Raptor Lane Housing Project
Feasibility Report

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TABLE OF CONTENTS

Exhibits

Executive Summary

The need for workforce and affordable housing in the Dorset area has become an increasing challenge for people looking to move to the area and for employers who need their staff to be able find housing opportunities in close proximity to their work.

This feasibility study focuses on the development potential of the Town-owned Raptor Lane property by assessing the suitability of the land area and the number of housing units that might be possible based on the suitability of the land and the type of housing desired by a Town-appointed committee.

Due to landform and natural resource constraints, the conceptual planning has focused on the western and lower half of the property where the study identified 100+/- homes could reasonably be developed. The housing is proposed as a mix of single family homes, duplexes, and multi-family buildings as requested by the Town. The homes are spread out across the site into 8 pods, maintaining a natural buffer for screening between pods to soften the scale of the development.

Approximately 1 mile of roadway has previously been constructed, and the development utilizes these roads to help decrease construction costs and impacts.

The property contains a number of high value natural resources that need to avoided or, if avoidance is not possible, impacts are to be minimized or mitigated. The property also contains a new Town Office and an extensive recreational trail network. The housing development has been laid out so as to avoid natural resources as much as possible and to integrate into the site without detracting from these other features.

Municipal water and wastewater services do not extend to the subject property therefore the development will need to be served by onsite potable water and wastewater systems. A single Public Community Water System is proposed to serve all of the homes through one shared system. Wastwater disposal is to be provided by multiple onsite wastewater systems serving the pods.

The study has reviewed the zoning bylaws and found that a Planned Unit Development approval is necessary. The project can satisfy maximum density requirements due to the large parcel size. Some zoning bylaws will need to revised in order to accommodate the project's large pod clusters and multi-family housing.

This development is located in an area where outdoor recreation and enjoyment of the natural environment is a core value. The development has the opportunity to incorporate amenities to enhance the experience for the homeowners and the community.

Introduction and Background

This report presents the findings of the Feasibility Study on the potential for a large housing development of the Raptor Lane property owned by the Town of Dorset.

The Town owns a number of contiguous parcels that comprise approximately 555 acres between Vermont Route 30 to the southwest and a ridgeline to the east near to Owl's Head summit. A gravel road, Raptor Lane, provides access from Route 30 and winds up the hill past the location of the new town office, and provides access to a number of trailheads. The eastern and upper portion of the property contain hiking and mountain biking trails. The Town began construction of a new town office on the southwestern and lower portion of the property in 2024.

A Raptor Lane committee was formed by the Town to study uses for the municipally owned parcels and housing was identified as a high priority. The Town contracted Enman Kesselring Engineers to study the potential for housing on the property's southwestern and lower portions that was part of an earlier subdivision. Our team includes two other consultants, Waite Heindel Environmental Management for hydrogeology related to water supply and wastewater disposal, and VHB for natural resources and habitat evaluation.

Prior to the Town's ownership, the western (lower) parcel of 307 Acres, was subdivided into 8 lots. The lots were permitted for single family homes, but the only development that occurred was the construction of the gravel roads, installation of drainage, and buried electrical conduits. Approximately 230+/- acres of this land, primarily below elevation 1,300 ft., were selected as the study area for this feasibility study.

The purpose of this report is to assess the usable land area within the 230+/- acre study area for housing units that balance providing a need for more housing with the Raptor Lane committee's vision for the mix of housing types that are appropriate. The study takes into account physical land form limitations, natural resource protections, and wastewater capacity. A conceptual development layout is presented in the exhibits.

This is not a market study to assess the need for housing or the type of housing (apartments, single family homes, etc.), but an assessment of how much housing the subject properties can reasonably support and in a manner that is appropriate for the Dorset community based on input from the committee. Assumptions have been made related to building size and number of units, and we expect that further progress on this project in the future will explore variations on the building type and style.

Property Description and Discussion

The 230+/- acre study area has two distinct landforms. The western half of the land has low to moderate slopes, generally below 15%, that are well suited for development. The natural resources (wetlands, streams, necessary wildlife habitat) discussed elsewhere in this report, are the primary physical barrier to development in this area.

Starting near elevations 1,050/1,110 ft. the land begins to climb steeply towards the east and contain slopes in excess of 15% and often much steeper. The slopes and necessary wildlife habitat generally render the eastern half of the study area not suitable for development. There may be some elements of the housing project, in particular the potable water system, that are considered for this area.

Hiking and mountain biking trails are present within the western portion of the study area, but generally the trail network exists at higher elevations to the east. There are a number of small streams (frequently dry), wetlands, and springs populating the study area.

The Raptor Lane gravel road network installed as part of the original subdivision connects Route 30 to the development areas. The property boundary has a narrow width (300+/- ft.) near Route 30 and then widens as the road approaches the new Town Office. Beyond the Town Office, the road splits north and south. The northern road spur terminates at a lower trailhead parking lot. The southern road spur travels south and then north to the upper elevations of the study area before ending at a trailhead parking lot. A maintenance road spurs off Raptor Lane directly west of the town office and terminates at a trailhead where some organic waste has been stored.

Natural Resources Assessment

Understanding where natural resources restrict development potential is important in defining the developable areas. Carla Fenner of VHB is leading the environmental and natural resources investigations for the project and a summary memorandum of findings is attached.

In 2019 VHB conducted field assessment of wetlands and Rare Threatened & Endangered (RT&E) species for the Town as part of a prior study. This work has beenrelied upon for this report with the expectation that updated fieldwork will be necessary prior to final design and permitting of the project.

Site investigations delineated Class 2 wetlands, RT&E plant species, streams, and protective buffers if known. The project area contains a number of protected natural resources including flora and fauna species.

The design team has sought to balance protecting the natural resources with accomplishing the Town's goals for creating housing. In some cases this means avoidance of the resources and in others we recommend pursuit of approval for impacts to a resource because it is unavoidable. Below is a list of identified resources and the approach taken with each in the conceptual plan:

Wetlands – Intent is to avoid Class 2 wetlands and their 50 ft. buffer.

Streams – Intent is to avoid streams and their 50 ft. buffer.

Threatened/Endangered Plants

- <u>Hairy Wood Mint</u> – Located along the existing Raptor Lane roads, impact to this species is unavoidable. Impact must be minimized and mitigation measures (such as replanting elsewhere) may be necessary. A Vermont Threatened and Endangered Species Takings Permit may be required.

- Putty Root – Located east of Raptor Lane and south of housing Pod 2, the goal is to avoid impacts to this plant. If impact becomes unavoidable, or if it is found in other locations not currently known, minimization and mitigation measures would be needed.

Threatened/Endangered Animals
3 Bat species habitat – the site may provide habitat for the Indiana Bat, Northern Long-eared Bat, and Eastern Tri-colored Bat. Generally, tree cutting would be prohibited between April 1 and November 1 each year when the bats may be in the trees. The State would seek restriction on tree clearing to outside of that time period. If tree clearing over a certain acreage is sought, there may be further restrictions to spread out tree cutting over several years.

Rare and Irreplaceable Natural Areas
Rich Fen – this plant is located within three Class 2 wetlands uphill of the homes. As the intent is to create no impacts to the wetlands, this plant should not be impacted.
Transition Hardwood Limestone Forest – cutting of trees in transitional forest is unavoidable for the project and mitigation measures are likely to be imposed on the project to offset the tree clearing.

Necessary Wildlife Habitat
Black Bear – the forested area uphill of the lower roadways has been previously determined by Vermont Fish & Wildlife Department (VFWD) to be necessary bear habitat. This area has been primarily avoided by the development, however VFWD may impose a buffer of 0.25 to 0.5 miles around this habitat. A buffer area of this size is unavoidable for the project as it would consume the entire project area. Even with agreement on the smaller buffer of ¼ mile, the project cannot avoid impacts and may have significant requirements for minimization and mitigation imposed through the Act 250 permit. The following are speculative thoughts from VHB on possible requirements:

1. Prohibit construction during a portion of the fall season to not disturb bears during beech nut feeding.
2. Annual/semi-annual survey monitoring of the habitat for 10-15 years after construction
3. Establish a permanent conservation easement on the habitat or make an agreement with a neighbor that also contains a portion of the habitat to conserve their land.

Deer Wintering – VFWD has confirmed that the area does not provide functioning winter habitat for deer and there would be no restrictions.
Vernal Pools – Prior fieldwork confirmed the wetlands onsite do not function as vernal pools. The updated fieldwork will verify if this remains accurate.

The fieldwork completed 5 years ago focused on certain areas and species, but was not a comprehensive survey of all rare, threatened, and endangered species. Impacts need to be avoided where possible to these species and extensive discussion with VFWD when avoidance is not feasible. Delineations of natural resources such as wetlands are only valid for 5 years and re-delineation is necessary. We recommend the next design phases wait until VHB can complete the resource surveys in the winter (black bear) and summertime (plants species, wetlands, etc.) that were not extensive enough in 2019 and to re-validate the work that has expired after 5 years.

The natural resources that do not appear completely avoidable by the project, which allows VFWD to impose significant permit conditions through the Act 250 process. The black bear habitat buffer, hairy wood mint plant along the roadways, and tree clearing (3 bat species, rare limestone forest) appear most impactful on the project.

Once the extent of the natural resources are delineated by VHB and confirmed by VFWD, the design team can then proceed with updating the conceptual design as necessary and proceeding into a preliminary design phase.

