIVE DETERMINATION OF APPLICABILITY FOR THE LOCUS PROPERTY ON 11/14/2002 FOR THE PROPOSED EARTH REMOVAL PROJECT.
8. NO PORTION OF THIS SITE CONTAINS A MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP) PUBLIC WATER SUPPLY OR AQUIFER PROTECTIVE ZONE, PER MASSGIS DATALAYERS AS OF 03/19/2021.
9. NO PORTION OF THIS SITE IS WITHIN THE GRAPHICAL FEMA FLOOD ZONE A (AREA OF 100 YEAR FLOOD), PER THE FEMA FLOOD INSURANCE RATE MAPS FOR THE TOWN OF OXFORD, COMMUNITY-PANEL NO. 25027C0782E, EFFECTIVE 7/4/2011.
10. NO PORTION OF THIS SITE CONTAINS CERTIFIED VERNAL POOLS PER THE MASSACHUSETTS NATURAL HERITAGE & ENDANGERED SPECIES PROGRAM (NHESP) ATLAS 14TH EDITION EFFECTIVE 8/1/2017.
11. NO PORTION OF THIS SITE LIES WITHIN NHESP PRIORITY HABITAT OF RARE SPECIES NOR CONTAINS ANY SPECIES OF SPECIAL CONCERN PER THE ATLAS NOTED ABOVE.
12. NO PORTION OF THIS SITE IS WITHIN AN AREA OF CRITICAL ENVIRONMENTAL CONCERN.
13. THE PROPERTY CONTAINS AN INCOMPLETE EARTH REMOVAL PROJECT. THE PREVIOUS PROPERTY OWNER WAS ISSUED A SPECIAL PERMIT FOR EARTH REMOVAL BY THE OXFORD BOARD OF SELECTMAN 5/7/2003. THE PERMIT WAS REVOKED IN 2004. THE BOARD OF SELECTMEN ISSUED A VIOLATION LETTER DATED 6/1/2004 NOTING FOLLOWING VIOLATIONS:
    1.) CONDUCTING OPERATIONS OUTSIDE OF THE SPECIFIED DAYS AND TIMES.
    2.) NO QUARTERLY REPORTS HAVE BEEN RECEIVED BY THE TOWN SINCE THE PROJECT'S INCEPTION.
    3.) NO SANITARY FACILITIES ON THE SITE.
    4.) NO GATES OR FENCING TO SECURE THE SITE.

B. CONSTRUCTION METHODOLOGIES

1. ALL WORK, MATERIALS, AND APPURTENANCES SHALL BE IN ACCORDANCE WITH COMMONWEALTH OF MASSACHUSETTS AND TOWN OF OXBORD REQUIREMENTS.
2. THE CONTRACTOR SHALL CALL DIG SAFE (811) AND OBTAIN A DIG SAFE NUMBER A MINIMUM OF 72 HOURS IN ADVANCE OF SUBSURFACE SITE EXPLORATION OR INITIATION OF CONSTRUCTION, AS REQUIRED BY LAW.
3. CONSTRUCTION ACTIVITIES SHALL NOT RESULT IN THE INTERRUPTION OF UTILITIES OR ACCESS TO ADJACENT SITES.
4. PRIOR TO CONSTRUCTION, EXISTING OFF-SITE AREAS (DRAINAGE, PAVEMENT, VEGETATION) SHOULD BE INSPECTED AND THEIR CONDITIONS NOTED AND/OR PHOTOGRAPHED.
5. THE TOWN OF OXFORD FIRE CHIEF SHALL BE NOTIFIED OF ANY PROPOSED BLASTING. ALL BLASTING SHALL BE PERFORMED BY A LICENSED BLASTER IN ACCORDANCE WITH COMMONWEALTH OF MASSACHUSETTS AND TOWN OF OXFORD REGULATIONS.
6. OWNER ACCEPTS RESPONSIBILITY FOR WORK AND MATERIALS WITHIN THE SCOPE OF THIS PLAN.

C. PROPOSED CONDITIONS

1. THE OWNER/APPLICANT PROPOSES TO COMPLETE THE EARTH REMOVAL OPERATION STARTED BY THE PREVIOUS PROPERTY OWNER. PER THE TOWN OF OXFORD ZONING BYLAW CHAPTER XVIII (EARTH REMOVAL) A SPECIAL PERMIT IS REQUIRED FROM THE BOARD OF SELECTMEN FOR EARTH REMOVAL. THE CURRENT OWNER / APPLICANT INTENDS TO ADDRESS THE VIOLATIONS REFERENCED IN EXISTING CONDITIONS NOTE A.13 ABOVE.
2. THE PROPOSED GRADING DEPICTED RESULTS IN THE REMOVAL OF ±75,000 C.Y. EARTHEN MATERIAL.
3. PER THE EXEMPTION SPECIFIED IN TOWN OF OXFORD ZONING BYLAWS, CHAPTER XVIII §9.0, AN EARTH REMOVAL PERMIT IS NOT REQUIRED FOR THE REMOVAL OF NOT MORE THAN 500 C.Y. OF EARTH FROM A LOT FOR THE PURPOSE OF CONSTRUCTING A BUILDING, STRUCTURE AND ASSOCIATED FACILITES ON SUCH LOT IN ACCORDANCE WITH A BUILDING PERMIT.
4. THE FOLLOWING THE EARTH REMOVAL THE PROPERTY IS INTENDED TO BE DEVELOPED AS RESIDENTIAL DWELLINGS. THE FUTURE DEVELOPMENT WILL REQUIRE ADDITIONAL SOIL EVALUATION TESTING..
5. THIS PLAN PROPOSES 3.70 AC. OF SITE ALTERATION. DISTURBANCE OF MORE THAN ONE ACRE REQUIRES THE SUBMITTAL TO THE U.S. EPA OF A "NOTICE OF INTENT FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY UNDER A NATIONAL POLLUTION DISCHARGE SYSTEM (NPDES) GENERAL PERMIT."

D. UTILITIES:

1. S. J. MULLANEY ENGINEERING, INC. HAS PERFORMED HYDROLOGIC AND HYDRAULIC CALCULATIONS TO ANALYZE EXISTING AND PROPOSED STORM DRAINAGE CONDITIONS. STORMWATER RUNOFF CALCULATIONS HAVE BEEN PREPARED IN ACCORDANCE WITH MASSACHUSETTS STORMWATER MANAGEMENT POLICY REQUIREMENTS.
2. ALL STRUCTURES SHALL BE CAPABLE OF AASHTO HS-20 LOADING FOR THE CONDITION SHOWN.
3. THE DRAINAGE SYSTEM SHALL BE INSTALLED FROM THE DOWNSTREAM END UP. SEDIMENT SHALL NOT BE ALLOWED TO ENTER OFF SITE AREAS. WATER SHALL NOT BE ALLOWED TO RUNOFF THE SITE FROM UNSTABILIZED SURFACES.

E. LANDSCAPING:

1. IMMEDIATELY FOLLOWING GRADING, ALL DISTURBED AREAS SHALL BE LOAMED AND SEEDED. LANDSCAPING SHALL OCCUR AS SOON AS POSSIBLE TO PROVIDE PERMANENT STABILIZATION OF DISTURBED SURFACES.
2. FINISHED SIDE SLOPES SHALL NOT EXCEED A SLOPE OF TWO FEET HORIZONTAL TO ONE FOOT VERTICAL.
3. BANKINGS WITH SLOPES GREATER THAN 3:1 SHALL BE PLANTED WITH WELL-ROOTED, LOW-GROWING PLANTS.
4. WHEN PERMANENT STABILIZATION IS NOT IMMEDIATELY POSSIBLE DUE TO THE SEASON, TEMPORARY STABILIZATION SHALL BE PROVIDED USING METHODS SUCH AS TACKIFIED WOOD CHIPS OR HAY MULCH WEIGHTED WITH BRANCHES AND SEEDING WITH A RAPIDLY GERMINATING GRASS SPECIES. HAY USED FOR MULCH MUST BE FREE OF WEED SEED.
5. A MINIMUM OF 4" TOPSOIL SHALL BE PLACED AND ITS SURFACE SMOOTHED TO THE SPECIFIED GRADES.
6. CONTRACTOR SHALL UTILIZE A VARIETY OF SLOPE STABILIZATION METHODS AND MATERIALS, WHICH SHALL BE ADJUSTED TO THE SITE CONDITIONS. EROSION CONTROL BLANKETS OR MIRAFI MIRAMAT (OR SIMILAR PRODUCTS) SHALL BE AVAILABLE ON SITE.
7. TO ENSURE A DENSE, SUCCESSION GROWTH, SEED MIXTURE TYPE "C" IS REQUIRED ON ALL DISTURBED SURFACES.
8. FERTILIZER SHOULD BE USED IN THE AMOUNTS PRESCRIBED ON THE BAG. FERTILIZER IS CRITICAL IN ESTABLISHING PROPER VEGETATIVE COVER. YET, CARE SHOULD BE TAKEN TO PREVENT OVER APPLICATION.
9. THE USE OF HERBICIDES IS STRONGLY DISCOURAGED.
10. CONTRACTOR SHALL PROVIDE SUFFICIENT WATER AND/OR IRRIGATION FOR A MINIMUM OF TWO WEEKS FROM THE DATE OF PLANTING AND AS REQUIRED TO OBTAIN THE MINIMUM STANDARDS FOR LAWN SURFACE STABILIZATION.

F. GRASS AND SLOPE COVER:

1. ALL DISTURBED AREAS, INCLUDING SLOPES AND THE STORM WATER BASINS, SHALL BE GRADED AND STABILIZED BY PLANTING OR OTHER METHOD AS SHOWN OR SPECIFIED ON THE SITE PLANS.
2. LOAM ACIDITY SHALL BE CHECKED AND ADJUSTED TO A PH OF 6.5. APPLY LIME AT A MINIMUM RATE OF 50 LBS. PER 1,000 SQUARE FEET, IF NECESSARY.
3. ORGANIC-SLOW RELEASE FERTILIZER OF A TYPE 5-2-2 APPLIED AT A RATE OF 50 LBS. PER 500 SQUARE FEET.
4. RAKE A SEED BED USING A YORK RAKE OR HAND RAKING TO A MINIMUM DEPTH OF 3", THOROUGHLY INCORPORATING LIME AND FERTILIZER.
5. SEEDING MAY BE PERFORMED BY HAND, OR BY MECHANICAL OR TRACTOR MOUNTED SPREADER. HYDRO SEEDING IS RECOMMENDED.
6. AREAS SEEDED BEFORE APRIL 15 OR AFTER NOVEMBER 1 SHALL BE REAPPLIED BETWEEN THESE DATES IF A MINIMUM GERMINATION OF 90% COVERAGE, DETERMINED BY SURFACE AREA, HAS NOT OCCURRED OR IF THE SURFACE AREA HAS ERODED OR BECOME UNSTABILIZED.

G. HAND SEEDING:

1. SEED SHALL BE APPLIED BY HAND OR BY BROADCAST SPREADER, TO PROVIDE A UNIFORM DISTRIBUTION OF SEED.
2. SEED SHALL BE LIGHTLY RAKED INTO A DEPTH OF 1/2" - 1", WITH ALL RAKING TO BE PERPENDICULAR TO THE SLOPE.
3. SEED IS TO BE ROLLED WITH A WATER BALLAST ROLLER TO ENSURE CONTACT OF SEED WITH SOIL. DO NOT COMPACT SOIL.
4. AREA SHALL BE MULCHED USING SEED-FREE STRAW TO ADEQUATELY COVER THE AREA TO A DEPTH OF 1/2" - 1", ENSURING A UNIFORM COVER OF 75% OF THE SURFACE AREA.
5. MULCH SHALL BE SECURED BY MEANS OF SECURED LANDSCAPE FABRIC, EROSION CONTROL NETTING (3/4" - 1" MESH), OR OTHER BIODEGRADABLE MATERIAL, WHICH WILL ENSURE ADEQUATE COVER UNTIL THE SURFACE HAS GROWN TO 90% GERMINATION OR ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

H. HYDRO SEEDING:

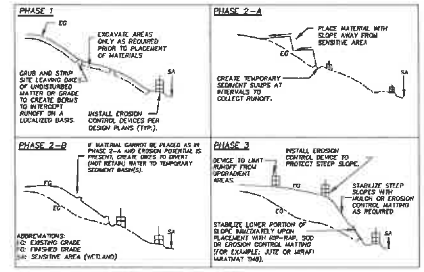
1. HYDRO SEEDING IS ENCOURAGED FOR ALL AREAS. ESPECIALLY FOR LARGE AREAS AND STEEP SLOPES.
2. HYDRO SEEDING SHALL BE PERFORMED IN A SINGLE UNIFORM LAYER.
3. A TRACK EQUIPPED MACHINE SHALL TRAVEL PERPENDICULAR TO ANY SLOPE TO PROVIDE COMPACTED SURFACE DEPRESSIONS FOR HYDRO SEEDING TO CATCH. SUCH TRACKS SHALL BE A MINIMUM OF THREE (3') FEET ON CENTER FOR THE TOTAL LENGTH OF THE SLOPE.
4. APPLICATION RATES ON SLOPES GREATER THAN 3:1 (HORIZONTAL TO VERTICAL) SHALL HAVE A MINIMUM SEEDING RATE OF 4 LBS. / 1000 S.F.
5. A LATEX OR FIBER TACKIFIER SHALL BE USED ON ALL AREAS AT THE RATE RECOMMENDED BY THE MANUFACTURER AND ON ALL SLOPES IDENTIFIED ABOVE (NO. 4). A MINIMUM RATE OF 50 LBS. OF TACKIFIER PER 500 GALS. OF WATER SHALL BE USED.
6. FERTILIZER AND LIME MAY BE INCORPORATED INTO THE HYDRO SEED MIXTURE IN THE QUANTITIES AND TYPE IDENTIFIED PREVIOUSLY (IF PERMITTED BY THE ORDERS OF CONDITIONS ONLY).

I. SEED MIXTURE TYPE "C"

1. SEED MIXTURES FOR SLOPED AREAS SHALL CONSIST OF A STANDARD CONSERVATION MIX CONFORMING TO THE RECOMMENDATIONS OF THE U.S. NATURAL RESOURCES CONSERVATION SERVICE (NRCS) GUIDELINES.
2. MINIMUM SEED COMPOSITION, BY TOTAL WEIGHT OF MIX, SHALL INCLUDE: 20% ANNUAL RYE, 15% RED TOP FESCUE, 10% WHITE CLOVER, 5% LADINA CLOVER, AND 5% CROWN VETCH.
3. NO MORE THAN 40% OF THE TOTAL MIX, BY WEIGHT, SHALL CONSIST OF ANNUAL RYE OR OTHER ANNUAL SPECIES.
4. SEED SHALL BE APPLIED AT A RATE OF 4 LBS. PER 1,000 SQUARE FEET.
5. ALL SEED SHALL BE OF THE PREVIOUS YEAR'S CROP AND SHALL HAVE A QUANTIFIED MIXTURE ANALYSIS ATTACHED.
6. NO MORE THAN 10% OF TOTAL MIXTURE SHALL CONSIST OF WEED SEED SPECIES.