Discussion of Site Layout

The natural resource delineations discussed above are incorporated into a conceptual site plan depicting a total of 100 housing units. The mix of housing units is based on guidance from the town committee:

Home Types	Building Sizes
1 bedroom apartments home units = 22	100’ x 50’ multi-unit building for 1- and 2-bedroom apartments
2 bedroom apartments home units = 13	
2 bedroom duplex home units = 44	65’ x 45’ building, each unit 32.5’ x 45’ for 2 bedroom duplex homes
3 bedroom single family homes = 21	40’ x 40’ building for 3 bedroom single family homes
Total homes = 100	

For purposes of the wastewater design, the homes have been separated into 8 “pods.” Some pods have a mix of housing types while others are only one type of home. The bedrooms are specified because of their importance in the design of wastewater disposal and potable water systems.

The Town Office will serve as a natural center and landmark within the housing development. Half of the pods are on the western (lower) road across Raptor Lane from the Town Office and the remaining home pods are uphill and will pass by the Town Office to arrive at or leave the homes.

The layout generally avoids impacts to recreational trails by being on the lower portion of the property. Pods 7 & 8 do impact a flat section of trail that begins at the end of the maintenance road. The homesites would remove about 1,200 ft. of that trail, but the new road could allow for continued access to the vast majority of the trail that would remain and which connect to the upper trail network. The impacted trail(s) could be relocated as part of the project or new trails installed to the link the development to the trail network.

All access roads are depicted as 20’ wide (NFPA Standard). The design seeks to utilize the existing roads, but they would require widening to be 20 ft. as they vary between 14-16 ft. New roads are depicted to spur off from the main roads to reach most of the housing. The natural resource and slope constraints make looped roads challenging, so turnaround cul de sacs are provided on dead end roads.

The Zoning Bylaws require one off-street parking space for every dwelling unit. Each single family home and duplex has a short driveway off the road for that specific unit. The single family homes are depicted with a driveway able to fit one vehicle and aligned with the home to allow for a garage for an additional vehicle. The duplex homes each have a driveway long enough to stack two vehicles. The multi-unit buildings have a shared parking lot adjacent to the building with a parking space for each home and a few additional spaces for guests.

A number of areas on the plan are labeled "Community Space" to serve as a placeholder for potential shared amenities. The development is located in an area where outdoor recreation and enjoyment of the natural environment is a core value. Project planning has the opportunity to incorporate additional features to enhance the experience for the homeowner and the community such as the following:

- Multiuse trails – the property contains a network of multiuse trails. Adding trails through the housing as an alternative to the roadways and connection with the existing trail network would provide the residents with opportunity for recreation right out their door.
- Community Garden – Areas could be designated where residents could enjoy gardening.
- Community Building – Separate structure to provide amenities to residents.
- Electric car charging – multi-family buildings should incorporate electric charging so residents have a reliable and convenient location to charge vehicles.
- Amenities for residents – Many residents are likely to have outdoor equipment like kayaks, bikes, and skis. Multi-family buildings should consider the inclusion of lockable storage areas for the residents to enable them to safely this equipment.
- Conservation of land – Many areas of the property are not developable, but provide opportunity for conservation to protect them.
- Playgrounds – A housing project of this scale would be expected to have families that would appreciate playground(s). Other Town residents may also value additional playground space in close proximity to the Town Office and outdoor trail network.

The homesites have generally low slopes, in particularly the western Pods 5, 6, 7 & 8 which allow for easier development. Pod 3 has a long, low slope section between two streams that is well suited to homesites. Pods 2 & 4 may require more re-grading because of steeper slopes in that area. Pod 1 homes drop off from the existing roadway and may be well suited to walkout basements to accommodate the elevation change.

The various pods may be naturally buffered from each other by the streams, wetlands, or other undeveloped areas which will effectively make the development feel smaller to residents.

Wastewater leachfields are located where suitable soils were identified and setbacks were met to various site features such as steep slopes. The wastewater has been an important factor to layout of the site and leachfields often consume flatter areas that would also work well for homesites. Septic tanks, pump tanks, and piping are not depicted because of the conceptual level of the plan.

Culverts for stream crossings exist underneath the road at two locations. No assessment of the adequacy of the culvert structures is included in this report and Vermont stream regulations have changed dramatically since Tropical Storm Irene to require larger culverts than in the past and natural bottoms through the pipes. With the widening of the roads being necessary, replacement of these culverts should be assumed.

Stormwater Treatment and Detention Systems

Stormwater treatment and detention systems will be required for the new impervious surfaces (roads, roofs, driveways) that are created by the project. The stormwater systems will consume a large amount of area and must be located at a downhill location from the development.

Catchbasins, stormwater piping, and swales (not depicted) will convey stormwater runoff to the stormwater systems. Sizing of the stormwater systems is not feasible at this conceptual stage, so a large area has been reserved on the plan for systems to treat the various pods and roads.

The stormwater permit issued in 2004 for the original subdivision included a “credit” for conserving 84 acres of the property instead of providing stormwater treatment and detention for the roads and homesites. Unfortunately, there was no plan/map included as part of that original permit to clearly define where the conserved area was to be and we have communicated with the Stormwater Program who also do not definitively know.

The Stormwater Permit issued in 2024 for the Town Office includes use of this “credit” but also does not define where the conserved areas are. The housing project will require re-assessment of all the prior stormwater approvals in order to comply with the current regulations for the expanded impervious surfaces for the homes, but it is unclear if there may be changes needed to stormwater systems serving the already existing impervious. For example, do the existing gravel roads throughout the property need to be retrofitted to collect, convey, treat, and detain stormwater runoff from their impervious surfaces? These are issues that require attention in later design phases.

Wastewater Disposal Systems and Water Supply Systems

We have collaborated with subconsultant, Craig Heindel, hydrogeologist, Waite Heindel Environmental Management, on assessing both the potable water and wastewater systems. A summary memorandum is attached discussing both systems in detail.

Wastewater Disposal

A municipal sewer system does not exist, so onsite wastewater systems are necessary for the homes. The original 2004 subdivision had permitted a wastewater system for each of the 8 individual houses, typically a mound-style leachfield with septic tank and pump tank. Given the number of homes proposed by the Town (100+/- homes), shared wastewater systems are necessary for improved efficiency of land area, design, construction, and cost.

Each housing pod would have a wastewater system to serve its homes. Approximate sizes and locations for each system are depicted on the Conceptual Plan, however these are very preliminary in nature and would be revised during later design phases. The systems would each consist of gravity sewer pipes from the homes, multiple septic tanks, a pump station, a pressurized force main, and mound leachfield for final disposal/infiltration of wastewater.

The systems are limited in size so as to not exceed 6,500 gpd and require IDR compliance (discussed below). Some system locations, such as system A serving Pods 1 and 2 and system E serving Pod 8, have additional hydrogeological capacity above 6,500 gpd if compliance with the IDR were possible. The other locations are maximized in terms of the hydraulic capacity they can manage which is often well below 6,500 gpd.

Two sets of regulations apply to onsite wastewater systems depending on the flow a system is sized for. If a wastewater system is smaller than 6,500 gpd (approximately 46 bedrooms), the (small scale) Wastewater System and Potable Water Supply Rules apply. If a wastewater system is larger than 6,500 gallons per day (gpd), it would need to conform to the Indirect Discharge Rules (IDR). Because of the larger amount of wastewater involved when discharging more than 6,500 gpd, the IDR have strict restrictions to prevent pollution of nearby surface waters. Large systems must prove that the wastewater is diluted sufficiently to not adversely impact a stream, lake, or wetland. Unfortunately, the size of the streams around the property that the wastewater leachfields would drain towards are too small to prove sufficient dilution and it is highly unlikely that large systems (over 6,500 gpd) would comply with the IDR without including a significant amount of costly pre-treatment.

The homes as proposed in the conceptual design would total approximately 27,860 gallons per day (gpd). Due to the landform, poorly draining soils, and IDR restrictions, the design intent is serve the homes with numerous smaller wastewater systems (less than 6,500 gpd) instead of one or two large shared systems. The IDR regulators have an interest in preventing circumvention of their rules by having two systems smaller than 6,500 gpd adjacent to each other that together would be greater than 6,500 gpd and pose the same threat to a waterway. Our office has had conversations with Nathan Kie, Vermont Indirect Discharge Program, to understand what is allowed onsite without requiring compliance with the IDR because compliance with its higher standards are not feasible. The IDRs are currently being revised and Nathan shared with us draft regulations so that we have direction on the future requirements. We have learned a number of considerations that the development must be designed to, with the most important being that the systems must not be hydraulically connected to another leachfield for the first 200 ft. downgradient. The effect of the IDR restrictions is that to develop the number of homes envisioned, the site will contain many smaller, separate wastewater systems spread across the development that may allow connection of 6 to 20 homes depending on the housing mix.

To confirm an area is suitable for an onsite wastewater system, soil classification is necessary to identify texture, seasonal high water table, and bedrock. For this feasibility study we used data from 2004 and conducted limited additional test pits to classify soils. The locations identified for wastewater disposal appear to have suitable soil conditions for a mound style system due to shall bedrock and/or groundwater conditions. Additional test pits are required for design purposes.

For any mound system over 1,000 gpd evaluation by a hydrogeologist is required. Waite Heindel Environmental has performed initial site specific hydrogeologic evaluation and assessed system sizes to confirm they meet requirements of the regulations. Their report is included as an exhibit.

Wastewater capacity for this project is a limitation on the creation of significantly more homes while also appearing feasible for the 100+/- homes proposed. The lack of municipal sewer and the IDR restrictions limit more intensive developments from occurring. Compact developments, such as clustered homes or apartment buildings, concentrate homes in a smaller area and more intensive development than depicted will have limits because of wastewater capacity.

Potable Water

The site lacks the availability of a public water system. The closest part of the Dorset municipal water system is on Route 30 approximately 1 mile north of Raptor Lane. Connection to the municipal water system is not feasible at this time. Without a municipal system nearby, an onsite potable water system must be created with either bedrock wells or springs.

The property is well known for onsite springs, including the Owl's Foot Spring which, per Kepler's report, has a possible yield of 10-100 gallons per minute (gpm). Our recommendation is not to pursue a spring water source (shallow source) for reasons of water quality, water quantity, and permitting. Permitting a spring source has additional scrutiny and requires larger protective zones around a spring than a bedrock well. Excerpts below from Heindel's memo discussing the challenges and risks of a spring source:

> *Water quality:* "Springs are generally more vulnerable to impacts from shallow-based contamination sources than drilled wells that tap deeper aquifers, so they generally are considered similar to surface water sources in their public health risk. That higher public health risk generally necessitates additional evaluations before a permit can be issued, including specialized sampling and treatment design."
>
> *Water quantity:* "Concern about springs regarding our ability to reliably predict the long-term capacity of a spring to meet the project demand, including during drought conditions."

Pursuit of a bedrock well water source is recommended and is the more standard approach. A project of this size must decide whether to design around a single, centralized public water system to serve the entire project or to have a decentralized approach where a non-public bedrock well is shared amongst 5-10 homes and there are many water systems spread across the property. Public water systems serving many homes have more regulatory oversight and regular (often daily) monitoring requirements for operation of the system by a licensed water operator. Non-public systems may have the same types of infrastructure as a public water system, but at a smaller scale and without the requirements for regular monitoring.

Our recommendation is for a single centralized, public water system to serve the project. The necessity of having many onsite wastewater systems as discussed above and spread throughout the site poses separation challenges for having numerous wells spread across the property to such elements as the septic leachfields. Additionally, each small-scale water system would need to consist of a drilled well, buried reservoir tank, a heated water system building with booster pumps and treatment if necessary, and piping to all of the homes. All of these water systems will consume a significant land area and be cost inefficient compared with a single shared water system. Both large or small water systems have ongoing maintenance costs, however we find that if the large system is professionally managed the system receives regular maintenance, there is less potential for emergency situations. Small scale systems are, more often than not, poorly maintained as it is on the homeowners alone to manage. In our opinion, a single Public Community Water System (PCWS) is the preferred solution.

Wells serving a PCWS have setback requirements from a number of potential contamination sources such as wastewater leachfields (200 ft. minimum), property lines (200 ft.), roads (200 ft.), and streams/wetlands (150 ft.). The conceptual design plan provides for a water system location uphill and east of the homes, along the upper trailhead access road. Two potential well locations are depicted due to the potential for needing multiple wells for sufficient yield. We recommend as part of a preliminary design phase that the hydrogeologist perform a "fracture-trace analysis" to see if there are potential water bearing fractures in the vicinity which have an increased potential for high yields.

The Town has existing vehicle access near to the well sites through the Raptor Lane road and through the roadway to the north known as Ken's CP Road providing access for both construction and maintenance. Short access paths would need to built to the well locations as spurs off the main road. The plan depicts three placeholders for "water system infrastructure" meant to represent two buried reservoir tanks and a heated water system building to house booster pumps, pressure tanks, and treatment equipment. Electrical power would need to installed up the Raptor Lane road to the water system site.

The uphill water system has several benefits. The undeveloped forest surrounding the wells provide protection from contamination as they are uphill and remote from onsite uses and neighboring lands uses. The location is far from most other wells, which will reduce testing costs typically required when wells are within the "interference zone" of 2,000 ft. The new wastewater systems are unlikely to contaminate the wells because they are downhill by 1,000+/- ft.

There is potential with the elevation difference that the water system could deliver adequate water pressure to the homes without the need for booster pumps and only using gravity; this would be determined during final design. Two options are depicted on the plan to deliver water downhill to the homes and are labeled Option 1 and 2. Option 1 is shorter if the well sites were to remain in the location identified. If the wells shift north during subsequent design phases, then Option 2 may be preferred.

Permitting of a PCWS involves multiple steps, significant time, and expense. First, there is a 3-step process known as Source Approval that is primarily handled by the hydrogeologist with assistance from the engineer and then Construction Permitting in which the engineering designs the pumps, piping, treatment, reservoir storage, etc. The steps are sequential and cannot run concurrently. The broad steps are as outlined here:

1. Source Permit Application (often referred to as Drill Approval) – This is the initial step to assess the location of the well to confirm it meets minimum regulatory requirements including setbacks to roads, wastewater systems, and other sources of contamination.

2. Source Testing Review (Test Approval) – The well is then drilled and a written plan is submitted to the State for review outlining how the well is to be tested for (A) quantity (installing a temporary pump to test yield, monitoring water levels within the well, and interference monitoring of neighbors' wells) and (B) water quality (testing the quality of the water for an extensive number of potential contaminants). Major costs associated with this step are building access roads to the well sites and drilling the wells.

3. Source Evaluation Report (Source Approval) – Once the intended testing protocol is approved by the State, the well is tested and those results are analyzed by the consultants. If the testing proves successful (there is sufficient water for all of the proposed homes and water quality is either clean or treatable), then an extensive report is submitted to the State in Step 3 summarizing the findings. Once State agrees, the well has been deemed an Approved Water Source. The testing can involve significant expense and time.

4. Construction Permit (Engineering Design) – With an approved well, the engineer can then design a water system to deliver potable water to the homes. If the well has poor water quality, then a treatment system needs to be designed inside a water system building and this can take various forms, expense, and square footage depending on the contaminants that require treatment. Large, buried storage reservoirs would be necessary for water security equal to the Average Day Demand of the homes, which may be 25,000-30,000 gallons. The State reviews the engineering design and once approval is granted, the water system can be constructed.

Each of the above design and permitting steps typically requires months in time and the entire process to reach the start of construction can be lengthy. If multiple wells are needed, which is likely, at least Steps 2 and 3 would be repeated for additional wells at additional expense.

Public Community Water Systems require that a licensed Water System Operator be hired to manage the system and there are companies that can provide this service. Their costs depend on the complexity of the water system.

Zoning/PUD Standards

Dorset's zoning bylaws, dated September 12, 2023 was reviewed for purposes of this report. The property is located in the Rural Residential (RR) Zoning District, the purpose of which is *"to provide an opportunity for residential living in a rural setting."*

In review of the zoning bylaws, a project of this scale requires approval as a Planned Unit Development (PUD), which provides flexibility to some standards. ***Section 2006.C(4)*** only allows more than one principal building to be used as a dwelling if approved through a PUD. Section 3307 states that the purpose of a PUD is *"to provide flexibility for residential subdivisions or developments in the rural areas of town to protect natural resources and conserve open space and working lands."*

Town of Dorset, VT Dimensional Standards
for Rural Residential (RR) District

Dimensional Standard	**RR District**
Lot Size Minimum:	**2.75 acres**
Lot Frontage Minimum:	**240 feet**
Lot Coverage Maximum:	**10%**
Front Setback Minimum:	**40 feet from ROW**
Side and Rear Setback Minimum:	**30 feet**
Height Maximum:	**35 feet**
Lot Area Per Dwelling Unit Minimum:	**1.5 acres**

In general, the dimensional standards of the RR District do not pose a challenge to the project. The one requirement of importance is the maximum density of 1.5 acres of property for each dwelling unit/home. ***Section 2008.H*** states that this is calculated based on total lot area and does not require exclusion of difficult to develop land. The lower/western property is 308 acres, which would allow a maximum of 205 homes at 1.5 acres/dwelling unit. The 100+/- homes proposed would require approximately 150 acres of land, which may allow for subdividing the project from the other property uses such as the Town office.

The following sections of the zoning bylaws could play a role in how the property can be developed. These are outlined here for awareness.

Section 2106.C – Permitted Uses and Section 3307.D Modification of District Standards
Single-unit and two-unit dwellings are allowed uses in the RR District. However, multi-family dwellings are not listed as a permitted or conditional use. The bylaws allow for multi-family dwellings in other zoning districts, so our interpretation is that current zoning does not allow for multi-family in the RR District even through the PUD process. We recommend the Town revise the Zoning Bylaws to allow for multi-family dwellings in the RR District as a Conditional Use.

The conceptual design has focused on providing independent residential uses. One other use listed under the RR District as a Conditional Use known as a "Care Home", essentially an assisted living facility, may also be worth considering for the property. If there is a local need for such facilities given the aging demographics of Vermont, this may be compatible with the other on-site uses. Due to other constraints, it is likely this facility would take the place of some of the independent living homes.

2006.C(3) - *The distance between new principal buildings or between a new principal building and an existing principal building must not be less than twice the side setback required in the applicable zoning district.*
The Conceptual Layout has been designed to satisfy this requirement by having 60 ft. (twice the side yard setback of 30 ft.) between each building.

2006.C(5) - *Approval of multiple principal buildings on a lot will not constitute a right to convey them separately unless:*
(a) The subject lot will be lawfully subdivided in accordance with the provisions of these regulations; or

(b) The building will be lawfully converted to condominium ownership, which may include the subdivision of footprint lots.
A plan for future ownership structure of the property and/or homes will be important to decide early in the project as it may impact the design and permitting.

3307.F Conservation Land Set Aside. *A minimum of 70% of the land with a PUD must be set aside as permanently protected conservation land**.***
The property's many high value natural resources are very conducive to complying with this requirement including wetlands, critical habitat, and steep slopes.