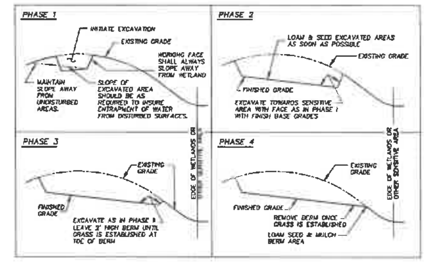
J. CRITERIA FOR EVALUATION

1. PER THE TOWN OF OXFORD ZONING BYLAWS XVIII (EARTH REMOVAL) §5.4, FOR EARTH REMOVAL OPERATIONS WITHIN 200 FEET OF A WAY OR WITHIN 250 FEET OF A BUILDING THE BOARD OF SELECTMEN NEEDS TO BE REASONABLY SATISFIED THAT SUCH OPERATIONS WILL NOT UNDERMINE SUCH WAY OR BUILDING. THE PREVIOUS EARTH REMOVAL PERMIT REFERENCED IN NOTE A.13 CONTAINED OPERATIONS WITHIN THE DISTANCES ABOVE. THE PROPOSED GRADING DEPICTED ON THIS PLAN IS IN KEEPING WITH THE SETBACKS ON THE PREVIOUS PERMIT.

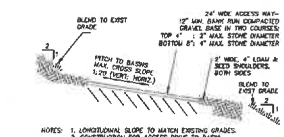


REFERENCE SEE: AASHTO DIVISION 200 EARTHWORK, SECTION 201-208
AASHTO DIVISION 600 MISCELLANEOUS CONSTRUCTION, SECTION 619 EROSION MATS AND BALES
AASHTO DIVISION 700 MATERIAL REQUIREMENTS, SECTION 713.07, EROSION CONTROL NET MATERIAL

FILL SEQUENCE
NOT TO SCALE

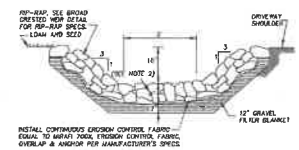


EXCAVATION SEQUENCE
NOT TO SCALE



NOTES: 1. LONGITUDINAL SLOPE TO MATCH EXISTING GRADES.
2. CONSTRUCTION FOR ACCESS DRIVE TO BASIN.

GRAVEL ACCESS WAY — NOT TO SCALE
STA 13+50 TO END OF DRIVE



NOTE:
1. FOR USE WHERE SLOPE EXCEEDS 5% AND AS SHOWN ON SITE PLAN.
2. INCREASE RIP-RAP DEPTH FROM 8" TO 16" FOR A DISTANCE OF 2 FEET EVERY 100 FEET OF SWALE TO SERVE AS CHECK DAM AND AS SHOWN ON SITE PLAN.

REINFORCED RIP-RAP SWALE — NOT TO SCALE

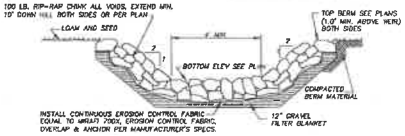
100LB. RIP-RAP SPECIFICATIONS:

1. ALL STONE SHALL BE CLEAN DURABLE ANGULAR STONE MEETING THE FOLLOWING SPECIFICATIONS:

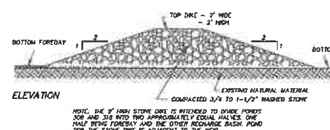
STONE SIZE	% OF WEIGHT SMALLER THAN GIVEN SIZE
100 LB.	100%
60 LB.	75%
25 LB.	50%
2 LB.	NOT TO EXCEED 10%

ROUNDED STONES, BOULDERS, SANDSTONE OR SIMILAR STONE OR RELATIVELY THIN SLAB SHALL NOT BE ACCEPTABLE.

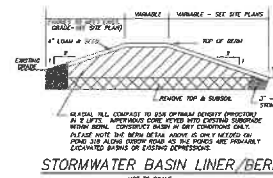
2. THE RIP-RAP SHALL BE UNDERLAYED WITH A FILTER BLANKET CONSISTING OF CLEAN, COARSE GRAVEL WITH NO STONES OVER 4" IN LONGEST DIMENSION AND NO FEWER THAN 10% OF TOTAL VOLUME PASSING A 200# SIEVE.
3. THE FILTER BLANKET NEED NOT BE COMPACTED, BUT SHALL BE GRADED TO A UNIFORM THICKNESS OF 12".
4. THE FILTER BLANKET SHALL BE OVERLAID WITH A STRUCTURAL/EROSION CONTROL FABRIC OF THE TYPE SPECIFIED. SUCH FABRIC SHALL BE CONTINUOUS IN LENGTHS, EITHER PARALLEL OR PERPENDICULAR TO THE SLOPE AND MUST BE UNDER ALL RIP-RAPPED SURFACES.



REINFORCED OVERFLOW BROAD-CRESTED WEIR
NOT TO SCALE



FOREBAY DIKE DETAIL
NOT TO SCALE



STORMWATER BASIN LINER/BERM
NOT TO SCALE

TOWN OF OXFORD BOARD OF SELECTMEN			
POSITION	NAME	SIGNATURE	DATE
CHAIRMAN	DENNIS E. LAMARCHE		
VICE-CHAIR	MEAGHAN E. TROIANO		
SECRETARY	CHERYLL A. LEBLANC		
MEMBER	MICHAEL F. DANIELS		
MEMBER	JOHN G. SAAD		

VERSION	NO.	BY	DATE	SURVEYOR
ORIGINAL ISSUE	--	--	3/23/2021	

VERSION	NO.	BY	DATE	ENGINEER
ORIGINAL ISSUE	--	--	3/23/2021	

COMMONWEALTH OF MASSACHUSETTS — JAMES PATRICK SMITH NO. 48510
COMMONWEALTH OF MASSACHUSETTS — ANDREW R. BAUM CIVIL NO. 47076 REGISTERED PROFESSIONAL ENGINEER

SITE MAP OF LAND IN
OXFORD, MASSACHUSETTS
LOCATED ON
19 OXBOW ROAD

SCALE: 1" = 60' (0–60 FEET)

PREPARED FOR OWNER AND APPLICANT
S & K DEVELOPMENT, LLC
JAMES P. SMITH, MANAGER
710 MAIN STREET
P.O. BOX 744
NORTH OXFORD, MA 01537
TEL: 508-987-2266 CELL: 508-207-6855

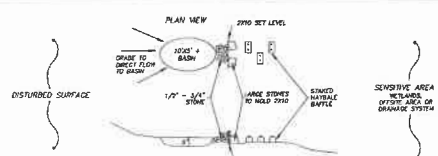
DESIGN: MAL
DRAWN: MAL
CHECK: ARB/JPS
REF:

S. J. MULLANEY ENGINEERING, INC.
CIVIL SITE DESIGN & PERMITTING
305 WHITNEY ST. - SUITE G3 - P.O. BOX 752 - LEOMINSTER, MA 01453-0752
TEL: 978 534-3131 - FAX: 978 534-3197 - EMAIL: info@sjmullaney.com

SHEET 4 OF 5
PLAN NO. 218-D-1

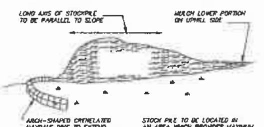
PROPOSED CONDITION

TOWN OF OXFORD BOARD OF SELECTMEN			
POSITION	NAME	SIGNATURE	DATE
CHAIRMAN	DENNIS E. LAMARCHE		
VICE-CHAIR	MEAGHAN E. TROIANO		
SECRETARY	CHERYLL A. LEBLANC		
MEMBER	MICHAEL F. DANIELS		
MEMBER	JOHN O. SAAD		



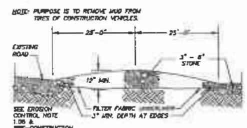
TEMPORARY DEWATERING AREA / TEMPORARY SETTLING BASIN

NOT TO SCALE



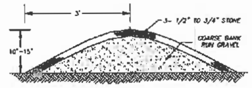
TEMPORARY STOCKPILE

NOT TO SCALE



TEMPORARY CONSTRUCTION ENTRANCE

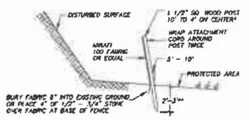
NOT TO SCALE



ARMORED DIKE

NOT TO SCALE

NOTE: SEVERAL TYPES OF EROSION CONTROL BARRIERS ARE SHOWN TO ALLOW THE CONTRACTOR FLEXIBILITY OF SELECTING BARRIERS THAT MAY BE MORE READILY AVAILABLE DURING THE TIME OF CONSTRUCTION.

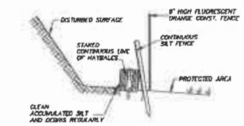


* STEEL POST MAY BE SUBSTITUTED. DISTANCE BETWEEN POSTS TO VARY AS REQUIRED BY TRIBUTARY AREA: 10' FOR 100 SF/LF FENCE 8' FOR 500 SF/LF FENCE

** DEPTH TO VARY WITH TRIBUTARY AREA: 2' FOR 100 SF ETC. IF POST IS TO BE SET IN PEAT OR UNSTABLE SOILS, THEN 3' OR DEPTH NECESSARY TO PROVIDE A STABLE POST FOR LOADED FENCE CONDITIONS

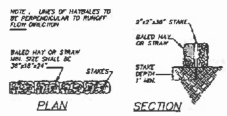
SILT FENCE DETAIL

NOT TO SCALE



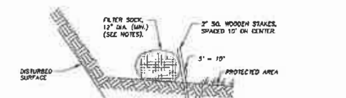
SILTATION BARRIER

NOT TO SCALE



HAYBALE DIKE

NOT TO SCALE



NOTE:
1) FILTER SOCKS MAY BE UTILIZED AS EROSION CONTROL BARRIER IN LIEU OF SILT FENCE AND/OR HAYBALES
2) FILTER SOCK SHALL BE A MESH TUBE FILLED WITH COMPOST. FILTER SOCK SHALL BE FILTREXX 'SILTSOXX' OR EQUAL. SEE WWW.FILTREXX.COM ENDS OF FILTER SOCK TO BE TIED AND DIRECTED UP SLOPE.
3) COMPOST MATERIAL SHALL BE DERIVED FROM FROM WELL-DECOMPOSED ORGANIC MATTER FREE OF WEEDS. COMPOST MATERIAL SHALL BE RELATIVELY FREE OF INERT OR MAN MADE MATERIALS. PARTICLE SIZE: 99% PASSING A 2" SIEVE AND A MINIMUM OF 60% GREATER THAN THE 3/8" SIEVE. PH RANGE: 5.0-8.0 WITH A MOISTURE CONTENT OF LESS THAN 60%
4) FILTER SOCK SHALL ALSO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

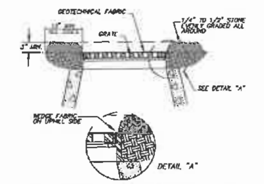
FILTER SOCK DETAIL

NOT TO SCALE

NOTE:
1) STUMP GRINDINGS MAY BE UTILIZED AS EROSION CONTROL BARRIER IN LIEU OF SILT FENCE AND/OR HAYBALES IN AREAS OUTSIDE OF STREAM CHANNELS AND AREAS OF CHANNELIZED FLOW.

STUMP GRINDING EROSION CONTROL DETAIL

NOT TO SCALE



FILTERED CATCHBASIN INLET

NOT TO SCALE

I. STORM WATER POLLUTION PREVENTION AND EROSION & SEDIMENTATION CONTROL PLAN

A. EROSION CONTROL MEASURES:

1. THE CONTRACTOR AND PROPERTY OWNER ARE RESPONSIBLE FOR ENSURING THAT EROSION AND SEDIMENTATION ARE CONTROLLED. THIS PLAN SHALL BE ADAPTED TO FIT THE CONTRACTOR'S EQUIPMENT, WEATHER CONDITIONS AND CONDITIONS ISSUED BY PERMITTING AUTHORITIES.
2. THE CONTRACTOR SHALL LIMIT THE EXTENT OF DISTURBANCE AND STABILIZE SURFACES AS SOON AS POSSIBLE. THE CONTRACTOR SHALL LIMIT THE SIZE AND LENGTH OF THE TRIBUTARY DRAINAGE AREA TO THE WORK SITE AND DRAINAGE STRUCTURES.
3. THE EXISTING SOIL CONDITIONS PROVIDE RUNOFF FROM AREAS WITH A HIGH WATER TABLE AND EROSION POTENTIAL. THE CONTRACTOR MUST ANTICIPATE HEAVY RUNOFF FROM THE HILLSIDE DURING ANY SPRING CONSTRUCTION OR DURING AND AFTER ANY INCLEMENT WEATHER.
4. THE CONTRACTOR SHALL CONSTRUCT TEMPORARY DIVERSION SWALES AND SETTLING BASINS IN AREAS OF FUTURE CONSTRUCTION. CONSTRUCTION IS PERMITTED BEYOND THE LIMIT OF DISTURBANCE ONLY WHEN ADDITIONAL DRAINAGE MEASURES OR STABILIZATION MEASURES ARE NEEDED AND SHALL BE SUBJECT TO APPROVAL BY THE OXFORD CONSERVATION COMMISSION PRIOR TO WORK OUTSIDE OF THE DESIGNATED LIMIT OF DISTURBANCE LINE, IF WITHIN THE 100-FT. WETLANDS BUFFER ZONE.
5. ALL DISTURBED SURFACES SHALL BE STABILIZED AS SOON AS PRACTICABLE WHERE PORTIONS OF THE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN 14 DAYS.
6. THE CONTRACTOR SHALL REGULARLY INSPECT, MAINTAIN AND REPAIR ALL EROSION CONTROL DEVICES ON-SITE. ANY SEDIMENTS REMOVED FROM THE CONTROL DEVICES SHALL BE DISPOSED OF OUTSIDE OF THE 100-FT. WETLANDS BUFFER ZONE.
7. TEMPORARY STABILIZATION SHALL BE PROVIDED USING METHODS SUCH AS TACKIFIED WOOD CHIPS OR HAY MULCH WEIGHTED WITH BRANCHES AND SEEDING WITH A RAPIDLY GERMINATING GRASS SPECIES. HAY USED FOR MULCH MUST BE FREE OF WEED SEED.
8. CONTRACTOR SHALL UTILIZE A VARIETY OF SLOPE STABILIZATION METHODS AND MATERIALS, WHICH SHALL BE ADJUSTED TO THE SITE CONDITIONS.
9. AT NO TIME SHALL SILT-LADEN WATER BE ALLOWED TO ENTER SENSITIVE AREAS (WETLANDS, OFF-SITE AREAS AND DRAINAGE SYSTEMS). RUNOFF FROM DISTURBED SURFACES SHALL BE DIRECTED THROUGH SETTLING BASINS, FILTERED CATCH BASIN INLETS AND/OR TEMPORARY DEWATERING AREAS, AND EROSION CONTROL BARRIERS PRIOR TO ENTERING SENSITIVE AREAS.
10. TEMPORARY DEWATERING AREAS AND/OR SEDIMENT BASINS (DEBRIS BASINS, DE-SILTING BASINS OR SILT TRAPS) SHALL BE INSTALLED AND MAINTAINED WHERE NECESSARY TO REMOVE FROM RUNOFF WATERS ANY SEDIMENT FROM LAND UNDERGOING DEVELOPMENT.
11. TEMPORARY SETTLING BASINS MUST HAVE A MINIMUM CAPACITY OF 3,600 CU. FT. STORAGE FOR EVERY ACRE DRAINED. MULTIPLE SMALLER BASINS PROVIDING THE SAME CAPACITY SHALL BE USED WHERE LARGE BASINS ARE NOT FEASIBLE.