***3307.G Development Areas. A maximum of 30% of the land within a PUD may be developed for residential and community use in accordance with the following**:*
(1) The development must be designed as one or more clusters composed of 3 to 12 lots or buildings separated by open space;
(2) All lots or buildings must have direct pedestrian access to any open space area(s) intended to accommodate passive recreational use from a continuous system of sidewalks, paths or trails;
(3) Access to the PUD must be from a single curb cut unless otherwise approved by the Planning Commission to provide adequate emergency access or to minimize disturbance of conservation resources;
(4) All reasonable measures must be taken to minimize the amount of impervious surface associated with vehicular access and parking (such as shared driveways, narrow lanes, and locating development near existing roads); and
(5) A PUD may include one or more community buildings or other facilities that would serve residents by providing amenities such as multi-purpose recreation or entertainment, food preparation and dining, library, daycare, guest quarters or storage. PUD residents must commonly own any community buildings or facilities.
The conceptual design has clusters of housing pods with often forested buffers between them, however the plan has more houses within some of the clusters (20+/-) than the bylaws list as a maximum (12 homes). The intent to have "open space" between housing clusters does not appear to be defined in terms of how large the open space needs to be. Future design phases would look at this in more detail and discussion could be conducted with the Town ZBA or Planning Commission to better understand the open space requirement. The Town may also consider revising the Zoning Bylaws to increase the number of homes in each pod to 25-30.

Satisfying the other portions of Section 3307.G requirements do not appear problematic. Sidewalks could be included along one side of the main roads for pedestrian usage or wooded trails incorporated into the layout. A number of flatter spaces have been set aside on the plan and labeled "Community Space" to allow for a variety of uses by the residents.

Permit Programs that apply to the Project

The property was originally permitted for development of an 8 lot subdivision through the Vermont Regional office for single family homes with onsite wells and septic systems. There was no Act 250 permit issued for the subdivision because of its smaller size. An Operational Stormwater Discharge Permit was issued for the subdivision and later amended for the Town Office project.

Land Use Permits that are anticipated for the housing project include the following:

- **Source Permit for the Onsite Water Source(s) –** 3 step approval process for drilling, testing, and evaluating bedrock wells for use with the Public Community Water System.
- **Water Supply Construction Permit –** is required for the potable water system to serve the homes including reservoirs, pumps, treatment, and piping. This permit is issued by the State's central office.
- **Wastewater Disposal –** gravity sewers, septic tanks, pump stations, forcemains, and leachfields will require permitting through a Wastewater Disposal and Potable Water Supply Permit. This permit is issued by the State's Rutland regional office. Due to the large size of the wastewater systems, a hydrogeological evaluation will be required. Conferring with the Indirect Discharge Permit program is expected to confirm the project does not require IDP approval.
- **Operational Stormwater Permit**– the creation of impervious area will trigger the need to manage, treat, and detain stormwater runoff in accordance with the State regulations.
- **Stormwater Construction General Permit** – this is a temporary permit while soil is disturbed during constriction. Phasing of the project will play a role in whether the project can be classified as a Low risk, Moderate risk project, or an Individual project.
- **Stream Alteration Permit and Army Corps of Engineers** – The Federal Army Corp and State both have jurisdiction over Stream crossings of perennial and intermittent streams and/or work along the banks of streams requires a Stream Alterations Permit. Replacement or new culvert crossings for roads will need permitting.
- **VTrans** – Driveways on Route 30 are under the jurisdiction of the Agency of Transportation and a VTrans Access Permit will be required for the project.
- **Town of Dorset Zoning** – The project will need to be approved through the Planned Unit Development process.
- **Vermont Threatened and Endangered Species Takings Permit** – If rare, threatened, or endangered species need to be impacted, in particular the Hairy Wood Mint, this permit becomes necessary.
- **Act 250 Land Use Permit** – This permit is typically triggered by the creation of 10 or more housing units or 10 or more acres of land involved. When a project is subject to Act 250, the Agency of Natural Resources has additional review by other regulatory agencies with the State (such as Vermont Fish & Wildlife Department) that are not required for smaller projects. Due to its quasi-legal process, the Town may benefit from having an attorney who specializes in Act 250 as part of the permitting team.
  Below are some of additional requirements this project need to address:
  - VFWD are likely to impose restrictions and mitigation requirements on the project because of the necessary wildlife habitat (black bears), threatened/endangered species (3 bat species, Hairy Wood Mint), and Rare Natural Areas (Limestone Forest).
  - In the areas identified for development there exist two soils that are classified by Vermont as valuable for agricultural uses. The Agency of Agriculture will review impacts to these soils and make require mitigation for the loss of this soil.
  - Traffic Impact Study as the number of anticipated vehicles during the peak hour would exceed 75.
  - Scenic Beauty and Natural Areas – Need to demonstrate the project will not have undue adverse effect on the scenic or natural beauty of the area.

Development Summary and Recommendations

This feasibility study demonstrates that development of 100+/- units could reasonably be developed on the subject property utilizing a single onsite Public Community Water Supply and multiple dispersed wastewater systems. The landform (steep slopes) and natural resource (wetland, species, stream) constraints have focused the conceptual planning on the western half of the study area.

Development is restricted to certain areas within the western half of the study area to avoid impacts as much as possible to sensitive and protected natural resources. Some resources cannot be avoided including black bear habitat, cutting of trees that may serve as habitat for bats, and impact to a threatened plant species. In order to allow development that impacts these resources, the permit review process will impose restrictions and mitigation measures on the project. The full extent of the natural resources has not been field documented and there may be changes needed to the project once the mapping is completed. Prioritizing the fieldwork is critical for the project development.

Due to restrictions, the project cannot have one or two large wastewater leachfields and must instead have the 7-8 separate systems dispersed across the site. One or two large stormwater systems are likely unfeasible due to the spread out nature of the homes. As a result, the homes have been separated into several housing pods with wastewater and stormwater systems located nearby to serve those homes only.

Roads, common areas, wastewater systems, potable water systems, and stormwater systems will all have required maintenance, some of which are mandated by permits. While the water system may be used by all residents, the wastewater systems and stormwater systems are associated with a specific group of homes by necessity. Decisions made about the future ownership of homes or land need to account for maintenance agreements and financial resources for the various infrastructure such as homeowners associations if multiple owners are to be involved.

A single, centralized potable water system is proposed. The alternative of a dozen or so separate water systems would involve higher long term costs, restrict area around the homes from development, create setback issues to the numerous wastewater systems, and challenging operational oversight. The water system would be located east and uphill of the homes near the major trailhead at the end of Raptor Lane.

The zoning bylaws will require that the project be permitted through a Planned Unit Development (PUD) to allow for more flexibility than the standard zoning would allow for. Even through a PUD, there remain some restrictions in the zoning that would need to be amended in order to allow for the project as envisioned. These changes include allowing for multi-family buildings in the RR District and increasing the maximum number of clustered homes allowed in a PUD from 12 to 30 homes.

The next phases of the project would involve fieldwork for natural resources by VHB. The natural resources work will occur over the winter and summer seasons to refine where the environmental restrictions exist and how challenging they are to overcome. Following that step, a preliminary design phase would begin to incorporate direction from the Town based on this report and the natural resource findings to advance the design further.

This Report focuses on the development potential of the land and not an exact building footprint or unit distribution. The next phase may benefit from adding an architect and/or landscape architect to the design team to provide preliminary building designs.

We recommend an extensive preliminary design approach for the next phase due to the scale of the project. The first action item is fieldwork by VHB of the natural resources, which we have provided in a separate proposal. This fieldwork would begin in winter 2025, but cannot be completed until summer 2025 due to plant growth. For a more conservative approach, preliminary design could wait for the completion of the VHB work before starting in fall 2025. The actual preliminary design tasks (discussed below) likely require 12 months, which would extend toward the end of 2026. Final design and permitting would then follow in 2027. If the Town desires a more aggressive timeline, the preliminary design could start early in 2025 before VHB findings are fully known, but this carries some risk.

The preliminary design phase will involve several components and likely be iterative. In collaboration with an architectural firm, we would develop an initial preliminary design for review and acceptance by the Town. Fieldwork would then be conducted consisting of additional test pits for wastewater and stormwater and limited surveying. Following the fieldwork, the preliminary design would be updated based on the information learned and further vetted and then reviewed by the Town. The water system could proceed at the same time to seek approval of the wells. The Source Permit process for the wells, led by Waite Heindel's hydrogeologist, would seek to drill at least one well and test for water yield and water quality. We anticipate that the preliminary design phase tasks may be in the range of $175K-$250K. This cost is speculative and when the Town is ready to proceed forward with this work, we would seek proposals from the subconsultants and determine a more accurate cost estimate.

Recommendations

1. The natural resources fieldwork completed 5 years ago focused on certain areas and species, but was not a comprehensive survey of all rare, threatened, and endangered species. We recommend prioritizing fieldwork by VHB to complete the resource surveys in the winter (black bear) and summertime (plants species, wetlands, etc.).
2. Town committees and leaders review the report and plans and provide feedback on the conceptual design including locations, layout, number of homes, types of homes, and if other uses are desirable such as a residential care facility.
3. The Town should conceive a development plan, eventual ownership structure, and subdivision of lands.
4. Revise Zoning Bylaws to accommodate project as follows:
    a. Section 2106.C – revise to add Multi-family dwellings as a conditional use
    b. Section 3307.G – revise to allow for more homes per cluster to 30 homes or remove a maximum number of homes altogether.

End of Report

Exhibit 1

VHB Memo dated Sept. 24, 2024
Preliminary Act 250 Natural Resources Constraints and Lookahead

Memorandum

To: Enman Kesselring- Raptor Lane Development Project File

Date: November 22, 2024

Project #: 59158.00

From: Carla Fenner, PWS CWS, Team Leader – Ecological Services

Re: Preliminary Act 250 Natural Resources Constraints and Lookahead

Introduction

Under agreement with Enman Kesselring Consulting Engineers ("Enman"), VHB is providing environmental and natural resources consulting services in support of a potential housing development project (the "Project"), proposed to be located within an approximately 238-acre portion of the so-called Raptor Lane site (the "Study Area") in Dorset, Vermont. At the request of Enman, this memorandum has been prepared to summarize the natural resources that are anticipated to potentially constrain the Project design and/or require additional assessments or agency consultation subject to an Act 250 Land Use Permit ("LUP") application. Resource impacts that may require collateral permitting are mentioned as well.

During the spring and summer of 2024, VHB has provided Project services including coordination and consultation with the Vermont Fish and Wildlife Department ("VFWD"), conducted map and natural resources database information analysis, and provided consulting services in review of preliminary Project site layouts and plan documents developed by Enman, and has also participated in planning communications with the Town of Dorset ("Town"). VHB's previous natural resources work in support of the Project consisted of wetlands and surface waters delineation followed by agency review with the Department of Environmental Conservation ("DEC"), a partial survey for rare, threatened, and endangered ("RTE") plants, assessments of on-site Significant Natural Communities and potential Necessary Wildlife Habitat as applicable under applicable Act 250 criteria.

The findings in this memorandum have relied on a conceptual Project layout developed by Enman as shown on a conceptual site plan dated September 6, 2024. VHB had also previously completed natural resources assessments within the Study Area in 2019 during preliminary Project planning under contract for another firm prior to the current contracted work for Enman. It is assumed that natural resources that have been previously field-assessed (depicted on the Natural Resources Map in Attachment 1) and as included on applicable natural resources databases are accurate and would not appreciably change between now and an Act 250 application (and collateral permits, if needed).

Act 250 Natural Resources Criteria Preliminary Project Constraints

Outstanding Resource Waters

Presence/Absence	Not anticipated to be present within the Study Area, but has not yet been assessed by VHB.
Agency consultation and review	None anticipated to be needed.
Additional Assessments Needed	Database review needed to confirm absence of ORW could be conducted by VHB and findings included in a Natural Resources Assessment report to support a LUP application.
Potential Project Constraints	Not anticipated to constrain the Project or require additional agency review/consultation.
Collateral Permitting	No applicable collateral permitting for this resource.

Wetlands

Presence/Absence	Present within the Study Area per VHB's 2019 field delineations, including Class II (Significant) and Class III (not Significant) wetlands. Significant wetlands carry a 50-foot buffer, which is also regulated under the Vermont Wetland Rules.
Agency consultation and review	Field review and confirmation of delineated wetlands was conducted by the DEC in October of 2019.
Additional Assessments Needed	Wetland delineations are considered valid by state and federal regulatory agencies for five years, and VHB's delineations were conducted in 2019. As such, a refreshed delineation is anticipated to be needed to support a LUP application and collateral permitting (if necessary). DEC review of updated delineation mapping would be required.
Potential Project Constraints	Not anticipated to constrain the Project per current conceptual design based on avoidance of impacts. If wetland boundaries and/or classifications change during a delineation refresh, then Project design may need to be revised to avoid impacts to wetlands and buffers or collateral state and/or federal collateral permitting may be necessary.
Collateral Permitting	None anticipated to be needed based on avoidance of impacts in current conceptual design. If impacts to Significant wetlands or buffers is unavoidable then a Vermont Wetland Permit may be needed. If impacts to any jurisdictional wetland (or other surface water, such as streams) is unavoidable, then permit authorization from the US Army Corps of Engineers may be needed.

Memorandum

Streams

Presence/Absence	Present on-site per VHB's 2019 field delineations, including streams with ephemeral, intermittent, and perennial flow regimes. Intermittent and perennial streams carry a 50-foot riparian buffer, which is a resource subject to review under Act 250.
Agency consultation and review	VHB conducted preliminary agency consultation with a VFWD Fisheries Biologist (James Brady) on July 2, 2024 via remote meeting, at which time a site visit was requested. The site visit has not occurred yet. The goal of the site visit would be for VFWD to confirm stream delineations and flow regime classifications as well as observe current conditions of on-site riparian buffers.
Additional Assessments Needed	Not anticipated to be necessary.
Potential Project Constraints	Not anticipated to constrain the Project per current conceptual design based on avoidance of impacts.
Collateral Permitting	None anticipated to be needed based on avoidance of impacts in current conceptual design.

Floodways / Floodplains

Presence/Absence	River corridors are preliminarily assumed to be present on-site based on VHB's observation of perennial streams on site and applicable definitions under the Flood Hazard Area and River Corridor Rule ("FHARC") but has not yet been formally assessed by VHB. The Federal Emergency Management Agency ("FEMA") FEMA Flood Insurance Rate Map indicates that no Special Flood Hazard Areas are present within the Project area.
Agency consultation and review	None anticipated to be needed.
Additional Assessments Needed	Mapping of applicable resource areas per FHARC could be conducted by VHB and findings included in a Natural Resources Assessment report to support a LUP application.
Potential Project Constraints	Not anticipated to constrain the Project or require additional agency review/consultation per the current conceptual design based on avoidance of impacts.
Collateral Permitting	None anticipated to be needed based on assumed avoidance of impacts in current conceptual design and preliminary findings presented here.

Shorelines

Presence/Absence	Not present based on the absence of lakes, ponds, and rivers.
Agency consultation and review	None anticipated to be needed.
Additional Assessments Needed	Database review needed to confirm absence of shorelines could be conducted by VHB and findings included in a Natural Resources Assessment report to support a LUP application.
Potential Project Constraints	Not anticipated to constrain the Project or require additional agency review/consultation.
Collateral Permitting	No applicable collateral permitting for this resource.

Endangered Species

Plants

Presence/Absence	Present on-site per VHB's 2019 partial field survey for rare, threatened, and endangered ("RTE") plants results as depicted on the Natural Resources Map included in Attachment 1 and per the Natural Heritage Inventory ("NHI") database. Species present include: o Putty-root (*Aplectrum hymale*) – Vermont Threatened o Hairy mountain-mint (*Blephilia hirsuta var. hirsuta*) – Vermont Threatened
Agency consultation and review	VHB conducted preliminary agency consultation with a VFWD Botanist (Grace Glynn) on July 2, 2024 via remote meeting. An agency site visit with the VFWD was requested but has not yet been completed, the goal of which would be to confirm the presence and extent of RTE plants as well as observe already-identified plant populations.
Additional Assessments Needed	Additional field surveys (mid-summer timeframe) and additional agency consultation (including the site visit mentioned above) are anticipated to be required, as the previous field survey was targeted to the putty root and not comprehensive for all potential rare, threatened, and endangered plants that could be impacted by the Project.
Potential Project Constraints	Not anticipated to constrain the Project per current conceptual design, however, impacts maybe unavoidable. Impacts to the hairy mountain-mint population along Raptor Lane may be unavoidable, however it is anticipated that minimal impact could be approved under Act 250 and collateral permitting with the appropriate demonstration of avoidance, minimization, and mitigation measures.
Collateral Permitting	Collateral permitting under a Vermont Threatened and Endangered Species Takings Permit ("Takings") permit may be needed, pending the results of forthcoming field surveys and final Project design.

Memorandum

Animals

Presence/Absence	Potentially suitable habitat present on-site per VHB's 2019 field assessments and per the Natural Heritage Inventory ("NHI") database. Species with potentially suitable on-site habitat include: • Indiana bat (*Myotis sodalis*) – Federally Endangered, Vermont Endangered • Northern long-eared bat (*Myotis septentrionalis*) – Federally Endangered, Vermont Endangered • Eastern tri-colored bat (*Perimyotis subflavus*) – Federally proposed Endangered, Vermont Endangered
Agency consultation and review	VHB conducted preliminary agency consultation with a VFWD Bat Biologist (Alyssa Bennett) on July 11, 2024 via remote meeting. Follow up consultation with VFWD to confirm appropriate conservation measures would be recommended once the Project's design has advanced and the total amount of tree clearing has been calculated.
Additional Assessments Needed	Additional consultation with VFWD will inform if additional surveys are required, based on proximity of Project site to hibernaculum habitat for multiple RTE bats and the Project's proposed extent of tree clearing, when known.
Potential Project Constraints	Not anticipated to constrain the Project per current conceptual design and anticipated ability of the Project to adhere to certain conservation measures (*e.g.*, sequencing and time-of-year restricted tree clearing) to avoid take of protected bats.
Collateral Permitting	Not anticipated to be necessary.

Rare and Irreplaceable Natural Areas ("RINA")

Presence/Absence	Significant Natural Communities that may be considered to be RINA under Act 250 are present on-site per VHB's 2019 partial field survey results. Potential RINA include: • Rich Fen • Transition Hardwood Limestone Forest
Agency consultation and review	VHB conducted preliminary agency consultation with a VFWD Natural Communities Ecologist (Bob Zaino) on July 2, 2024 via remote meeting. An agency site visit with the VFWD was requested but has not yet been completed, the goal of which would be to confirm the presence and extent of significant natural communities as well as observe current conditions.
Additional Assessments Needed	No additional assessments anticipated to be needed.
Potential Project Constraints	Not anticipated to constrain the Project per current conceptual design based on avoidance of impacts to the Rich Fen community and anticipated minimal cutting in the Transition Hardwood Limestone Forest community, anticipated to require limited additional agency review/consultation. Minimized cutting within the Transition Hardwood Limestone Forest is anticipated to be unavoidable based on the Project's conceptual design, and it is also anticipated that conservation and/or mitigation measures could be able to be established through consultation with VFWD sufficient to meet the RINA criterion under Act 250.
Collateral Permitting	No applicable collateral permitting for this resource.