B. GENERAL CONSTRUCTION REQUIREMENTS:

1. REFUELING OF CONSTRUCTION VEHICLES AND EQUIPMENT SHALL TAKE PLACE OUTSIDE OF THE 100-FT. BUFFER ZONE TO THE WETLANDS AND SHALL NOT BE CONDUCTED IN PROXIMITY TO SEDIMENTATION BASINS OR DIVERSION SWALES.
2. NO ON-SITE DISPOSAL OF SOLID WASTE, INCLUDING BUILDING MATERIALS, IS ALLOWED IN THE 100-FT. BUFFER ZONE. IT IS RECOMMENDED THAT LOCATIONS OF STUMP DUMPS GREATER THAN 50-C.Y. BE COORDINATED WITH THE OXFORD BOARD OF HEALTH.
3. NO MATERIALS SHALL BE DISPOSED OF INTO THE WETLANDS OR EXISTING OR PROPOSED DRAINAGE SYSTEMS. ALL CONTRACTORS, INCLUDING: CONCRETE SUPPLIERS, PAINTERS AND PLASTERERS, SHALL BE INFORMED THAT THE CLEANING OF EQUIPMENT IS PROHIBITED IN AREAS WHERE THE WASH-WATER WILL DRAIN DIRECTLY TO THE WETLANDS OR DRAINAGE SYSTEMS.
4. CONTRACTOR IS RESPONSIBLE FOR DUST CONTROL WHICH SHALL INCLUDE STREET SWEEPING OF ALL PAVED SURFACES WITHIN THE SITE AND OFF-SITE AREAS THAT ARE IMPACTED BY SITE CONSTRUCTION ON A REGULAR BASIS, AS NEEDED.
5. ALL SITE WORK SHALL BE STABILIZED AT THE END OF THE WORK DAY OR PRIOR TO ANTICIPATED CONDITIONS WHICH COULD CAUSE EROSION OR AIR-BORNE SEDIMENT PROBLEMS (I.E., RAIN, HIGH WINDS, EXPOSED SURFACES OR STEEP SLOPES).
6. SITE OPERATIONS IN THE AREA OF DISTURBANCE SHALL BE CONDUCTED IN SUCH A MANNER TO MAINTAIN OR CREATE GRADES AND SURFACES WHICH SLOPE AWAY FROM ABUTTING PROPERTIES.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT ABUTTING PROPERTIES ARE KEPT CLEAR OF CONSTRUCTION RELATED DEBRIS. ALL MATERIALS TRACKED ONTO SUCH AREAS SHALL BE PROMPTLY REMOVED.
8. THE OWNER/APPLICANT IS RESPONSIBLE FOR IMPLEMENTING THESE CONTROL MEASURES UNLESS AND UNTIL AN OUTSIDE CONTRACTOR IS RETAINED.

C. PRE-CONSTRUCTION:

1. AN EROSION CONTROL BARRIER (SILT FENCE, HAY BALE DIKE OR SILTATION BARRIER) SHALL BE INSTALLED TO LIMIT THE AREA OF DISTURBANCE. THIS IS ESPECIALLY IMPORTANT DOWNGRADIENT OF SITE ACTIVITY AND ON PORTIONS OF THE SITE ADJACENT TO SENSITIVE AREAS SUCH AS WETLANDS. THESE BARRIERS SHALL REMAIN IN PLACE UNTIL ALL TRIBUTARY SURFACES HAVE BEEN FULLY STABILIZED. THE EROSION CONTROL BARRIERS AS SHOWN ON THE SITE PLAN ARE THE MINIMUM REQUIRED TO PROTECT THE WETLANDS.
2. A TEMPORARY STONE ACCESS AREA SHALL BE ESTABLISHED AT THE ENTRANCE TO EACH STREET AND LOT DRIVEWAY TO COLLECT ENTRAPPED SOILS AND SEDIMENT FROM CONSTRUCTION AND SERVICE VEHICLES ENTERING AND LEAVING THE SITE. THIS ACCESS AREA SHALL BE THE SINGULAR ACCESS FOR ALL CONSTRUCTION VEHICLES. THE STONE SHALL BE REPLACED REGULARLY AS WELL AS WHEN THE STONE IS SILT LADEN. EACH CONSTRUCTION ENTRANCE SHALL BE LEFT IN PLACE UNTIL THE BINDER PAVEMENT SURFACE IS INSTALLED.
3. ONLY THE MINIMUM AREA SHALL BE DISTURBED FOR ALL CONSTRUCTION. ANY SPECIMEN TREES TO BE SAVED AND THE EXACT LIMITS OF CLEARING SHOULD BE MARKED IN ADVANCE.
4. THE CONTRACTOR SHALL ESTABLISH STAGING AREAS WITHIN THE AREA OF DISTURBANCE, OUTSIDE THE 100-FT. BUFFER ZONE, FOR THE OVERNIGHT STORAGE OF EQUIPMENT AND STOCKPILING OF MATERIALS.
5. CONSTRUCTION MATERIALS SHALL BE PILED SO AS NOT TO CONCENTRATE RUNOFF.
6. IN THE STAGING AREAS, THE CONTRACTOR SHALL HAVE STOCKPILES OF MATERIALS REQUIRED TO CONTROL EROSION ON-SITE TO BE USED TO SUPPLEMENT OR REPAIR EROSION CONTROL DEVICES. THESE MATERIALS SHALL INCLUDE, BUT ARE NOT LIMITED TO, HAY BALES, SILT FENCE AND CRUSHED STONE.
7. THE CONTRACTOR IS RESPONSIBLE FOR EROSION CONTROL ON SITE AND SHALL UTILIZE EROSION CONTROL MEASURES WHERE NEEDED, REGARDLESS OF WHETHER THE MEASURES ARE SPECIFIED HEREIN OR IN CONDITIONS ISSUED BY PERMITTING AUTHORITIES.

D. PRELIMINARY SITE WORK:

1. THE STORM WATER BASINS SHALL BE CONSTRUCTED PRIOR TO ANY ROUGH GRADING ON THE SITE. IT IS RECOMMENDED THAT THE BASINS BE CONSTRUCTED LARGER AND DEEPER THAN REQUIRED ON THE FINAL PLANS TO ALLOW ADDITIONAL CAPACITY FOR SEDIMENTATION DURING CONSTRUCTION. ARMORED DIKES AND SILT FENCES SHALL BE PLACED AT THE OUTLETS TO PROVIDE ADDITIONAL FILTRATION OF RUNOFF.
2. MATERIAL REMOVED SHOULD BE STOCKPILED, SEPARATING THE TOPSOIL FOR FUTURE USE ON THE SITE. WOOD CHIPS GENERATED ON SITE AS A RESULT OF LAND CLEARING OPERATIONS SHOULD REMAIN ON SITE FOR USE AS MULCH. EROSION CONTROLS SHALL BE UTILIZED ALONG THE DOWNSLOPE SIDE OF THE PILES IF THE PILES ARE TO REMAIN MORE THAN THREE WEEKS. RUNOFF SHALL BE DIRECTED AWAY FROM STOCKPILES.
3. STOCKPILES SHALL BE LOCATED WITHIN THE LIMITS OF DISTURBANCE, IN AREAS OF MINIMAL IMPACT, OUTSIDE OF THE 100-FT. WETLANDS BUFFER, UNLESS ALLOWED BY ORDERS OF CONDITIONS.
4. NO EARTHEN MATERIAL SHALL LEAVE THE SITE EXCEPT IN ACCORDANCE WITH THE TOWN OF OXFORD ZONING BYLAWS – CHAPTER XVIII – EARTH REMOVAL.
5. GRUBBING AND STRIPPING ON SLOPES LEADING TO WETLANDS SHALL NOT OCCUR DURING HEAVY RAIN.
6. IF INTENSE RAINFALL IS ANTICIPATED, SUPPLEMENTAL HAY BALE DIKES, SILT FENCES, OR ARMORED DIKES SHALL BE INSTALLED.
7. ROUGH GRADING OF THE DRIVEWAY SHOULD BE CONDUCTED IN SUCH A MANNER AS TO MAINTAIN OR CREATE GRADES SLOPING AWAY FROM OFF SITE AREAS AND INTO TEMPORARY DETENTION BASINS WHEREVER POSSIBLE.

E. DRAINAGE SYSTEM:

1. THE DRAINAGE SYSTEM SHALL BE INSTALLED FROM THE DOWNSTREAM END UP. SEDIMENT SHALL NOT BE ALLOWED TO ENTER ABUTTING PROPERTIES. PRETREATMENT OF STORMWATER RUNOFF FROM UNSTABILIZED SURFACES SHALL REQUIRED PRIOR TO LEAVING THE SITE.
2. RIP RAP SHALL BE INSTALLED AT THE PIPE INLETS AND OUTLETS IMMEDIATELY UPON THE PLACEMENT OF THE PIPE. SILT FENCES SHALL BE INSTALLED AT THE OUTFALLS OF ALL TEMPORARY BASINS AND SWALES. THEY SHALL REMAIN IN PLACE UNTIL ALL TRIBUTARY AREAS ARE STABILIZED.
3. UNTIL TRIBUTARY AREAS ARE STABILIZED, ARMORED DIKES INLETS SHALL COVER THE INLETS AND OUTLETS TO THE STORM WATER BASINS TO MINIMIZE SILTATION IN THE DRAINAGE STRUCTURES. IF INTENSE RAINFALL (SUCH AS A HURRICANE) IS PREDICTED BEFORE ALL TRIBUTARY AREAS ARE STABILIZED, THE ARMORED DIKES SHALL BE REINFORCED FOR THE DURATION OF THE STORM. DOWNSTREAM AREAS SHALL BE INSPECTED AND ANY SEDIMENTS REMOVED AT THE END OF THE STORM.
4. IF UNSTABLE AREAS ARE ENCOUNTERED DUE TO NATURAL SPRINGS OR GROUNDWATER BREAKOUT, INTERCEPTOR DRAINS SHALL BE INSTALLED TO DIRECT THE RUNOFF INTO THE DRAINAGE SYSTEM.
5. ALL SWALES MUST BE MAINTAINED AND KEPT FREE OF OBSTRUCTIONS, TO ALLOW UNIMPEDED FLOW.
6. ALL SURFACES SHOULD BE RAPIDLY AND THOROUGHLY STABILIZED TO THEIR FINAL CONDITION TO AVOID SEDIMENTS LEAVING THE PROPERTY.
7. AT THE COMPLETION OF WORK, THE DRAINAGE SYSTEM SHALL BE OPENED AND INSPECTED. ANY FOREIGN MATERIAL PRESENT SHALL BE REMOVED.

F. UTILITIES: (NONE PROPOSED)

1. UTILITY TRENCHES SHALL NOT CHANNELIZE RUNOFF TOWARD WETLANDS OR OFF-SITE AREAS.
2. TRENCH EXCAVATIONS SHALL BE LIMITED TO THE MINIMUM LENGTH REQUIRED FOR DAILY UTILITY INSTALLATION. ALL TRENCHES SHALL BE BACKFILLED AS SOON AS POSSIBLE. THE ENDS OF PIPES SHALL BE CLOSED NIGHTLY WITH PLYWOOD.
3. WHEN EXCAVATING EACH UTILITY LINE, TRENCH EXCAVATION SHOULD BEGIN AT THE LOW END AND PROCEED UPHILL.

G. ILLICIT DISCHARGES:

ILLICIT DISCHARGES TO THE STORM WATER MANAGEMENT SYSTEM, I.E., DISCHARGES THAT ARE NOT ENTIRELY COMPRISED OF STORM WATER, ARE PROHIBITED. NOTWITHSTANDING THE FOREGOING, AN ILLICIT DISCHARGE DOES NOT INCLUDE DISCHARGES FROM THE FOLLOWING ACTIVITIES OR FACILITIES: FIREFIGHTING, WATER LINE FLUSHING, LANDSCAPE IRRIGATION, UNCONTAMINATED GROUND WATER, POTABLE WATER SOURCES, FOUNDATION DRAINS, AIR CONDITIONING CONDENSATION, FOOTING DRAINS, INDIVIDUAL RESIDENT CAR WASHING, FLOWS FROM RIPARIAN HABITATS AND WETLANDS, DECHLORINATED WATER FROM SWIMMING POOLS, WATER USED FOR STREET WASHING AND WATER USED TO CLEAN RESIDENTIAL BUILDINGS WITHOUT DETERGENTS.

II. NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES):

A. APPLICABILITY

1. THIS PLAN IS INTENDED TO MEET THE REQUIREMENTS OF THE NATIONAL STORM WATER POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES) OF SECTION 402 OF THE FEDERAL CLEAN WATER ACT. THE PROPOSED EARTH REMOVAL WILL RESULT IN MORE THAN ONE (1) ACRE OF TOTAL DISTURBED AREA (3.70 ACRES PROPOSED), REQUIRING A STORM WATER POLLUTION PREVENTION PLAN (SWPPP).
2. THE SITE AS DESIGNED IS ANTICIPATED TO MEET THE CRITERIA FOR A NPDES CONSTRUCTION GENERAL PERMIT (CGP). THE SUBMISSION OF THE NPDES NOTICE OF INTENT (NPDES NOI) TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY MUST OCCUR A MINIMUM OF 14 DAYS PRIOR TO THE INITIATION OF ANY SITE DISTURBANCE OR CONSTRUCTION.
3. THIS PLAN IS ALSO INTENDED TO PROVIDE GUIDANCE AND INSTRUCTION TO THE OWNER AND CONTRACTOR(S) IN THE PREVENTION OF EROSION AND SEDIMENTATION ON AND OFF-SITE. THIS PLAN IS INTENDED TO ALLOW ANY ORDERS OF CONDITIONS TO BE MORE SPECIFIC IN ADDRESSING ITEMS OF CONCERN. IF, UPON ISSUANCE OF ORDERS BY PERMITTING AUTHORITIES, ANY ITEMS SPECIFIED HEREIN CONFLICT WITH THE ORDERS, SAID ORDERS SHALL SUPERSEDE THE REQUIREMENTS SPECIFIED HEREIN.

B. NPDES RECORD REQUIREMENTS:

1. A COPY OF THE NPDES SUBMITTAL AND THIS PLAN MUST BE KEPT ON-SITE IN A WEATHER-PROOF ENCLOSURE AT THE SITE CONSTRUCTION TRAILER OR AT THE CONSTRUCTION ENTRANCE AT ALL TIMES DURING CONSTRUCTION AND SHALL BE MADE AVAILABLE TO ALL INTERESTED PARTIES.
2. RECORDS MUST BE MAINTAINED BY THE PERMITTEE AT ITS PHYSICAL ADDRESS OF RECORD FOR A PERIOD OF THREE (3) YEARS FROM THE DATE OF STABILIZATION OF THE SITE. STABILIZATION OCCURS WHEN THE SITE HAS OVER 70% VEGETATIVE GROWTH AND/OR MECHANICAL STABILIZATION THROUGHOUT. RECORDS SHOULD INCLUDE DATES WHEN MAJOR GRADING ACTIVITIES OCCUR, WHEN CONSTRUCTION ACTIVITIES CEASE (TEMPORARILY AND PERMANENTLY) AND WHEN STABILIZATION (TEMPORARY AND PERMANENT) IS INITIATED AND COMPLETED.