Necessary Wildlife Habitat ("NWH")

Presence/Absence	Present on site per VHB's 2019 field delineations. A concentration of bear scarred beech ("BSB") trees which represents a bear mast feeding stand of high enough quality to be considered Necessary Wildlife Habitat was identified on site.
Agency consultation and review	VHB conducted preliminary agency consultation with VFWD Biologists (Joel Flewelling) on July 11, 2024 via remote meeting and follow up email communications. An agency site visit with the VFWD was requested but has not yet been completed, the goal of which would be to confirm the presence of the bear mast feeding resource as well as observe current conditions to inform the effective buffer distance from the feeding stand. The buffer is anticipated to be between 0.25 to 0.5 mile wide as measured from the limits of the BSB stand.
Additional Assessments Needed	No additional assessments anticipated to be needed.
Potential Project Constraints	Pending the result of VFWD's observations during a site visit, it is anticipated that there could be a buffer applied to the limits of the bear mast feeding stand, which could extend up to 0.25 to 0.5 mile from the stand. Project activities, including tree clearing, seasonal noise, and proposed Project infrastructure could be constrained by a buffer on the bear mast feeding stand. The specific buffer size is dependent on VFWD determination from an in-field observation of conditions. Although there is a VFWD-mapped Deer Wintering Area ("DWA") intersecting a portion of the Study Area and DWA are typically considered to be NWH under Act 250, the FWD has confirmed that it does not provide functioning wintering habitat for deer and as such would not be considered NWH. Although VHB's 2019 Natural Resources Map (Attachment 1) includes two Potential Vernal Pools ("PVP") and vernal pools can be considered NWH under Act 250, VHB understands that vernal pool surveys were conducted after VHB's initial 2019 assessment and the survey results as reviewed by the DEC Wetlands Program confirmed that no vernal pools are present. Accordingly, there is no vernal pool NWH present on site. A re-survey for vernal pools would be recommended to occur during the refreshed wetland delineations.
Collateral Permitting	No applicable collateral permitting for this resource.

Conclusions

Based on the information presented above, VHB anticipates that the resources that will require additional agency consultation and review of potential impacts include streams and riparian buffers, RTE plants, RTE bats, bear mast feeding area, and significant natural communities. Based on the Project's conceptual design, there are potential impacts to natural resources that would be considered under the following Act 250 criteria:

- Endangered Species
    - Hairy wood mint – anticipated

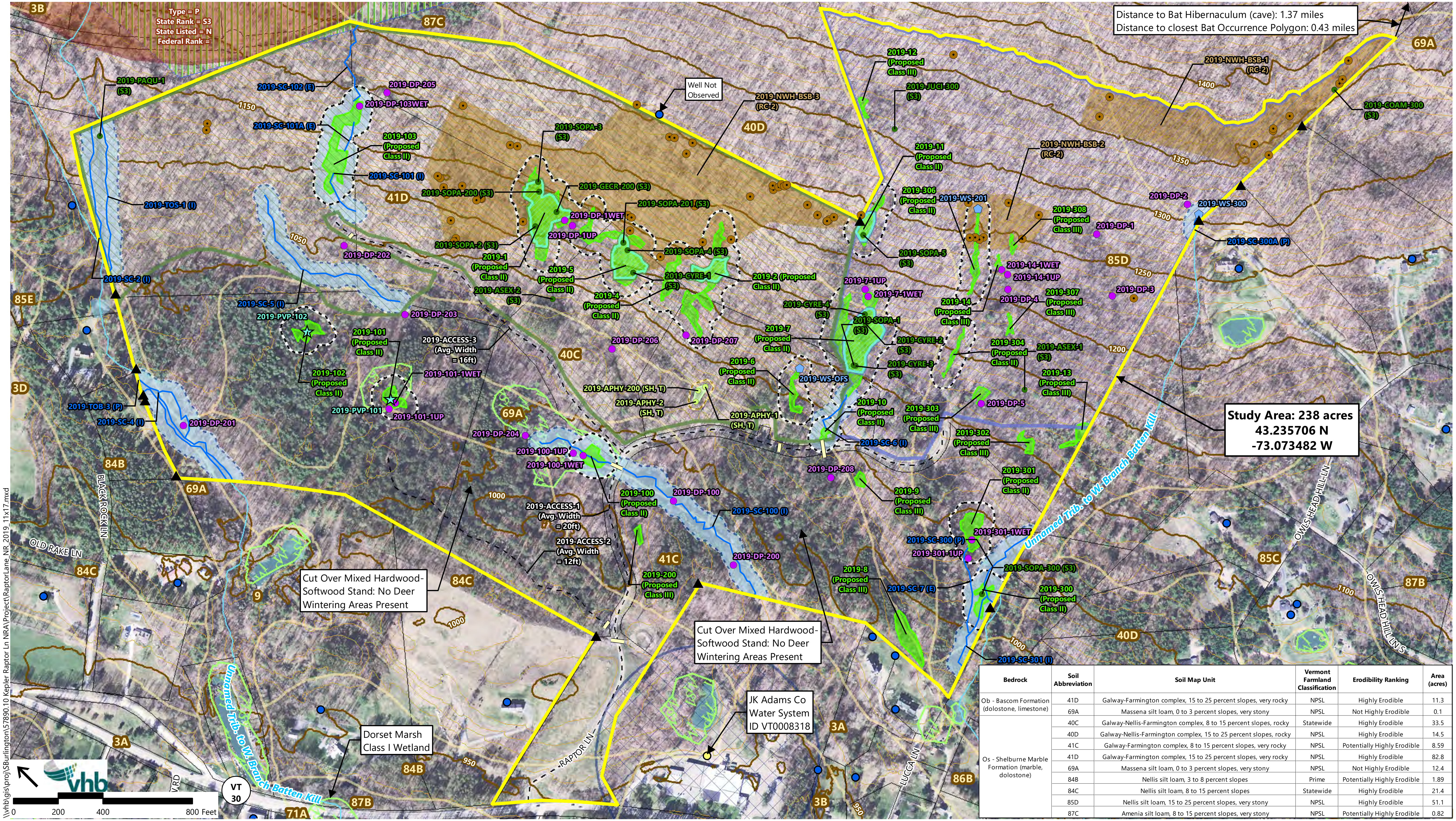
    - Bats (multiple species) – potential
- Necessary Wildlife Habitat - potential
    - Bear mast feeding area buffer
- RINA
    - Transition Limestone Hardwood Forest

It is recommended that a complete RTE plant survey be conducted prior to the completion of Project designs, and that the plant survey include detailed mapping of the hairy wood mint population so as to determine if Project impacts can be further avoided or minimized, or to determine what the unavoidable impact to the population would be. It is further recommended that ongoing consultation with VFWD, including site visits as requested by individual staff, occur prior to completion of Project design and submittal of an Act 250 LUP application. Of primary importance for VFWD consultation and site visits is a determination of the buffer distance from the BSB stand which could be 0.25 to 0.5 mile wide. Based on the Project's current conceptual plan, collateral permit authorization via a Vermont Takings Permit may be needed for unavoidable impacts to the state-listed hairy wood mint. There are no other collateral natural resource permits anticipated to be needed.

VHB has previously provided an Opinion of Probable Cost ("OPC") memorandum, which includes natural resources fieldwork and agency consultation prior to an LUP application for the Project, which is a rough approximation of potential costs for a limited scope of consulting services. The costs contained in the OPC are not inclusive of all the resources and anticipated natural resources consulting services described herein. The suite of assessments, data collection, reporting, and coordination necessary to sufficiently address natural resources criteria listed above in a complete LUP application can be provided in a Client Authorization as a contract amendment to the existing consulting services contract between VHB and Enman.

Attachments

Attachment 1 – Natural Resources Map (VHB, 2019)



Bedrock	Soil Abbreviation	Soil Map Unit	Vermont Farmland Classification	Erodibility Ranking	Area (acres)
Ob - Bascom Formation (dolostone, limestone)	41D	Galway-Farmington complex, 15 to 25 percent slopes, very rocky	NPSL	Highly Erodible	11.3
	69A	Massena silt loam, 0 to 3 percent slopes, very stony	NPSL	Not Highly Erodible	0.1
Os - Shelburne Marble Formation (marble, dolostone)	40C	Galway-Nellis-Farmington complex, 8 to 15 percent slopes, rocky	Statewide	Highly Erodible	33.5
	40D	Galway-Nellis-Farmington complex, 15 to 25 percent slopes, rocky	NPSL	Highly Erodible	14.5
	41C	Galway-Farmington complex, 8 to 15 percent slopes, very rocky	NPSL	Potentially Highly Erodible	8.59
	41D	Galway-Farmington complex, 15 to 25 percent slopes, very rocky	NPSL	Highly Erodible	82.8
	69A	Massena silt loam, 0 to 3 percent slopes, very stony	NPSL	Not Highly Erodible	12.4
	84B	Nellis silt loam, 3 to 8 percent slopes	Prime	Potentially Highly Erodible	1.89
	84C	Nellis silt loam, 8 to 15 percent slopes	Statewide	Highly Erodible	21.4
	85D	Nellis silt loam, 15 to 25 percent slopes, very stony	NPSL	Highly Erodible	51.1
	87C	Amenia silt loam, 8 to 15 percent slopes, very stony	NPSL	Potentially Highly Erodible	0.82