C. NPDES INSPECTION REQUIREMENTS:

1. ALL INSPECTIONS SHALL BE CONDUCTED BY QUALIFIED PERSONNEL WHO SHALL PRODUCE SIGNED WRITTEN QUANTITATIVE AND QUALITATIVE REPORTS ON THE METHODS, SUITABILITY OF STRUCTURES AND THE GENERAL CONSTRUCTION. QUALIFIED PERSONNEL INCLUDE CONSULTANTS, ENGINEERS OR CONTRACTORS LICENSED IN SITE DEVELOPMENT RELATED FIELDS. INSPECTORS MUST INCLUDE ALL ITEMS IN PART 3.10.E. AND G. OF THE CGP.
2. INSPECTIONS ARE REQUIRED DURING SITE ALTERATIONS A MINIMUM OF ONCE EVERY FOURTEEN (14) DAYS WHILE SURFACES ARE UNSTABILIZED.
3. INSPECTIONS ARE REQUIRED WITHIN 24-HOURS OF STORMS WHICH PRODUCE 0.25" OF PRECIPITATION OR GREATER AND OCCURRENCES OF DISCHARGE FROM SNOW MELT SUFFICIENT TO CAUSE DISCHARGE.
4. WHEN THE SITE IS FULLY STABILIZED, INSPECTIONS SHALL BE CONDUCTED AT MONTHLY INTERVALS FOR A PERIOD OF 3 YEARS.
5. IF EXISTING BEST MANAGEMENT PRACTICES (BMPS) NEED MODIFICATION OR ADDITIONAL BMPS ARE NECESSARY, IMPLEMENTATION MUST BE COMPLETED BEFORE THE NEXT STORM EVENT IF PRACTICABLE AND THE SWPPP MUST BE AMENDED TO DOCUMENT CHANGES MADE IN BMPS.
6. THE SWPPP AND SITE PLAN MUST BE AMENDED OR MODIFIED WHENEVER THERE IS A CHANGE IN DESIGN, CONSTRUCTION, OPERATION OR MAINTENANCE OR IF BMPS ARE INEFFECTIVE IN MINIMIZING POLLUTANTS IN STORM WATER RUNOFF TO SURFACE WATERS.
7. OPERATIONS AND MAINTENANCE RECORDS SHALL BE KEPT ON THE PREMISES AND BE MADE AVAILABLE TO PERMITTING AUTHORITIES OR THEIR AGENTS FOR INSPECTION, UPON REQUEST.

III. DRAINAGE SYSTEM OPERATIONS & MAINTENANCE PLAN

A. STORM WATER COLLECTION SYSTEM:

1. THE STORM WATER COLLECTION SYSTEM SERVING THIS SITE IS INTENDED TO BOTH COLLECT STORM WATER RUNOFF AND TO PROVIDE TREATMENT OF THE STORM WATER PRIOR TO ITS DISCHARGE DOWNGRADIENT. THE STORM WATER DRAINAGE SYSTEM COLLECTS RUNOFF GENERATED FROM THE SITE THROUGH RIP-RAP SWALES. THE SWALES DISCHARGE INTO A SEDIMENT FOREBAY WHICH FLOWS INTO A STORMWATER BASIN. THE SWALES AND FOREBAYS COLLECT SEDIMENT AND DEBRIS. WHEN THESE TWO BASIC CONTROL MECHANISMS ARE FUNCTIONING PROPERLY, THEY PROVIDE FOR A REDUCTION OF CONTAMINANTS AND DEBRIS ENTERING DOWNSTREAM AREAS.
2. STORM WATER RUNOFF IS CONVEYED BY SWALES TO UPLAND STORM WATER BASINS THAT COLLECT SEDIMENT, ATTENUATE AND RECHARGE GENERATED RUNOFF. THE BASINS WILL BE GRASSED, WHICH WILL AID IN SEDIMENT REMOVAL AND POLLUTANT UPTAKE.
3. THE ABOVE-DESCRIBED SYSTEMS RELY UPON PROPER MONITORING, OPERATIONS AND MAINTENANCE TO FUNCTION AS DESIGNED AND INTENDED. THE ACTIVITIES DESCRIBED BELOW ARE TO BE IMPLEMENTED BEGINNING DURING CONSTRUCTION OF THE PROJECT AS APPROPRIATE.

B. MONITORING AND OPERATION:

1. THE OWNER SHALL BE RESPONSIBLE FOR OPERATION AND MAINTENANCE OF THE STORM WATER BASINS.
2. THE DRAINAGE SYSTEM IS REQUIRED TO BE MONITORED BY THE OWNER, WHO SHALL DIRECT AN INDIVIDUAL ENTITY TO ACT AS THE PROJECT SITE MANAGER.
3. OPERATIONS AND MAINTENANCE RECORDS SHALL BE KEPT ON THE PREMISES AND BE MADE AVAILABLE TO PERMITTING AUTHORITIES OR THEIR AGENTS FOR INSPECTION, UPON REQUEST.
4. MONITORING AND OPERATION DURING CONSTRUCTION AND PRIOR TO TOWN ACCEPTANCE SHALL CONSIST OF THE FOLLOWING:
5. THE OUTLETS FROM THE SWALES AND THE STORM WATER BASINS SHALL BE INSPECTED ON A REGULAR BASIS TO ENSURE THAT NO EROSION IS OCCURRING AT THE OUTLETS, THAT ALL OUTLETS ARE FREE-FLOWING AND THAT NO DAMAGE HAS OCCURRED AS PART OF SITE MAINTENANCE OR ACTIVITIES.
6. AT THE PROJECT COMPLETION, THE STORM WATER DRAINAGE SYSTEM SHALL BE INSPECTED AND CLEANED OF ANY MATERIAL INHIBITING STORM WATER FLOW.

C. OPERATIONS:

1. ALL MATERIALS STORED ON SITE SHALL BE STORED IN A NEAT, ORDERLY MANNER.
2. ONSITE VEHICLES AND PARKING AREAS SHALL BE REGULARLY MONITORED FOR LEAKS AND RECEIVE REGULAR PREVENTIVE MAINTENANCE TO PREVENT LEAKAGE.
3. PETROLEUM PRODUCTS SHALL BE STORED UNDER COVER AND SHALL BE IN TIGHTLY SEALED CONTAINERS WHICH ARE CLEARLY LABELED.
4. FERTILIZERS SHALL ONLY BE USED IN THE MINIMUM AMOUNTS AS RECOMMENDED BY THE MANUFACTURER.
5. THE CONTENTS OF ANY UNUSED FERTILIZER SHALL BE TRANSFERRED TO A CLEARLY LABELED, SEALABLE PLASTIC BIN, TO AVOID SPILLAGE.
6. SPILLS OF TOXIC OR HAZARDOUS MATERIAL OR NATURE WILL BE REPORTED TO THE APPROPRIATE STATE, LOCAL OR FEDERAL AGENCY, AS REQUIRED BY LAW.
7. THE USE OF SODIUM CHLORIDE FOR ICE CONTROL SHALL BE MINIMIZED CONSISTENT WITH THE PUBLIC HIGHWAY SAFETY REQUIREMENTS.

D. MAINTENANCE:

1. EXISTING STREET GUTTERS ALONG THE PROJECTS FRONTAGE SHALL BE SWEPT CLEAN OF DEBRIS AND ACCUMULATION OF SOIL AND SILT ON A REGULAR BASIS. AT A MINIMUM, A SPRING AND FALL CLEANING SCHEDULE IS RECOMMENDED.
2. COORDINATE WITH THE OXFORD DEPARTMENT OF PUBLIC WORKS THE CLEANING OF EXISTING CATCH BASIN(S) ALONG THE PROJECT FRONTAGE. IT IS RECOMMENDED TO HAVE THE SUMPS CLEANED AT ANY TIME OF THE YEAR WHEN 2 FT. OR LESS SPACE EXISTS BELOW THE OUTLET INVERT, OR A MINIMUM OF ONCE PER YEAR, REGARDLESS OF SUMP ACCUMULATION. ALL DEBRIS FROM THE CLEANING SHALL BE DISPOSED OF OFFSITE AND IN A MANNER AS PRESCRIBED BY LAW. CATCH BASIN(S) SHALL BE CLEANED AT THE COMPETITION OF THE PROJECT.
3. ANY EXISTING CATCHBASIN(S) CLEANED SHALL ALSO HAVE THEIR OIL & GREASE TRAPS (IF INSTALLED) CHECKED FOR PHYSICAL INTEGRITY AND SEAL IMMEDIATELY AFTER EACH CATCH BASIN CLEANING.
4. OIL ABSORBING PILLOWS OR OTHER MEANS SHALL BE USED TO REMOVE ACCUMULATIONS OF HYDROCARBONS (OIL / GREASE) FROM EXISTING CATCH BASIN(S) THAT ARE REGULARLY OBSERVED TO CONTAIN HYDROCARBONS WHICH DO NOT EVAPORATE BETWEEN INSPECTIONS.
5. ALL BROKEN, LEAKING OR OTHERWISE DAMAGED STRUCTURES SHALL BE REPAIRED PROMPTLY UPON DISCOVERY.
6. ALL EROSION AT OUTLETS SHALL BE REPAIRED. THE REPLACEMENT OF ANY PIPE OR DRAINAGE STRUCTURE SHALL MATCH THE ORIGINAL DESIGN SPECIFICATIONS.
7. THE CONSERVATION COMMISSION SHALL BE CONSULTED PRIOR TO THE INITIATION OF ANY REPAIRS INVOLVING THE USE OF HEAVY EQUIPMENT OR DISTURBANCE WITHIN THE 100-FT. BUFFER ZONE. A REQUEST FOR DETERMINATION OF APPLICABILITY OR A NOTICE OF INTENT MAY BE REQUIRED.

E. STORM WATER BASIN MAINTENANCE:

1. IN ACCORDANCE WITH TOWN OF OXFORD RULES AND REGULATIONS GOVERNING THE ISSUANCE OF SPECIAL PERMITS FOR EARTH REMOVAL (DATED 4/23/1991) A STORMWATER DRAINAGE DESIGN HAS BEEN PREPARED. SINCE SPECIFIC DESIGN STANDARDS FOR STORMWATER ARE NOT NOTED IN THE RULES AND REGULATIONS, THE STORMWATER SYSTEM HAS BEEN DESIGNED CONSISTENT WITH THE MASSACHUSETTS STORMWATER MANAGEMENT POLICY STANDARDS. BASINS DEPICTED ON THE SITE PLAN ARE DESIGNED TO MITIGATE THE PEAK RATE OF RUNOFF FOR THE CALCULATED STORM EVENTS BY HOLDING STORM WATER AND SIMULTANEOUSLY RELEASING STORM WATER, THROUGH OVERFLOW WEIRS AND OR INFILTRATION, AT THE SAME RATE THAT STORM WATER WOULD HAVE PASSED OVER THE BOUNDARIES BEFORE DEVELOPMENT. SIMULTANEOUSLY, THE BASINS WILL ACT TO ENTRAP SEDIMENTS AND HYDROCARBONS PRIOR TO ENTERING THE RESOURCE AREA. IN DOING SO, THE BASINS WILL ACCUMULATE THESE MATERIALS AS DEPOSITED DEBRIS, SEDIMENT LAYERS AND EXCESSIVE VEGETATIVE GROWTH WITHIN THE BASINS. THESE MATERIALS WILL BE REQUIRED TO BE REMOVED ON A REGULAR BASIS TO ENSURE THE CONTINUING FUNCTION OF THE BASINS. THE BASINS ARE INTENDED TO FUNCTION AS PREVENTATIVE AND MITIGATIVE SYSTEMS, NOT TO BECOME PROTECTED RESOURCE AREAS. BASED UPON THE ABOVE, THE FOLLOWING MAINTENANCE CONDITIONS SHALL APPLY AND BE PART OF ANY CONTINUANCE OF THE PROPOSED DEVELOPMENT;
2. WEEDS AND WETLANDS PLANTS SHALL BE REMOVED ON A REGULAR BASIS, BUT NOT LESS THAN ONCE PER YEAR IN THE LATE SUMMER. REMOVAL SHALL BE BY HAND, OR BY APPLICATION OF HERBICIDES IF PLAN GROWTH IS TOO PROLIFIC TO MANAGE BY HAND METHODS.
3. SIMILARLY, THE STORM WATER BASIN EMBANKMENTS SHALL BE INSPECTED AT LEAST ONCE PER YEAR FOR TREE AND BRUSH GROWTH. IF NEEDED, REMOVAL OF THIS GROWTH SHALL BE BY HAND (I.E., CHAINSAW, BRUSH CUTTERS OR MOWERS) BUT SHALL NOT BE REMOVED BY HEAVY MACHINERY OR OTHER METHOD THAT WOULD MAKE THE BASIN BERMS UNSTABLE. DURING ANY REMOVAL OR TRIMMING OPERATIONS, CARE SHALL BE TAKEN TO LEAVE THE GRASS/GROUNDCOVER OF THE BERMS INTACT TO PREVENT THE POSSIBILITY OF EROSION.
4. THE STORM WATER BASINS SHALL BE INSPECTED FOR SEDIMENT ACCUMULATION A MINIMUM OF ONCE PER YEAR. ACCUMULATED SEDIMENTS SHALL BE REMOVED AS REQUIRED BUT AT A MINIMUM OF ONCE EVERY FIVE YEARS AND AT THE COMPLETION OF THE PROJECT. HEAVY MACHINERY MAY BE USED; HOWEVER, ALL AREAS WHICH WERE STABILIZED WITH GRASS / GROUNDCOVER SHALL BE PROMPTLY RE-ESTABLISHED IF DISTURBED. SEDIMENTS ENTRAPPED IN AREAS OF RIP-RAP AND INLET/OUTLET SWALES AND PIPES SHALL ALSO BE REMOVED, BY HAND IF NECESSARY. ANY RIP-RAP OR TURF DISTURBED SHALL BE RE-ESTABLISHED IN ACCORDANCE WITH THE ORIGINAL CONSTRUCTION SPECIFICATIONS.
5. ALL EROSION AT OUTLETS SHALL BE REPAIRED AND/OR THE REPLACEMENT OF ANY PIPE OR DRAINAGE STRUCTURE SHALL MATCH THE ORIGINAL DESIGN SPECIFICATIONS.
6. ALL SPOILS, STUMPS AND DEBRIS SHALL BE DISPOSED OF OUTSIDE THE 100-FT. BUFFER ZONE. THIS MATERIAL'S CONTENTS SHALL BE ASSESSED AND SHALL BE DISPOSED OF PROMPTLY AND IN ACCORDANCE WITH ALL APPLICABLE LAWS AND REGULATIONS IN EFFECT AT THE TIME.

STORM WATER POLLUTION PREVENTION PLAN

ORIGINAL ISSUE	--	--	03/23/2021	
REVISION	NO.	BY	DATE	ENGINEER

COMMONWEALTH OF MASSACHUSETTS – ANDREW R. BAUM – CIVIL – NO. 47075 – REGISTERED PROFESSIONAL ENGINEER

COMMONWEALTH OF MASSACHUSETTS – JAMES PATRICK SMITH – NO. 46510 – REGISTERED PROFESSIONAL ENGINEER

SITE PLAN OF LAND IN
OXFORD, MASSACHUSETTS
LOCATED AT
19 OXBOW ROAD

FEET
FEET
SCALE: AS NOTED

PREPARED FOR OWNER AND APPLICANT
S & K DEVELOPMENT, LLC
JAMES P. SMITH, MANAGER
710 MAIN STREET
P.O. BOX 744
NORTH OXFORD, MA 01537
TEL: 508-987-2266 CELL: 508-207-5855

DESIGN: MAL
DRAWN: MAL
CHECK: ARB
REF:

S. J. MULLANEY ENGINEERING, INC.
CIVIL SITE DESIGN & PERMITTING
305 WHITNEY ST. - SUITE G3 - P.O. BOX 752 - LEOMINSTER, MA 01453-0752
TEL: 978 534-3131 - FAX: 978 534-3197 - EMAIL: info@sjmullaney.com

SHEET 5 OF 5

PLAN NO. 218-D-1

TOWN OF OXFORD
DPW
DEPARTMENT OF PUBLIC WORKS

MEMORANDUM

DATE: November 1, 2022

TO: Jennifer Callahan, Town Manager

FROM: Jared Duval, P.E., DPW Director

RE: 19 Oxbow Road Earth Removal – Remanded Special Permit Application Review

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Per your request the DPW has reviewed S&K Development's remanded special permit application for earth removal at 19 Oxbow Road. The application and following supporting documents form the basis of our review:

1. "Application for Special Permit for Earth Removal" prepared by S & K Development, LLC, dated October 14, 2022.
2. "Stormwater Report" prepared by S.J. Mullaney Engineering, Inc., dated March 25, 2021.
3. Plan Set No. "218-D-1," including sheets 1 through 5, prepared by S.J. Mullaney Engineering, Inc., dated March 23, 2021.

Based on previous site observations and review of the aforementioned documents I am pleased to offer the following comments:

1. The applicant's plan has not changed from the original application submitted last year. However, the plans submitted as part of the remanded application are not the most recent version. A revised plan dated June 11, 2021 was submitted including DEP well completion report information. The applicant should provide the latest revision of the plans and also amend the Board of Selectmen table on the first plan sheet to reflect the current membership and positions.
2. Considering the scope of the project has not changed from the original submission last year my earlier comments from my memorandums dated April 20, 2021, June 15, 2021, and September 7, 2021 regarding plan review, performance standards (e.g. dust and erosion control), site cleanup, etc. still stand and are attached hereto for reference. Since the scope has not changed, I also assume many, if not all of the residents' original concerns regarding the Earth Removal project still hold true (e.g. noise, truck traffic, roadway degradation, potential well impacts, length of project, etc.). Again, much, if not all of the analysis and comments provided in my original memorandums dated April 20, 2021, June 15, 2021, and September 7, 2021 still stands.
3. Regarding the estimated cost for roadway repairs cited in comments number 5 and 3 of my memorandums dated June 15, 2021 and September 7, 2021, respectively, costs for roadway construction have continued to escalate since last year. I offer the following updated opinions of

probable cost for roadway repairs to Oxbow Road in the event the applicant and Board consider repairs as a condition of approval and/or project mitigation:

a. Roadway pavement reclamation, regrade, & repave (*original access point – 1,427 linear feet +/-*) = **$170,000**
b. Roadway pavement reclamation, regrade, & repave (*alternate access point over Town property – 947 linear feet +/-*) = **$113,000**

4. I understand there has been discussion regarding the proponent possessing a contract with MassDOT to provide aggregate products for the Route 20 Corridor Improvements project. My understanding of the contracting process with DOT is the aggregate supplier would not contract directly with MassDOT, but instead would contract with the General Contractor or their subcontractors directly to supply materials for the project. I understand DOT is in the process of awarding the Route 20 project to DW White. Per my conversation with Mike Tomasello at DW White today they still don't have official award from DOT, let alone formal notice to proceed, so they are not authorized to contract or expend funds on any work or materials at this time. Mr. Tomasello circulated my inquiry regarding discussions of a contract with the proponent throughout his company and was clear they have not had discussions with the proponent regarding material supply nor do they have a contract with the proponent at this time.

The DPW reserves the right on behalf of the Board of Selectmen to require certain Special Conditions that are customary for earth removal permits. Items such as dust control, sanitary facilities, impact monitoring, change of ownership requirements, etc. will be written into the Board's final Special Permit for earth removal. This should be made aware to the applicant. The DPW offers the following Special Conditions, included in my memorandum dated September 7, 2021, consistent with previous earth removal permits, for consideration by the Board. Should the Board vote in the affirmative regarding the Special Permit for Earth Removal, and if the Board finds the Special Conditions described below acceptable, the Board should include these Special Conditions and any other Special Conditions deemed necessary, in the Board's vote of approval:

SPECIAL CONDITIONS

SC-1. **SCOPE OF WORK** – The scope of work for this earth removal permit involves the removal of approximately 75,000 cubic yards of primarily sand and gravel. The area is identified on the plan as approximately 3.7 acres.

SC-2. **LIMITS OF EXCAVATION TO THE WEST & SOUTH** - Based on the evidence submitted the Board has determined that earth fill will occur within 50-feet of the west and south property line. The Applicant shall provide adequate down slope protection in this area and provide documentation proving an acknowledgement of understanding from the Town for the parcel at 0 Oxbow Road. Adequate slope protection shall be provided to the DPW for review.

SC-3. **FINISHED GRADES** – Based on the evidence submitted the Board has determined the cut and fill slopes will not exceed 2 horizontal to 1 vertical. The Applicant shall provide adequate slope protection. Adequate slope protection shall be provided to the DPW for review.

SC-4. **SITE RECLAMATION** – The Applicant is responsible for the reclamation of the site and any off-site impacts resulting from the permitted earth removal operation. Where "earth" removal has taken place, the Applicant shall revegetate all unstable areas where revegetation can reasonably occur and grow as required in the GENERAL CONDITIONS. The Applicant shall provide a contribution to the Town to be used to cover anticipated increased roadway maintenance costs during the life of the project and to subsidize future roadway repairs due to anticipated roadway degradation attributed to increased truck traffic during earth removal operations. The amount of said contribution shall be mutually agreed upon between the Town Manager and Applicant.

SC-5. **PROJECT SECURITY** – The Special Permit shall not be granted and no operations shall be conducted until the Applicant furnishes to the Board, to be posted with the Town Treasurer, a security in the penal amount of $3,500 per acre of disturbance per acre of land affected by the proposed operation in such form as is approved by the Board. The preferred form of security is a deposit of money in a passbook payable to the Town of Oxford or a cashier's or certified check made payable to the Town of Oxford. If the Board accepts a bond, the bond shall be executed as surety by an insurance or bonding company approved by the Board and qualified to do business in the Commonwealth of Massachusetts. The bond shall have the Town of Oxford named as the insured and shall be non-cancellable without the permission of the Board; the cost of the bond shall be prepaid by the Applicant prior to the issuance of the permit; and the term of the bond shall conform to the terms of the Special Permit. The amount of the proposed security shall be initially based on an area of maximum disturbance at any one time. The Board reserves the right to periodically adjust the mitigation amount to reflect inflation or other appropriate material costs, with the period of adjustment not to exceed once a year.

SC-6. **HOURS OF OPERATION** – Hours of operation vary depending on the work activity. Excavation operations will be allowed between 9:00 A.M. and 5:00 P.M prevailing time, Monday through Friday. Trucks may enter and leave the site of the operation between 8:30 AM and 4:30 PM prevailing time, Monday through Friday. Loaded vehicles shall be suitably covered to prevent dust and contents from spilling and/or blowing from the load.

SC-7. **TRANSPORTATION ROUTES** – To protect residents along local routes from excessive noise and vibration, no earth removal shall be allowed until the routes are established on an accompanying map or plan and verified to the satisfaction of the DPW. The preferred travel route is easterly on Oxbow Road to Southbridge Road (Route 20).

SC-8. **PROJECT SUPERVISION** - The responsibility for the accuracy, neatness, and integrity of all work involved in connection with the approved Special Permit for earth removal lies entirely with the Applicant; inspections performed by the Board, Town employees, or a third party inspector are only to verify that the work is in progress in accordance with the conditions of this Special Permit. The Applicant is required to hire responsible competent professionals to layout the work in accordance with the plan and supervise the earth removal and site reclamation work. The Applicant shall furnish to the Board or the appointed agent(s) four copies of written calendar quarterly reports prepared by a registered engineer describing the Applicant's performance, specifically detailing the Applicant's adherence to each condition of approval. The reports shall be due on July 15, October 15, January 15, and April 15 of each year, beginning with the above date that coincides with the end of the first quarter of operation and continuing until completion of the allowed earth removal operation. The Applicant's engineer shall certify that the work completed to date is in conformance with the plan and, where applicable, shall submit partial as-built plans for the completed work. Failure to submit all reports within one week of the dates above will be sufficient cause for Board agents to issue a notice to cure. Failure to submit all reports within two weeks of the dates above will be sufficient cause for Board agents to issue a CEASE AND DESIST unless otherwise arranged.

SC-9. **ONSITE INSPECTIONS** - The Board and/or agent(s) designated by the Board shall have the right to enter upon the site at all reasonable times for the purpose of conducting onsite inspections when accompanied by an agent of the Applicant. If requested in writing by the Board or agent(s) designated by the Board, the Applicant must install property line markers at appropriate intervals to allow verification of conformance with setback requirements. Agents for the Board include but are not limited to the Land Management Office or DPW. These agents shall have the authority to halt operations if it is deemed in their opinion that the conditions of the Special Permit are not being met. The Applicant can appeal the decision to the Board. In addition, if Town officials are unable to provide inspection, inspections by a third party on behalf of the Town at the expense of the Applicant. Third party inspectors shall give the owner 24 hours notice to ensure safe access to the property.

SC-10. **EROSION AND SEDIMENTATION CONTROL** – Prior to any earth removal, the Applicant shall install erosion and sedimentation controls in accordance with the approved plans, their stormwater management and land disturbance permit, and applicable EPA NPDES requirements. The Applicant is responsible for the maintenance and monitoring of appropriate erosion and sedimentation control within the site to protect workers on the site from danger, abutters from undermining of their land, and downstream land from siltation. The controls shall be installed in accordance with the requirements of the Applicant's stormwater management and land disturbance permit and EPA NPDES permit. Prior to the removal of any vegetation and stripping of any loam the erosion control measures should

be inspected by the assigned NPDES SWPPP inspector and a representative from the Town during every phase. The Applicant shall provide a rip-rap tracking pad sufficient for one revolution of all truck tires for the purposes of controlling sedimentation entering roadways. Sweeping of the entrance(s)/exit(s) shall be swept twice per day and monitored throughout the day.

SC-11. **DUST CONTROL** - It shall be the responsibility of the Applicant to provide adequate means of dust control. There shall be a water wagon, well(s) with pumps and hoses, and/or a suitable supply of calcium chloride stored on site and either or both shall be used as required to control dust. The control of dust shall comply with all regulations with the Town of Oxford Board of Health, Massachusetts DEP, and the Federal OSHA requirements.

SC-12. **SANITARY FACILITIES** - The Applicant is responsible to provide adequate sanitary facilities for the use of all persons employed on the site. Said facilities shall be properly screened from public view, shall be provided in sufficient number, in such manner, and at such locations as are appropriate to serve the needs of the employees. These facilities shall include a dumpster for proper storage of debris on the site. The facilities shall be maintained in a neat and sanitary condition and in compliance with the requirements of local and state health officials. The Applicant shall rigorously prohibit the committing of nuisances within, on, or about the site.

SC-13. **PUBLIC SAFETY** - The Applicant is responsible for the protection of the public safety and the integrity of the public ways used to access the site. Accordingly, the Applicant shall be required to maintain a gate at each vehicle entry and exit point. Such gates shall be locked when the project is not in operation to prohibit entry. A copy of the key for each gate shall be entrusted to the Board and/or its agent to allow free access for inspections. The Applicant shall post and maintain NO TRESPASSING signs along the perimeter of the site. The Applicant shall secure detention ponds from unauthorized access. The Applicant shall provide adequate warning signage in advance of points of egress, subject to DPW approval. The Applicant shall provide adequate traffic control at points of egress and at the intersection of Route 20 and Oxbow Road, including but not limited to roadway flaggers or police detail officers.

SC-14. **INSURANCE REQUIREMENTS** - The entity responsible for earth removal operations shall maintain insurance on all vehicles and equipment used on the site in amounts satisfactory to the Board. The Applicant's insurance company shall send the Board a certificate of insurance indicating that the insurance is in force, naming the Town of Oxford as additional insured, and stating that the policies will not be materially changed or cancelled without thirty (30) days advance notice by certified mail.

SC-15. **TOWN INDEMNIFIED** – The Applicant agrees to defend, indemnify and hold harmless the Town from and against any and all claims, demands, suits, actions, costs and judgment, whatsoever, including reasonable attorney's fees, which may be imposed upon, incurred by, or asserted against the Town by reason of (a) any failure on the part of the Applicant to comply with any provision or term required to be performed or complied with by the Applicant Licensee under the terms of the Special Permit, or (b) for the death, injury or property damage suffered by any person on account of or based upon the act, omission, fault, negligence or misconduct of the Applicant, its employers, agents, assigns or invitees.

SC-16. **FAILURE TO PERFORM** – In the event that the Applicant is unable to conform to the monitoring and reporting or regrading and revegetating conditions of this Special Permit, the Board may decide, by majority vote, to declare the Applicant in default and demand payment from the project security to complete the necessary work. Upon such finding of default the Board shall notify the Applicant in writing by certified mail of its decision and allow fifteen (15) days from receipt by the Applicant to start correction of the violation. If the violation is not addressed within the allowed fifteen days and thereafter is not diligently pursued to satisfactory resolution, the Board shall take the security and cause the remedial work to be performed either by Town forces or a private contractor hired through appropriate procedures. By acceptance of the conditions of this Special Permit the Applicant also grants permission for such Town forces or contractors to enter the site and complete the necessary work.

SC-17. **RELEASE OF SECURITY**- The penal amount of the security posted as a condition of this Special Permit (see Special Condition entitled **PROJECT SECURITY**) may, from time to time, be reduced by the Board provided that the amount remaining is, in the opinion of the Board, sufficient to complete the outstanding stabilizing, regarding, and revegetating, and provide a guarantee of $1,000 per acre stabilized within the last two (2) years of the request for partial release of security. The request for any release of security shall not be valid unless accompanied by an as-built plan prepared and stamped by the project engineer or surveyor showing the finished grades and condition of the site and certifying compliance with the conditions of this Special Permit.

SC-18. **COMPLETION OF WORK**- All permitted excavation work shall be completed, and all areas shall be reclaimed prior to the expiration date of this permit unless the Applicant applies for renewal of this Special Permit. If the renewal is to be sought, the completed application shall be submitted at least four (4) months before the expiration date of this Special Permit.

SC-19. **CHANGE OF OWNERSHIP** - All conditions herein contained shall run with the land and any new owner shall be bound by the conditions of this Special Permit. Prior to a

change of ownership, the new owner shall provide the Board with credentials and new insurance certificates.

SC-20. **VIOLATIONS OF CONDITIONS** - In addition to the enforcement provisions of the Oxford Zoning By-Law, the Board, upon recommendation of its agent(s), may, by majority vote, issue a cease and desist order if it is found that the requirements of any of these conditions have been violated. In the event that the Board issues a cease and desist order, and the Applicant unsuccessfully challenges that order in court, the town shall be reimbursed by the Applicant for all legal costs and expenses including attorney's fees incurred in defense of the cease and desist order and shall receive such reimbursement before any work may continue under this Special Permit.