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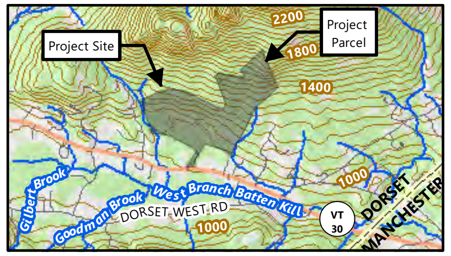
Study Area (VHB)
Found Rock Quarry/Potential Vernal Pool (VHB)
Found Property Marker (VHB)
Delineation Data Point (VHB)
Found Bear Scarred Tree (VHB)
Found Culvert (VHB)
Delineated Stream (VHB)
Found Natural Spring (VHB)
Found RTE Plant (VHB)
Found Uncommon Plant Species (VHB)
Found RTE Population (VHB)
Delineated Wetland (VHB)
Proposed Class II Wetland Buffer (VHB)
RTE Species Buffer (VHB)
Riparian Buffer (VHB)
Observed Wildlife Habitat (VHB)
Observed State Significant Natural Community (VHB)
Rich Fen (S2)
Transition Hardwood Limestone Forest (S3)
Observed Natural Community (VHB)
Mesic Red Oak-Northern Hardwood Forest (S4)
Observed Access Road (VHB)
NHI Element Occurrence (FWD)
Deer Wintering Area (ANR)**
Bear Habitat (FWD)
Private Well (ANR)
Public Well (ANR)
VSWI Wetland (ANR)
GW Protection Area (ANR)
SW Protection Area (ANR)*
River Corridor (ANR)*
VHD Stream (VCGI)
Waterbody (VCGI)
FEMA Floodway (VCGI)*
FEMA 100 year Flood Zone (VCGI)*
NRCS Soil Boundary (VCGI)
Parcel Boundary (VCGI)
50 ft Contour (VCGI)
10 ft Contour (VCGI)

*Feature not present in current map extent **ANR mapped DWA not present per VHB field review



Town of Dorset - Raptor Lane

Dorset, Vermont

Sources:
Background Imagery by VCGI (Collected in 2016)
ANR (Vermont Agency of Natural Resources - Various dates)
FWD (Vermont Fish and Wildlife Department - 2019)
VCGI (Vermont Center for Geogrpahic Information - Various dates)
VHB - 2019

Natural Resources Map

DRAFT: October 28, 2019

Wetlands/Waters/Natural Community/Wildlife Habitat surveys conducted by A. Wood, M. Jackman, C. Sheldon, and A. Crary, August-October, 2019. Bear-scarred tree (beech) mapping is qualitative based on general transects in suitable habitat. RTE and uncommon plant mapping is from incidental observations during other field surveys. Wetlands were field reviewed by DEC Wetland Ecologist (Z. Courage) on 10/22/19.

Exhibit 2

Water and Wastewater Basis of Design Flows by Enman Kesselring

Waite Heindel Memo dated Dec. 3, 2024
Preliminary Evaluation: Hydrogeologic Capacity for Wastewater Disposal and Water Supply Source Options

Dorset Housing Study	**Enman Kesselring Engineers**
Raptor Lane	**15-Nov-24**
Dorset, VT	**2406**

Assumptions:
Single family homes all 3 bedrooms
Duplexes all 2 bedrooms

Preliminary Calculation of Average Day Demand

POD 1	Quantity	GPD	Flow	
1 Bedroom Homes	0	140	0	gpd
2 Bedroom Homes	8	280	2,240	gpd
3 Bedroom Homes	0	420	0	gpd
		SubTotal:	2,240	gpd

POD 2	Quantity	GPD	Flow	
1 Bedroom Homes	12	140	1,680	gpd
2 Bedroom Homes	9	280	2,520	gpd
3 Bedroom Homes	0	420	0	gpd
		SubTotal:	4,200	gpd

POD 3	Quantity	GPD	Flow	
1 Bedroom Homes	0	140	0	gpd
2 Bedroom Homes	20	280	5,600	gpd
3 Bedroom Homes	0	420	0	gpd
		SubTotal:	5,600	gpd

POD 4	Quantity	GPD	Flow	
1 Bedroom Homes	0	140	0	gpd
2 Bedroom Homes	0	280	0	gpd
3 Bedroom Homes	6	420	2,520	gpd
		SubTotal:	2,520	gpd

POD 5	Quantity	GPD	Flow	
1 Bedroom Homes	0	140	0	gpd
2 Bedroom Homes	6	280	1,680	gpd
3 Bedroom Homes	0	420	0	gpd
		SubTotal:	1,680	gpd

POD 6	Quantity	GPD	Flow	
1 Bedroom Homes	10	140	1,400	gpd
2 Bedroom Homes	4	280	1,120	gpd
3 Bedroom Homes	0	420	0	gpd
		SubTotal:	2,520	gpd

POD 7	Quantity	GPD	Flow	
1 Bedroom Homes	0	140	0	gpd
2 Bedroom Homes	10	280	2,800	gpd
3 Bedroom Homes	0	420	0	gpd
		SubTotal:	2,800	gpd

POD 8	Quantity	GPD	Flow	
1 Bedroom Homes	0	140	0	gpd
2 Bedroom Homes	0	280	0	gpd
3 Bedroom Homes	15	420	6,300	gpd
		SubTotal:	6,300	gpd

Total Living Units	100			
Total 1 Bedroom Units	22	22%		
Total 2 Bedroom Units in Multi-Family Building	13	13%		
Total Duplex Units	44	44%		
Total Single Family Home Units	21	21%		
		Total Flow	**27,860**	**gpd**

MEMORANDUM:

PRELIMINARY EVALUATION:
HYDROGEOLOGIC CAPACITY
for WASTEWATER DISPOSAL
and
WATER SUPPLY SOURCE OPTIONS

TOWN OF DORSET HOUSING STUDY
Raptor Lane, Dorset, VT

TO: Enman-Kesselring Consulting Engineers [EKCE]
FROM: Craig Heindel, C.P.G.
DATE: December 3, 2024

This Memo is an update of my preliminary evaluations of the approximate hydrogeologic capacities for on-site wastewater disposal proposed to serve eight housing "pods", and of options for locations of water sources for a Public Community Water System, to serve a proposed housing project on the Raptor Lane parcel, Town of Dorset, east of Rte. 30 in Dorset, VT. ***This Memo updates and replaces my Memo dated July 17, 2024.***

This Memo has three sections:

A. ***Estimated Wastewater Capacities for Housing Pods #1 through #8 [pages 1 – 5];***
B. ***Estimated Wastewater Capacities at Un-allocated Sites [pages 5 – 6];***
C. ***Preliminary Evaluation of Water System and Water Source Options [pages 6 – 7].***

A. Preliminary Estimates of On-Site Wastewater Disposal Capacities at WW Sites A through E, for Housing Pods #1 through #8:

Basis: These hydrogeologic capacity estimates are based on soils data from soil test pits excavated on Sept. 19, 2024 and logged by Patrick Griffin, P.E. [Enman-Kesselring Consulting Engineers] with Craig Heindel [Memo author]; and on soils data that are reported in 2004 test pit logs by others; and on EKCE site plans of the proposed wastewater areas showing test pit locations, topographic elevation contours, streams and wetlands [etc.]. I used the soils data to interpret the depths to Limiting Conditions for wastewater disposal [seasonal high water table, impeding soils, groundwater, or bedrock], and the characteristics of effluent-transmitting soil horizons above the Limiting Condition depth. I made measurements on the EKCE site plans of ground slopes [to simulate hydraulic gradient] and maximum cross-slope lengths in areas that I estimated would be suitable for mound-type wastewater disposal systems. I then used Darcy's Law calculations to predict the maximum hydrogeologic capacities of each proposed disposal site; and from those results I also calculated an estimated Linear Loading Rate for each site [maximum estimated capacity, divided by estimated cross-slope length]. Refer to the annotated site plans, calculation sheets, and summary table, attached.

Results of Preliminary Evaluations of Wastewater Capacities: The soil conditions and depths to Limiting Conditions for wastewater disposal indicate that mound-type wastewater disposal fields for all eight housing pods will be necessary, and/or will have the highest wastewater capacity. Almost all of the proposed sites would not be suitable for other types of wastewater disposal such as in-ground disposal, except potentially for spray irrigation disposal – which requires a high level of treatment including disinfection, a substantial storage volume, and a licensed wastewater system operator – so treatment followed by spray irrigation disposal was not further evaluated.

All of these sites will need additional test pits, in order to provide confirmatory and sufficient soils information to document their compliance with the Vermont Wastewater System and Water Supply Rules. These additional test pits will likely result in different capacities and linear loading rates than are reported in this preliminary evaluation.

Size of Wastewater Disposal Systems; Consideration of Indirect Discharge Permitting: Wastewater disposal areas that are proposed to receive more than 6,500 gpd design flows may trigger the need for an Indirect Discharge Permit [IDP] under the Indirect Discharge Rules [IDRs]. Adjacent wastewater disposal systems with design flows of less than 6,500 gpd may also trigger the need for an IDP if they are "hydraulically connected" as defined or regulated by the Indirect Discharge Program. In my experience with evaluating potential wastewater disposal sites according to the IDRs, it will likely be difficult or impossible to obtain an IDP on this property. That is because the IDP requirements include an evaluation of the potential nutrient impacts on the "receiving surface waters" down-gradient of a proposed wastewater disposal field. At this property, all of the receiving waters appear to be very small streams, which will have very little dilution capacity – making them ineligible for an IDP unless a very high degree of nutrient removal is provided by advanced treatment systems. These systems are very expensive, both initially and then for ongoing operations, permit compliance monitoring, and maintenance.

None of the proposed Housing Pods have wastewater design flows exceeding 6,500 gpd – see the summary table, attached. There are two sections of this property that are currently being considered as sites for wastewater disposal systems which would serve more than one housing pod:

- Contiguous WW Area A1 and A2, which is proposed to receive wastewater from housing pods 1 and 2; and

- Contiguous WW Area C1 and C2, which is proposed to receive wastewater from housing pods 5 and 6.