SC-21. **LAPSE OF RIGHTS** – In accordance with the requirements of Chapter XIV, Section 6 of the Oxford Zoning Bylaw (Applicability), the right to remove earth granted by this Special Permit shall not take effect until a copy of the decision, bearing the certification of the Town Clerk that twenty (20) days have elapsed after the decision has been filed in the office of the Town Clerk and that no appeal has been filed or if an appeal has been filed that it has been dismissed or denied, is recorded in the Worcester District Registry of Deeds and indexed in the grantor index under the name of the owner of record or is recorded and noted on the owner's certificate of title. If, except for good cause, a substantial use of a Special Permit has not been made, or in the case of a Special Permit for construction, construction has not begun within one year of the date that the Town Clerk certifies that no appeal has been filed or, if an appeal has been filed, that it has been dismissed or denied, the rights granted by the Special Permit shall lapse.

SC-22. **PAYMENT OF REAL ESTATE AND PERSONAL PROPERTY TAXES** – Should the owner become 30 days in arrears in paying either his real estate taxes or personal property taxes all earth removal operations taking place under this Special Permit shall CEASE AND DESIST, until such a time as all funds due the Town of Oxford along with all penalties and interest have been received and a letter has been sent to the Board by the Treasurer/Collector verifying receipt. Upon receipt of said letter activities will be allowed to commence.

SC-23. **GROUNDWATER MONITORING & TESTING –** The Applicant shall provide monitoring wells to evaluate static water levels at the onset and throughout the project. The Applicant shall also perform water quality testing on adjacent wells at minimum at the beginning, middle, and end of the project or whenever the Board and/or DPW deems necessary. The Applicant shall provide monthly reports on static water levels to the DPW for review. Water quality reports shall be provided to the DPW after each round of testing. Should any issues arise with respect to static groundwater levels and/or water quality during the project the Applicant shall immediately investigate the issues to determine if

earth removal operations are accountable. In the event it is determined the earth removal operations negatively impacted static water levels and/or water quality the work shall cease until the issues are rectified.

Enclosure: J. Duval Memorandum dated April 20, 2021
J. Duval Memorandum dated June 15, 2021
J. Duval Memorandum dated September 7, 2021

Town of Oxford
Department of Public Works
450 Main Street
Oxford, MA 01540
508-987-6006

TOWN OF OXFORD

DPW

DEPARTMENT OF PUBLIC WORKS

MEMORANDUM

DATE: April 20, 2021

TO: Jennifer Callahan, Town Manager

FROM: Jared Duval, P.E., DPW Director

CC: Jennifer Warren-Dyment, Executive Assistant

RE: 19 Oxbow Road Earth Removal Special Permit Application Review

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Per your request the DPW has reviewed S&K Development's special permit application for permit removal at 19 Oxbow Road. The application and following supporting documents form the basis of our review:

1. "Soil Suitability Assessment for Earth Removal" prepared by BC Engineering & Surveying, Inc., dated September 17, 2002.
2. "Stormwater Report" prepared by S.J. Mullaney Engineering, Inc., dated March 25, 2021.
3. Plan Set No. "218-D-1," including sheets 1 through 5, prepared by S.J. Mullaney Engineering, Inc., dated March 23, 2021.

Based on a site observation on April 20, 2021 and review of the aforementioned documents we offer the following comments:

1. Based on DPW's area takeoff from the plan the proposed limit of earth removal is approximately 4.2 acres. Note C-5 on sheet 4 of the plans calls out 3.70 acres of disturbance. The applicant shall confirm area of removal. The proposed volume of earth removal is approximately 75,000 cubic yards according to note C-2 on sheet 4 of the plans.

2. The proposed limit of earth removal is within 200 feet of a public way (Oxbow Road). Given the topography of the site and the fact most of the work is occurring upgradient from the way, it is the DPW's opinion there is minimal risk of undermining said way.

3. The proposed limit of earth removal is within 250 feet of several of the structures on neighboring parcels, the closest of which is 87 feet. However, much of the subject site is at a higher elevation than the surrounding structures therefore it is our opinion there is no identifiable concern for undermining. Downslope protection shall be provided to prevent erosion and sediment transport to abutting parcels.

Town of Oxford
Department of Public Works
450 Main Street
Oxford, MA 01540
508-987-6006

4. Given the proximity to neighboring residential properties the applicant shall make provisions for noise and dust control to the satisfaction of the DPW and Board of Selectmen. At a minimum, dust control shall include application of water and/or liquid or flake calcium chloride during dry weather or at the DPW or Board's discretion.

5. It appears that all slopes will not exceed 2-foot horizontal to 1-foot vertical. Therefore, it is assumed that all cut and fill slopes will be loamed and seeded. The Applicant shall confirm.

6. The applicant shall provide a sufficient gate at the entrance of the property. It appears one is shown on the plans but not called out.

7. It appears the applicant is preserving a 50-foot setback from all adjacent properties apart from the Town-owned parcel located to the south of the subject site. The DPW takes no exception with reduced setback as the proposed work in this area should not cause harm to the Town's vacant parcel.

8. The applicant shall remove the existing office trailer from the site, as well as any trash and old tires discarded on the premises.

9. The applicant shall remove decrepit fencing along a portion of the western property line, and any other decrepit fencing on-site and replace with adequate security fencing around the limits of excavation, especially near the top of larger proposed slopes. It appears fencing is included on the plans, but the size and type is not called out.

10. There does not appear to be any proposed landscaping as part of the project. The Board may wish to have the applicant provide provisions for landscaping to shield and enhance the aesthetics of the site during earth removal operations.

11. As a condition of approval under section 7.5 of the by-law the applicant shall post a bond in an amount sufficient to guarantee compliance with the terms and conditions of the permit. The bond shall be in the form of a cash bond or Performance Bond which holds the Town of Oxford harmless which it may suffer by reason of failure and shall reimburse and repay the Town all outlay and expense which the Town may incur in making good any default. Tri-party agreements between the Applicant, Applicants financing entity, and the Town shall not be considered. Consistent with recent Earth Removal Permits, the bond amount shall be $3,500.

The DPW reserves the right on behalf of the Board of Selectmen to require certain Special Conditions that are customary for earth removal permits. Items such as dust control, sanitary facilities, impact monitoring, change of ownership requirements, etc. will be written into the Board's final Special Permit for earth removal. This should be made aware to the applicant. The DPW offers the following preliminary Special Conditions, consistent with previous earth removal permits, for consideration by the Board. If the Board finds the Special Conditions described below acceptable, the Board should include these Special Conditions and any other Special Conditions deemed necessary, in the Board's vote of approval:

SPECIAL CONDITIONS

SC-1. **SCOPE OF WORK** – The scope of work for this earth removal permit involves the removal of approximately 75,000 cubic yards of primarily sand and gravel. The area is identified on the plan as approximately 3.7 acres.

SC-2. **LIMITS OF EXCAVATION TO THE WEST & SOUTH** - Based on the evidence submitted the Board has determined that earth fill will occur within 50-feet of the west and south property line. The Applicant shall provide adequate down slope protection in this area and provide documentation proving an acknowledgement of understanding from the Town for the parcel at 0 Oxbow Road. Adequate slope protection shall be provided to the DPW for review.

SC-3. **FINISHED GRADES** – Based on the evidence submitted the Board has determined the cut and fill slopes will not exceed 2 horizontal to 1 vertical. The Applicant shall provide adequate slope protection. Adequate slope protection shall be provided to the DPW for review.

SC-4. **SITE RECLAMATION** – The Applicant is responsible for the reclamation of the site and any off-site impacts resulting from the permitted earth removal operation. Where "earth" removal has taken place, the Applicant shall revegetate all unstable areas where revegetation can reasonably occur and grow as required in the GENERAL CONDITIONS.

SC-5. **PROJECT SECURITY** – The Special Permit shall not be granted and no operations shall be conducted until the Applicant furnishes to the Board, to be posted with the Town Treasurer, a security in the penal amount of $3,500 per acre of disturbance per acre of land affected by the proposed operation in such form as is approved by the Board. The preferred form of security is a deposit of money in a passbook payable to the Town of Oxford or a cashier's or certified check made payable to the Town of Oxford. If the Board accepts a bond, the bond shall be executed as surety by an insurance or bonding company approved by the Board and qualified to do business in the Commonwealth of Massachusetts. The bond shall have the Town of Oxford named as the insured and shall be non-cancellable without the permission of the Board; the cost of the bond shall be prepaid by the Applicant prior to the issuance of the permit; and the term of the bond shall conform to the terms of the Special Permit. The amount of the proposed security shall be initially based on an area of maximum disturbance at any one time. The Board reserves the right to periodically adjust the mitigation amount to reflect inflation or other appropriate material costs, with the period of adjustment not to exceed once a year.

SC-6. **HOURS OF OPERATION** – Hours of operation vary depending on the work activity. Excavation operations will be allowed between 9:00 A.M. and 5:00 P.M prevailing time, Monday through Friday. Trucks may enter and leave the site of the operation between 8:30 AM and 4:30 PM prevailing time, Monday through Friday. Loaded vehicles shall be suitably covered to prevent dust and contents from spilling and/or blowing from the load.

SC-7. **TRANSPORTATION ROUTES** – To protect residents along local routes from excessive noise and vibration, no earth removal shall be allowed until the routes are established on an accompanying map or plan and verified to the satisfaction of the DPW. The preferred travel route is easterly on Oxbow Road to Southbridge Road (Route 20).

SC-8. **PROJECT SUPERVISION** - The responsibility for the accuracy, neatness, and integrity of all work involved in connection with the approved Special Permit for earth removal lies entirely with the Applicant; inspections performed by the Board, Town employees, or a third party inspector are only to verify that the work is in progress in accordance with the conditions of this Special Permit. The Applicant is required to hire responsible competent professionals to layout the work in accordance with the plan and supervise the earth removal and site reclamation work. The Applicant shall furnish to the Board or the appointed agent(s) four copies of written calendar quarterly reports prepared by a registered engineer describing the Applicant's performance, specifically detailing the Applicant's adherence to each condition of approval. The reports shall be due on July 15, October 15, January 15, and April 15 of each year, beginning with the above date that coincides with the end of the first quarter of operation and continuing until completion of the allowed earth removal operation. The Applicant's engineer shall certify that the work completed to date is in conformance with the plan and, where applicable, shall submit partial as-built plans for the completed work. Failure to submit all reports within one week of the dates above will be sufficient cause for Board agents to issue a notice to cure. Failure to submit all reports within two weeks of the dates above will be sufficient cause for Board agents to issue a CEASE AND DESIST unless otherwise arranged.

SC-9. **ONSITE INSPECTIONS** - The Board and/or agent(s) designated by the Board shall have the right to enter upon the site at all reasonable times for the purpose of conducting onsite inspections when accompanied by an agent of the Applicant. If requested in writing by the Board or agent(s) designated by the Board, the Applicant must install property line markers at appropriate intervals to allow verification of conformance with setback requirements. Agents for the Board include but are not limited to the Land Management Office or DPW. These agents shall have the authority to halt operations if it is deemed in their opinion that the conditions of the Special Permit are not being met. The Applicant can appeal the decision to the Board. In addition, if Town officials are unable to provide inspection, inspections by a third party on behalf of the Town at the expense of the Applicant. Third party inspectors shall give the owner 24 hours notice to ensure safe access to the property.

SC-10. **EROSION AND SEDIMENTATION CONTROL** – Prior to any earth removal, the Applicant shall install erosion and sedimentation controls in accordance with the approved plans, their stormwater management and land disturbance permit, and applicable EPA NPDES requirements. The Applicant is responsible for the maintenance and monitoring of appropriate erosion and sedimentation control within the site to protect workers on the site from danger, abutters from undermining of their land, and downstream land from siltation. The controls shall be installed in accordance with the requirements of the Applicant's stormwater management and land disturbance permit and EPA NPDES permit. Prior to the removal of any vegetation and stripping of any loam the erosion control measures should be inspected by the assigned NPDES SWPPP inspector and a representative from the Town

during every phase. The Applicant shall provide a rip-rap tracking pad sufficient for one revolution of all truck tires for the purposes of controlling sedimentation entering roadways. Sweeping of the entrance(s)/exit(s) shall be swept twice per day and monitored throughout the day.

SC-11. **DUST CONTROL** - It shall be the responsibility of the Applicant to provide adequate means of dust control. There shall be a water wagon, well(s) with pumps and hoses, and/or a suitable supply of calcium chloride stored on site and either or both shall be used as required to control dust. The control of dust shall comply with all regulations with the Town of Oxford Board of Health, Massachusetts DEP, and the Federal OSHA requirements.

SC-12. **SANITARY FACILITIES** - The Applicant is responsible to provide adequate sanitary facilities for the use of all persons employed on the site. Said facilities shall be properly screened from public view, shall be provided in sufficient number, in such manner, and at such locations as are appropriate to serve the needs of the employees. These facilities shall include a dumpster for proper storage of debris on the site. The facilities shall be maintained in a neat and sanitary condition and in compliance with the requirements of local and state health officials. The Applicant shall rigorously prohibit the committing of nuisances within, on, or about the site.

SC-13. **PUBLIC SAFETY** - The Applicant is responsible for the protection of the public safety and the integrity of the public ways used to access the site. Accordingly, the Applicant shall be required to maintain a gate at each vehicle entry and exit point. Such gates shall be locked when the project is not in operation to prohibit entry. A copy of the key for each gate shall be entrusted to the Board and/or its agent to allow free access for inspections. The Applicant shall post and maintain NO TRESPASSING signs along the perimeter of the site. The Applicant shall secure detention ponds from unauthorized access.

SC-14. **INSURANCE REQUIREMENTS** - The entity responsible for earth removal operations shall maintain insurance on all vehicles and equipment used on the site in amounts satisfactory to the Board. The Applicant's insurance company shall send the Board a certificate of insurance indicating that the insurance is in force, naming the Town of Oxford as additional insured, and stating that the policies will not be materially changed or cancelled without thirty (30) days advance notice by certified mail.

SC-15. **TOWN INDEMNIFIED** – The Applicant agrees to defend, indemnify and hold harmless the Town from and against any and all claims, demands, suits, actions, costs and judgment, whatsoever, including reasonable attorney's fees, which may be imposed upon, incurred by, or asserted against the Town by reason of (a) any failure on the part of the Applicant to comply with any provision or term required to be performed or complied with by the Applicant Licensee under the terms of the Special Permit, or (b) for the death, injury or property damage suffered by any person on account of or based upon the act, omission, fault, negligence or misconduct of the Applicant, its employers, agents, assigns or invitees.

SC-16. **FAILURE TO PERFORM** – In the event that the Applicant is unable to conform to the monitoring and reporting or regrading and revegetating conditions of this Special Permit, the Board may decide, by majority vote, to declare the Applicant in default and demand payment from the project security to complete the necessary work. Upon such finding of default the Board shall notify the Applicant in writing by certified mail of its decision and allow fifteen (15) days from receipt by the Applicant to start correction of the violation. If the violation is not addressed within the allowed fifteen days and thereafter is not diligently pursued to satisfactory resolution, the Board shall take the security and cause the remedial work to be performed either by Town forces or a private contractor hired through appropriate procedures. By acceptance of the conditions of this Special Permit the Applicant also grants permission for such Town forces or contractors to enter the site and complete the necessary work.

SC-17. **RELEASE OF SECURITY**- The penal amount of the security posted as a condition of this Special Permit (see Special Condition entitled **PROJECT SECURITY**) may, from time to time, be reduced by the Board provided that the amount remaining is, in the opinion of the Board, sufficient to complete the outstanding stabilizing, regarding, and revegetating, and provide a guarantee of $1,000 per acre stabilized within the last two (2) years of the request for partial release of security. The request for any release of security shall not be valid unless accompanied by an as-built plan prepared and stamped by the project engineer or surveyor showing the finished grades and condition of the site and certifying compliance with the conditions of this Special Permit.

SC-18. **COMPLETION OF WORK**- All permitted excavation work shall be completed, and all areas shall be reclaimed prior to the expiration date of this permit unless the Applicant applies for renewal of this Special Permit. If the renewal is to be sought, the completed application shall be submitted at least four (4) months before the expiration date of this Special Permit.

SC-19. **CHANGE OF OWNERSHIP** - All conditions herein contained shall run with the land and any new owner shall be bound by the conditions of this Special Permit. Prior to a change of ownership, the new owner shall provide the Board with credentials and new insurance certificates.

SC-20. **VIOLATIONS OF CONDITIONS** - In addition to the enforcement provisions of the Oxford Zoning By-Law, the Board, upon recommendation of its agent(s), may, by majority vote, issue a cease and desist order if it is found that the requirements of any of these conditions have been violated. In the event that the Board issues a cease and desist order, and the Applicant unsuccessfully challenges that order in court, the town shall be reimbursed by the Applicant for all legal costs and expenses including attorney's fees incurred in defense of the cease and desist order and shall receive such reimbursement before any work may continue under this Special Permit.

SC-21. **LAPSE OF RIGHTS** – In accordance with the requirements of Chapter XIV, Section 6 of the Oxford Zoning Bylaw (Applicability), the right to remove earth granted by this Special Permit shall not take effect until a copy of the decision, bearing the certification of the

Town Clerk that twenty (20) days have elapsed after the decision has been filed in the office of the Town Clerk and that no appeal has been filed or if an appeal has been filed that it has been dismissed or denied, is recorded in the Worcester District Registry of Deeds and indexed in the grantor index under the name of the owner of record or is recorded and noted on the owner's certificate of title. If, except for good cause, a substantial use of a Special Permit has not been made, or in the case of a Special Permit for construction, construction has not begun within one year of the date that the Town Clerk certifies that no appeal has been filed or, if an appeal has been filed, that it has been dismissed or denied, the rights granted by the Special Permit shall lapse.

SC-22. **PAYMENT OF REAL ESTATE AND PERSONAL PROPERTY TAXES** – Should the owner become 30 days in arrears in paying either his real estate taxes or personal property taxes all earth removal operations taking place under this Special Permit shall CEASE AND DESIST, until such a time as all funds due the Town of Oxford along with all penalties and interest have been received and a letter has been sent to the Board by the Treasurer/Collector verifying receipt. Upon receipt of said letter activities will be allowed to commence.

TOWN OF OXFORD

DPW

DEPARTMENT OF PUBLIC WORKS

MEMORANDUM

DATE: June 15, 2021

TO: Jennifer Callahan, Town Manager

FROM: Jared Duval, P.E., DPW Director

CC: Jennifer Warren-Dyment, Executive Assistant

RE: 19 Oxbow Road Earth Removal Special Permit Application Review

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In the wake of the initial public hearing for the subject application on June 1, 2021 it is my understanding the DPW was to follow up on the following matters:

1. Coordinate with the applicant's engineer in their investigation on the potential impacts to abutting wells, including water quality and quantity, and traffic safety concerns for trucks entering Route 20.
2. Provide zoning district in which the subject parcel is located.
3. Provide a current market rate for gravel products to evaluate potential gravel sale revenue from earth removal operations.
4. Evaluate number of truck trips to and from the subject site and potential roadway impacts as a result.
5. Provide cost scenarios for roadway improvements to Oxbow Road from the entrance of the property to the intersection of Route 20.

The applicant's engineer submitted the following documents on June 11, 2021 for DPW review:

- Plan Set No. "218-D-1," including sheets 1 through 5, prepared by S.J. Mullaney Engineering, Inc., latest revision dated June 11, 2021.
- MassDEP Well Completion Reports for house numbers 6, 7, 7R, 13, 15.

Based on review of the above documents and DPW analysis with respect to items 2-5 noted above we are pleased to offer the following comments:

1. The applicant's engineer provided well reports based on available information from the Office of Energy and Environmental Affairs' online well database. Based on review of the reports provided and revised plans it appears most wells have a ground elevation at the well proximate to the lowest proposed grades on-site (within 4'-8') after earth removal is complete. It also appears most wells in

the area are drilled a minimum of 280 feet with at least 35 feet in bedrock and steel casing depth at least 51 feet deep. While it is beyond the expertise of my department to comment definitively on the project's potential impact on groundwater elevations it is my humble opinion from an engineering perspective – not as a hydrogeologist – that abutting wells are at sufficient depth where they should not be tangibly impacted by the proposed work. Should the Board wish to take affirmative action on the permit they may want to require monitoring wells to evaluate static water levels at the onset and throughout the project. Please note, well information regarding additional abutting properties including house numbers 12, 16, 20, 25, and 27 was not provided, therefore our assessment is limited only to the reports provided.

With respect to water quality, including arsenic mentioned at the last meeting, it is my understanding that while it can be from man-made sources it is also naturally occurring in soil and rock so the culprit may be difficult to pinpoint. The applicant has offered to perform water quality testing to monitor levels before, during, and after the project.

With regards to traffic safety for trucks entering Route 20, MassDOT's Route 20 corridor improvements project may overlap earth removal operations on the subject site based on available schedule information from the state. If this is the case, there should be considerable traffic control measures in place along Route 20 to calm traffic through the limits of work. I'd also imagine there will be several traffic control officers on-site, including at the intersection of Route 20 with Oxbow Road, to direct traffic onto Route 20.

2. The subject parcel is zoned "R-2," or "suburban district" according to Assessor's Map No. 9.
3. Current local rates for gravel borrow range from $14-$15 per cubic yard. The project proponents estimate the removal of approximately 75,000 cubic yards of material. However, it is not known how much saleable gravel they will yield from the premises.
4. Based on the applicant's estimated volume of earth removal – 75,000 cubic yards – below is an analysis of potential truck trips to and from the site over the duration of the project (5 years based on information from the applicant):

Table 1: Estimated Number of Truck Trips

Truck Type	Capacity (cubic yards)	Total Trips (to and from)	Avg. Per Year (5 Yr duration)	Avg. Per Day (252 business days)	Avg. Per Day (construction season – Apr. 15-Nov.15)
Tri-Axle Dump Truck	12	12,500	2,500	10	18
End Dump Trailer	26	5,769	1,154	5	8
50/50	12/26	9,135	1,827	8	13

The analysis includes an estimated number of trips for either triaxle dump trucks or end dump trailers. Realistically there will be a mix of triaxles and end dump trailers used so the DPW assumed a 50/50 distribution of truck types for further analysis.

5. The DPW analyzed two scenarios for roadway improvements to Oxbow Road, from the entrance of

the subject parcel to the intersection of route 20 (approximately 1,660'), for potential mitigation following earth removal operations:

a. Shim & Overlay road - **$115,000**
b. Roadway pavement reclamation, regrade, & repave - **$160,000**

Please note the above estimates reflect current pricing to perform the work and have not been adjusted for inflation for when the work may take place at the culmination of earth removal operations. It is the DPW's opinion that merely shimming and overlaying the road is not an ideal solution for mitigation given present and anticipated conditions of the road after numerous truck trips over the life of the project, however it is presented here only as a lower cost option that would improve upon current and anticipated roadway conditions. Full-depth pavement reclamation, regrading and repaving is the preferred and recommended alternative if the Board is to consider mitigation measures.

Should mitigation in the form of roadway paving at the culmination of earth removal be considered, the Board may wish to consider moving the paving limit away from Route 20 as this intersection will be reconstructed and realigned considerably during MassDOT's Route 20 corridor improvements project within the next few years. A reduced limit of work would reduce the paving costs presented above. However, it is not clear when the culmination of earth removal work will line up with DOT's construction schedule and the Board may want the entire limits repaired in advance.

Please note there are several means of analysis to attempt to evaluate the overall impact of heavy vehicles on existing local roadways. Analysis may include the following methods outlined in a 2014 report produced by the Minnesota Department of Transportation[1] in which the DPW has not had sufficient time to perform leading up to the hearing:

Incremental Design: "This method involves the design of two new pavements for future service – one without any of the heavy vehicles in question, and one with the additional heavy vehicle loads. The difference in the predicted construction cost of these two pavements is assumed to be the direct result of the additional loads. This additional cost must be considered over the entire life of the pavement, since it represents the additional pavement structure that must be built to accommodate the heavy vehicles over the life of the pavement."

Overlay Design: "This method uses the standard MnDOT overlay design method for bituminous pavements. After a period of time, defined by the user, the expected damage caused by additional heavy vehicles is computed, and an appropriate overlay thickness is determined to accommodate the additional loads. The cost of the overlay is assumed to be related directly to the additional damage caused by the heavy vehicles in question. Often, however, the computed overlay thickness needed is less than the minimum thickness that is appropriate for overlay construction. In this case, the owner has two options: consider the cost to be that of the minimum overlay thickness, or set aside the small cost and use it in a future overlay to be constructed at some later date."

Percent of Life Consumed: "Comparing the amount of additional "life" consumed by additional pavement loads each year with the annual or total loads for which the pavement was designed. This

1. Wilde, Dr. W. James. *Assessing the Effects of Heavy Vehicles on Local Roadways*. Minnesota Dept. of Transportation, Aug. 2014.

approach computes the proportion of the reconstruction cost based on the proportion of the original design life (in terms of ESALs) consumed by the additional loads."

Should the Board take affirmative action on the Earth Removal permit application they may wish to consider the following conditions in addition to those noted in my earlier memorandum dated April 20, 2021:

1. Require monitoring wells to evaluate groundwater levels throughout the duration of the project.
2. Require water quality testing on adjacent wells at minimum at the beginning, middle, and end of the project or at whatever interval the Board deems necessary.
3. Increase the bond amount to cover repairs to Oxbow Road.

Please do not hesitate to contact my office should you have any questions.

Town of Oxford
Department of Public Works
450 Main Street
Oxford, MA 01540
508-987-6006

TOWN OF OXFORD
DPW
DEPARTMENT OF PUBLIC WORKS

MEMORANDUM

DATE: September 7, 2021

TO: Jennifer Callahan, Town Manager

FROM: Jared Duval, P.E., DPW Director

CC: Jennifer Warren-Dyment, Assistant Town Manager

RE: 19 Oxbow Road Earth Removal Special Permit Application Review

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Following Board of Selectmen meetings on April 20th, June 1st, and June 15th the DPW was charged with cooperating with the applicant to address the following concerns with respect to the applicant's application:

1. The Board was concerned with sight distances for trucks exiting the site at the proposed point of egress opposite #12 Oxbow Road and was considering flaggers and additional signage.
2. Abutters' concern with regards to increased truck traffic on the narrow existing road and associated noise.
3. Abutters' concern with regards to further roadway degradation resulting from increased truck traffic.
4. The Board was considering requiring mitigation in the form of roadway reconstruction along the designated travel route to Route 20.

Please note other items, including potential impacts to abutting wells, zoning district, market rate for gravel, truck trips, and preliminary roadway repair estimates, were addressed in my memorandum dated June 15, 2021.

With respect to outstanding items noted above, the applicant's engineer submitted the following documents on August 16, 2021, for further review:

- "Supplemental Site Map of Land," prepared by S.J. Mullaney Engineering, Inc., originally dated June 16, 2021, with latest revision not indicated on plan.
- Letter to the Board of Selectmen from Mikael Lassila, P.E. of S.J. Mullaney Engineering, Inc. dated August 6, 2021.

Based on review of the above documents and my discussion with the applicants on August 5, 2021, I am pleased to offer the following comments:

1. The applicant proposes an alternative driveway location across the Town-owned property identified

on the Assessor's Map as 9-A21-01. In my opinion the alternative driveway location improves sight lines for trucks exiting the property and for traffic on Oxbow Road approaching the exit point. The alternative driveway should be designed to meet Oxbow Road at near perpendicular to maximize sight lines for exiting trucks. I concur with the applicant's engineer in that a temporary easement and/or right of entry would need to acquired with an agreement in place ensuring the Town is held harmless in the event of any injury or damage on the premises, and the Town's parcel is restored to equal or better condition. I suggest Town Counsel be engaged to determine the proper instrument for the agreement. Regardless of the location of the driveway, the applicant shall provide MUTCD compliant warning signage notifying roadway users of truck entries into the roadway, including but not limited to the following signage:

W8-6


W11-10

As for flaggers and/or police details, it is my opinion the applicant can not rely on MassDOT's project to provide adequate traffic control at the intersection of Route 20 and Oxbow Road. It is possible DOT's project schedule and/or work plan will not accommodate the applicant's need during their hours of operation. The applicant should be prepared to hire adequate details at the intersection to ensure safe truck entry onto Route 20.

2. Below is DPW's previous analysis that estimates the number of truck trips to and from the site. As noted previously the basis of the analysis is for 75,000 estimated cubic yards of earth removal. The analysis includes an estimated number of trips for either triaxle dump trucks or end dump trailers. Realistically there will be a mix truck types used so the DPW assumed a 50/50 distribution of truck types for further analysis:

Truck Type	Capacity (cubic yards)	Total Trips (to and from)	Avg. Per Year (5 Yr duration)	Avg. Per Day (252 business days)	Avg. Per Day (construction season – Apr. 15-Nov.15)
Tri-Axle Dump Truck	12	12,500	2,500	10	18
End Dump Trailer	26	5,769	1,154	5	8
50/50	12/26	9,135	1,827	8	13

Based on the above analysis, and in my opinion, the increase in truck traffic due to earth removal

operations will create an increase in noise over present conditions. The applicant shall provide adequate vegetation and fencing around the site in an effort to reduce noise.

3. Based on my discussion with the applicants on August 5, 2021, they informed me reconstructing the road at the culmination of earth removal operations is not economically viable if they were to bear the entire cost. DPW previously analyzed market rates for gravel material, which was presented in my June 15, 2021 memo and summarized here: current local rates for gravel borrow range from $14-$15 per cubic yard. The project proponents estimate the removal of approximately 75,000 cubic yards of material, although there is debate over how much saleable material their project will yield to estimate potential revenue.

   The DPW initially estimated the cost to reclaim and pave the road from the original access point to Route 20 to be $160,000. If the Board were to approve the alternate driveway location it would reduce the use of Oxbow Road by approximately 480 feet. The limits should also be reduced to reflect MassDOT's tie-in point on Oxbow Road following their project. Under this scenario the DPW estimates the roadway reconstruction to be approximately **$80,000**.

   I last reported to the Board that Oxbow Road was ranked with Pavement Condition Index (PCI) of 50 out of a 100 scale. Under normal traffic conditions DPW's Pavement Management System assumes a drop of 2 points on the PCI scale per year. With the increase in truck traffic, we can assume the roadway will degrade at a faster rate, at approximately 4 points per year. Therefore, under normal traffic conditions we would expect to see Oxbow Road fall to a PCI of 40 after 5 years, and with the added truck traffic the PCI may fall to 30.

   Based on the analysis above the added truck traffic associated with earth removal operations may consume an additional 10% of the pavement life over normal traffic conditions over the assumed life of the project (5 years). Please note this is a simplified analysis and the true extent of roadway degradation due to truck traffic depends on many factors including but not limited to the existing pavement type/depth, subbase material, and the frequency and weight of the truck loadings. The deterioration may occur more rapidly but unfortunately the true impact to the road will not be known until the project is underway.

   The applicants have stated they are willing to pitch in a portion of the cost to repair the segment of Oxbow Road they intend to use. Considering Oxbow Road has a current PCI of 50, essentially 50% of the pavement's life has already been consumed before the applicants start their project. Based on the analysis above the DPW estimates an additional 6% of life consumed attributed to the added truck traffic. In my opinion, requiring the applicant to bear the entire cost to bring the road back to 100% is not reasonable. During my conversation with the applicants, they entertained the idea of contributing up to 50% of the cost to reconstruct the road. In my opinion this is more than reasonable, however I will defer to the Town Manager and the Board to decide the appropriate contribution. I recommend the contribution should also reflect increased roadway maintenance costs on Oxbow Road during the life of the project. I suggest the sum of $3,500 be considered for increased roadway maintenance. Language pertaining to off-site mitigation in the form of roadway

reconstruction is included in Special Condition "SC-4" provided herein. I recommend consulting with Town Counsel to determine the legal mechanism to accept a contribution for future road repairs.

4. All comments from my original memo to the Town Manager dated April 20, 2021 still stand.

The DPW reserves the right on behalf of the Board of Selectmen to require certain Special Conditions that are customary for earth removal permits. Items such as dust control, sanitary facilities, impact monitoring, change of ownership requirements, etc. will be written into the Board's final Special Permit for earth removal. This should be made aware to the applicant. The DPW offers the following Special Conditions, revised from my previous memo dated April 20, 2021, consistent with previous earth removal permits, for consideration by the Board. If the Board finds the Special Conditions described below acceptable, the Board should include these Special Conditions and any other Special Conditions deemed necessary, in the Board's vote of approval:

SPECIAL CONDITIONS

SC-1. **SCOPE OF WORK** – The scope of work for this earth removal permit involves the removal of approximately 75,000 cubic yards of primarily sand and gravel. The area is identified on the plan as approximately 3.7 acres.

SC-2. **LIMITS OF EXCAVATION TO THE WEST & SOUTH** - Based on the evidence submitted the Board has determined that earth fill will occur within 50-feet of the west and south property line. The Applicant shall provide adequate down slope protection in this area and provide documentation proving an acknowledgement of understanding from the Town for the parcel at 0 Oxbow Road. Adequate slope protection shall be provided to the DPW for review.

SC-3. **FINISHED GRADES** – Based on the evidence submitted the Board has determined the cut and fill slopes will not exceed 2 horizontal to 1 vertical. The Applicant shall provide adequate slope protection. Adequate slope protection shall be provided to the DPW for review.

SC-4. **SITE RECLAMATION** – The Applicant is responsible for the reclamation of the site and any off-site impacts resulting from the permitted earth removal operation. Where "earth" removal has taken place, the Applicant shall revegetate all unstable areas where revegetation can reasonably occur and grow as required in the GENERAL CONDITIONS. The Applicant shall provide a contribution to the Town to be used to cover anticipated increased roadway maintenance costs during the life of the project and to subsidize future roadway repairs due to anticipated roadway degradation attributed to increased truck traffic during earth removal operations. The amount of said contribution shall be mutually agreed upon between the Town Manager and Applicant.

SC-5. **PROJECT SECURITY** – The Special Permit shall not be granted and no operations shall be conducted until the Applicant furnishes to the Board, to be posted with the Town Treasurer, a security in the penal amount of $3,500 per acre of disturbance per acre of land affected by the proposed operation in such form as is approved by the Board. The preferred form of security is a deposit of money in a passbook payable to the Town of Oxford or a cashier's or certified check made payable to the Town of Oxford. If the Board accepts a bond, the bond shall be executed as surety by an insurance or bonding company approved by the Board and qualified to do business in the Commonwealth of Massachusetts. The bond shall have the Town of Oxford named as the insured and shall be non-cancellable without the permission of the Board; the cost of the bond shall be prepaid by the Applicant prior to the issuance of the permit; and the term of the bond shall conform to the terms of the Special Permit. The amount of the proposed security shall be initially based on an area of maximum disturbance at any one time. The Board reserves the right to periodically adjust the mitigation amount to reflect inflation or other appropriate material costs, with the period of adjustment not to exceed once a year.

SC-6. **HOURS OF OPERATION** – Hours of operation vary depending on the work activity. Excavation operations will be allowed between 9:00 A.M. and 5:00 P.M prevailing time, Monday through Friday. Trucks may enter and leave the site of the operation between 8:30 AM and 4:30 PM prevailing time, Monday through Friday. Loaded vehicles shall be suitably covered to prevent dust and contents from spilling and/or blowing from the load.

SC-7. **TRANSPORTATION ROUTES** – To protect residents along local routes from excessive noise and vibration, no earth removal shall be allowed until the routes are established on an accompanying map or plan and verified to the satisfaction of the DPW. The preferred travel route is easterly on Oxbow Road to Southbridge Road (Route 20).

SC-8. **PROJECT SUPERVISION** - The responsibility for the accuracy, neatness, and integrity of all work involved in connection with the approved Special Permit for earth removal lies entirely with the Applicant; inspections performed by the Board, Town employees, or a third party inspector are only to verify that the work is in progress in accordance with the conditions of this Special Permit. The Applicant is required to hire responsible competent professionals to layout the work in accordance with the plan and supervise the earth removal and site reclamation work. The Applicant shall furnish to the Board or the appointed agent(s) four copies of written calendar quarterly reports prepared by a registered engineer describing the Applicant's performance, specifically detailing the Applicant's adherence to each condition of approval. The reports shall be due on July 15, October 15, January 15, and April 15 of each year, beginning with the above date that coincides with the end of the first quarter of operation and continuing until completion of the allowed earth removal operation. The Applicant's engineer shall certify that the work completed to date is in conformance with the plan and, where applicable, shall submit partial as-built

plans for the completed work. Failure to submit all reports within one week of the dates above will be sufficient cause for Board agents to issue a notice to cure. Failure to submit all reports within two weeks of the dates above will be sufficient cause for Board agents to issue a CEASE AND DESIST unless otherwise arranged.

SC-9. **ONSITE INSPECTIONS** - The Board and/or agent(s) designated by the Board shall have the right to enter upon the site at all reasonable times for the purpose of conducting onsite inspections when accompanied by an agent of the Applicant. If requested in writing by the Board or agent(s) designated by the Board, the Applicant must install property line markers at appropriate intervals to allow verification of conformance with setback requirements. Agents for the Board include but are not limited to the Land Management Office or DPW. These agents shall have the authority to halt operations if it is deemed in their opinion that the conditions of the Special Permit are not being met. The Applicant can appeal the decision to the Board. In addition, if Town officials are unable to provide inspection, inspections by a third party on behalf of the Town at the expense of the Applicant. Third party inspectors shall give the owner 24 hours notice to ensure safe access to the property.

SC-10. **EROSION AND SEDIMENTATION CONTROL** – Prior to any earth removal, the Applicant shall install erosion and sedimentation controls in accordance with the approved plans, their stormwater management and land disturbance permit, and applicable EPA NPDES requirements. The Applicant is responsible for the maintenance and monitoring of appropriate erosion and sedimentation control within the site to protect workers on the site from danger, abutters from undermining of their land, and downstream land from siltation. The controls shall be installed in accordance with the requirements of the Applicant's stormwater management and land disturbance permit and EPA NPDES permit. Prior to the removal of any vegetation and stripping of any loam the erosion control measures should be inspected by the assigned NPDES SWPPP inspector and a representative from the Town during every phase. The Applicant shall provide a rip-rap tracking pad sufficient for one revolution of all truck tires for the purposes of controlling sedimentation entering roadways. Sweeping of the entrance(s)/exit(s) shall be swept twice per day and monitored throughout the day.

SC-11. **DUST CONTROL** - It shall be the responsibility of the Applicant to provide adequate means of dust control. There shall be a water wagon, well(s) with pumps and hoses, and/or a suitable supply of calcium chloride stored on site and either or both shall be used as required to control dust. The control of dust shall comply with all regulations with the Town of Oxford Board of Health, Massachusetts DEP, and the Federal OSHA requirements.

SC-12. **SANITARY FACILITIES** - The Applicant is responsible to provide adequate sanitary facilities for the use of all persons employed on the site. Said facilities shall be properly

screened from public view, shall be provided in sufficient number, in such manner, and at such locations as are appropriate to serve the needs of the employees. These facilities shall include a dumpster for proper storage of debris on the site. The facilities shall be maintained in a neat and sanitary condition and in compliance with the requirements of local and state health officials. The Applicant shall rigorously prohibit the committing of nuisances within, on, or about the site.

SC-13. **PUBLIC SAFETY** - The Applicant is responsible for the protection of the public safety and the integrity of the public ways used to access the site. Accordingly, the Applicant shall be required to maintain a gate at each vehicle entry and exit point. Such gates shall be locked when the project is not in operation to prohibit entry. A copy of the key for each gate shall be entrusted to the Board and/or its agent to allow free access for inspections. The Applicant shall post and maintain NO TRESPASSING signs along the perimeter of the site. The Applicant shall secure detention ponds from unauthorized access. The Applicant shall provide adequate warning signage in advance of points of egress, subject to DPW approval. The Applicant shall provide adequate traffic control at points of egress and at the intersection of Route 20 and Oxbow Road, including but not limited to roadway flaggers or police detail officers.

SC-14. **INSURANCE REQUIREMENTS** - The entity responsible for earth removal operations shall maintain insurance on all vehicles and equipment used on the site in amounts satisfactory to the Board. The Applicant's insurance company shall send the Board a certificate of insurance indicating that the insurance is in force, naming the Town of Oxford as additional insured, and stating that the policies will not be materially changed or cancelled without thirty (30) days advance notice by certified mail.

SC-15. **TOWN INDEMNIFIED** – The Applicant agrees to defend, indemnify and hold harmless the Town from and against any and all claims, demands, suits, actions, costs and judgment, whatsoever, including reasonable attorney's fees, which may be imposed upon, incurred by, or asserted against the Town by reason of (a) any failure on the part of the Applicant to comply with any provision or term required to be performed or complied with by the Applicant Licensee under the terms of the Special Permit, or (b) for the death, injury or property damage suffered by any person on account of or based upon the act, omission, fault, negligence or misconduct of the Applicant, its employers, agents, assigns or invitees.

SC-16. **FAILURE TO PERFORM** – In the event that the Applicant is unable to conform to the monitoring and reporting or regrading and revegetating conditions of this Special Permit, the Board may decide, by majority vote, to declare the Applicant in default and demand payment from the project security to complete the necessary work. Upon such finding of default the Board shall notify the Applicant in writing by certified mail of its decision and allow fifteen (15) days from receipt by the Applicant to start correction of the violation. If

the violation is not addressed within the allowed fifteen days and thereafter is not diligently pursued to satisfactory resolution, the Board shall take the security and cause the remedial work to be performed either by Town forces or a private contractor hired through appropriate procedures. By acceptance of the conditions of this Special Permit the Applicant also grants permission for such Town forces or contractors to enter the site and complete the necessary work.

SC-17. **RELEASE OF SECURITY**- The penal amount of the security posted as a condition of this Special Permit (see Special Condition entitled **PROJECT SECURITY**) may, from time to time, be reduced by the Board provided that the amount remaining is, in the opinion of the Board, sufficient to complete the outstanding stabilizing, regarding, and revegetating, and provide a guarantee of $1,000 per acre stabilized within the last two (2) years of the request for partial release of security. The request for any release of security shall not be valid unless accompanied by an as-built plan prepared and stamped by the project engineer or surveyor showing the finished grades and condition of the site and certifying compliance with the conditions of this Special Permit.

SC-18. **COMPLETION OF WORK**- All permitted excavation work shall be completed, and all areas shall be reclaimed prior to the expiration date of this permit unless the Applicant applies for renewal of this Special Permit. If the renewal is to be sought, the completed application shall be submitted at least four (4) months before the expiration date of this Special Permit.

SC-19. **CHANGE OF OWNERSHIP** - All conditions herein contained shall run with the land and any new owner shall be bound by the conditions of this Special Permit. Prior to a change of ownership, the new owner shall provide the Board with credentials and new insurance certificates.

SC-20. **VIOLATIONS OF CONDITIONS** - In addition to the enforcement provisions of the Oxford Zoning By-Law, the Board, upon recommendation of its agent(s), may, by majority vote, issue a cease and desist order if it is found that the requirements of any of these conditions have been violated. In the event that the Board issues a cease and desist order, and the Applicant unsuccessfully challenges that order in court, the town shall be reimbursed by the Applicant for all legal costs and expenses including attorney's fees incurred in defense of the cease and desist order and shall receive such reimbursement before any work may continue under this Special Permit.

SC-21. **LAPSE OF RIGHTS** – In accordance with the requirements of Chapter XIV, Section 6 of the Oxford Zoning Bylaw (Applicability), the right to remove earth granted by this Special Permit shall not take effect until a copy of the decision, bearing the certification of the Town Clerk that twenty (20) days have elapsed after the decision has been filed in the

office of the Town Clerk and that no appeal has been filed or if an appeal has been filed that it has been dismissed or denied, is recorded in the Worcester District Registry of Deeds and indexed in the grantor index under the name of the owner of record or is recorded and noted on the owner's certificate of title. If, except for good cause, a substantial use of a Special Permit has not been made, or in the case of a Special Permit for construction, construction has not begun within one year of the date that the Town Clerk certifies that no appeal has been filed or, if an appeal has been filed, that it has been dismissed or denied, the rights granted by the Special Permit shall lapse.

SC-22. **PAYMENT OF REAL ESTATE AND PERSONAL PROPERTY TAXES** – Should the owner become 30 days in arrears in paying either his real estate taxes or personal property taxes all earth removal operations taking place under this Special Permit shall CEASE AND DESIST, until such a time as all funds due the Town of Oxford along with all penalties and interest have been received and a letter has been sent to the Board by the Treasurer/Collector verifying receipt. Upon receipt of said letter activities will be allowed to commence.

SC-23. **GROUNDWATER MONITORING & TESTING –** The Applicant shall provide monitoring wells to evaluate static water levels at the onset and throughout the project. The Applicant shall also perform water quality testing on adjacent wells at minimum at the beginning, middle, and end of the project or whenever the Board and/or DPW deems necessary. The Applicant shall provide monthly reports on static water levels to the DPW for review. Water quality reports shall be provided to the DPW after each round of testing. Should any issues arise with respect to static groundwater levels and/or water quality during the project the Applicant shall immediately investigate the issues to determine if earth removal operations are accountable. In the event it is determined the earth removal operations negatively impacted static water levels and/or water quality the work shall cease until the issues are rectified.