However, as currently configured, neither of these wastewater areas are proposed to receive more than 6,500 gpd as follows:

- Pod 1: 2,240 gpd; Pod 2: 4,200 gpd; Total: 6,440 gpd to contiguous WW Area A1 and A2.
- Pod 5: 1,680 gpd; Pod 6: 2,520 gpd; Total: 4,200 gpd to contiguous WW Area C1 and C2.

Therefore, it appears that none of the wastewater disposal systems for the currently proposed eight Housing Pods will trigger the need for an Indirect Discharge Permit.

Preliminary Wastewater Disposal Capacities for Housing Pods 1 through 8, at WW Areas A through E: The preliminary wastewater disposal capacities for each Housing Pod are described below. Refer to the summary table and overall site plan in the Attachment, as well as individual calculations for each WW area.

- **Wastewater Disposal Areas A1 and A2, serving Housing Pods #1 and #2:**
  - Preliminary Maximum Wastewater Disposal Capacity: WW Area A has substantial disposal capacity based on the 2004 test pits, which show relatively deep depths of suitable soil and groundwater conditions, and a potential cross-slope available length of 370 feet. Two separate portions of WW Area A are proposed to be used: the northern section would serve Pod #1 [WW Area A1], and the southern section would serve Pod #2 [WW Area A2]. These two separate wastewater disposal mounds would have independent effluent flow paths that would not intersect in their immediate vicinities. The exact directions and outer edges of the effluent flow paths can only be determined after the actual footprints of the two disposal areas are laid out by the project engineer. The hydrogeologic capacities of the two WW-A disposal areas are likely to be more than enough for the proposed design flows of 2,240 gpd for Pod #1 and 4,200 gpd for Pod #2.
  - Notes: Confirmation of the favorable soil conditions and disposal capacities will be needed by additional test pits and refined induced-mound calculations.

- **Wastewater Disposal Areas B3 North and South, serving Housing Pod #3:**
  - Preliminary Maximum Wastewater Disposal Capacity: The two B3 disposal areas are at different elevations, with a gap between them, due to a concave section of the ground topography which could cause converging effluent flows. Area B3-North has an estimated capacity of approx. 2,715 gpd, based on a potential cross-slope available length of 165 feet. Area B3-South has an estimated capacity of approx. 3,411 gpd, based on a potential cross-slope length of 120 feet.
  - Notes: The combined estimated hydrogeologic capacity of WW Areas B3-North and South is approximately 6,126 gpd. This is more than enough for the proposed design flow from Pod #3 of

5,600 gpd. Confirmation of the favorable soil conditions and disposal capacity will be needed by additional test pits and refined induced-mound calculations.

- **Wastewater Disposal Areas B1 and B2, serving Housing Pod #4:**
  - Preliminary Maximum Wastewater Disposal Capacity: The B1 and B2 combined disposal areas have an estimated capacity of approx. 8,300 gpd, based on a potential cross-slope available length of 285 feet. This is more than enough for the proposed design flow from Pod #4 of 2,520 gpd.
  - Notes: Confirmation of the favorable soil conditions and disposal capacity will be needed by additional test pits and refined induced-mound calculations.

- **Wastewater Disposal Area C1-West, serving Housing Pod #5:** This site is located on the west side of a gentle ridge. It has an estimated hydrogeologic capacity of approximately 1,900 gpd, based on the gentle slope, and a potential cross-slope available length of 190 feet. This capacity is adequate for the proposed design capacity of 1,680 gpd.
  - WW-C1-West Notes: This site's wastewater capacity is limited by the shallow depth of favorable soil conditions, the quite gentle slope, and the relatively short cross-slope length. Confirmation of the favorable soil conditions and disposal capacity will be needed by additional test pits and refined induced-mound calculations.

- **Wastewater Disposal Area C1-East, serving Housing Pod #6:** This site is located on the east side of a gentle ridge. It has an estimated hydrogeologic capacity of approximately 2,700 gpd, based on the gentle slope, and a potential cross-slope available length of 120 feet. This capacity is adequate for the proposed design capacity of 2,520 gpd.
  - WW-C1-East Notes: This site's wastewater capacity is limited by the shallow depth of favorable soil conditions, the gentle slope, and the relatively short cross-slope length. Confirmation of the favorable soil conditions and disposal capacity will be needed by additional test pits and refined induced-mound calculations.

- **Wastewater Disposal Area D, serving Housing Pod #7:**
  - Preliminary Maximum Wastewater Disposal Capacity: Approx. 2,827 gpd, based on a potential cross-slope available length of 120 feet, moderate depth of suitable soil conditions, and moderate slope. This capacity is adequate for the proposed design capacity of 2,800 gpd.
  - Notes: Confirmation of the favorable soil conditions and disposal capacity will be needed by additional test pits and refined induced-mound calculations.

- **Wastewater Disposal Area E-North, serving Housing Pod #8:**
  - Preliminary Maximum Wastewater Disposal Capacity: Approx. 9,500 gpd, based on a potential cross-slope available length of 110 feet. This capacity is more than adequate for the proposed design capacity of 6,300 gpd.
  - Notes: Confirmation of the favorable soil conditions and disposal capacity will be needed by additional test pits and refined induced-mound calculations.

B. Preliminary Estimates of On-Site Wastewater Disposal Capacities at Currently Un-Allocated Sites B4, D2, D3 and E-South:

This section of the Memo presents the preliminary wastewater disposal capacities of sites that are not currently targeted to serve any buildings, but which could potentially be used. These currently un-allocated wastewater disposal sites are labeled WW-B4, D2, D3 and E-South. Their estimated preliminary wastewater capacities are described below.

- **Wastewater Disposal Area B4:**
  - Preliminary Maximum Wastewater Disposal Capacity: Approx. 1,005 gpd, based on a potential cross-slope available length of 210 feet. This site is limited in capacity due to the shallow depths to limiting soil conditions.
  - Notes: Confirmation of the favorable soil conditions and disposal capacity will be needed by additional test pits and refined induced-mound calculations.

- **Wastewater Disposal Area D2:**
  - Preliminary Maximum Wastewater Disposal Capacity: Approx. 1,122 gpd, based on a potential cross-slope available length of 150 feet. This site is limited in capacity due to the relatively short cross-slope length that is suitable for a wastewater disposal mound, and due to the shallow depths to limiting soil conditions.
  - Notes: Confirmation of the favorable soil conditions and disposal capacity will be needed by additional test pits and refined induced-mound calculations.

- **Wastewater Disposal Area D3:**
  - Preliminary Maximum Wastewater Disposal Capacity: Approx. 2,932 gpd, based on a potential cross-slope available length of 140 feet. This site is limited in capacity due to the relatively short cross-slope length that is suitable for a wastewater disposal mound, and due to the shallow depths to limiting soil conditions.

- Notes: Confirmation of the favorable soil conditions and disposal capacity will be needed by additional test pits and refined induced-mound calculations.

- **Wastewater Disposal Area E-South:**
  - Preliminary Maximum Wastewater Disposal Capacity: Approx. 10,412 gpd, based on a potential cross-slope available length of 290 feet.
  - Notes: Confirmation of the favorable soil conditions and disposal capacity will be needed by additional test pits and refined induced-mound calculations.

C. Preliminary Evaluation of Water System and Water Source Options

Water System Type: EKCE suggests a single water system for this development, which makes sense to me. For the purposes of permitting, it will be categorized as a “Public Community Water System” [PCWS], and will be regulated primarily by the Vermont Water Supply Rules [VT WSR]. The current estimated water system demand for the eight housing pods is approximately 27,000 gallons per day [gpd], based on the combined wastewater design flows – or approximately 37 gallons per minute [gpm], based on the VT WSR standard 12-hour “water day”. The alternative – individual water systems with separate water sources for each housing pod – would likely not be as cost efficient, either initially or in the long run, as a single PCWS.

Water Source Options: For the past two or more decades, the most common and suitable type of water source for a public water system is one or more drilled wells that tap either a gravel aquifer or bedrock aquifer. Surface water sources such as rivers or lakes are possible, but they are generally quite expensive because of the higher degree of treatment required to provide protection from possible pathogens, particularly disease-causing organisms such as bacteria, viruses and protozoans.

Springs are also possible sources for public water systems, but they have the same treatment requirements and concerns as surface waters -- springs are generally more vulnerable to impacts from shallow-based contamination sources than drilled wells that tap deeper aquifers, so they generally are considered similar to surface water sources in their public health risk. That higher public health risk generally necessitates additional evaluations before a permit can be issued, including specialized sampling and treatment design. In addition, there is the additional concern about springs regarding our ability to reliably predict the long-term capacity of a spring to meet the project demand, including during drought conditions. Therefore, my initial recommendation is that it is unlikely that a spring can be documented as a suitably reliable and cost-efficient long-term source for this public water system, considering the initial hydrogeologic evaluation and ongoing treatment costs that are likely to be incurred. I am aware of the consideration of the potential capacity of the “Owl’s Foot Spring” on this property to be a public water source [mentioned in the Kepler

Consulting report dated Sept. 2020, *Master Plan, Raptor Housing Property*]. If desired, we can investigate this option further – but my concerns mentioned above will apply to this spring.

Well Type, Well Locations: Drilled well[s] as the source[s] for this public system are likely to bedrock wells, not gravel wells. There is no indication from test pits, geological maps or my field reconnaissance of the presence of a viable gravel aquifer on this property. In my estimation, the water demand for this project can likely be met by one or more bedrock wells with the standard 6-inch diameter borehole.

Drilled bedrock wells for a PCWS must be located at least 200 feet uphill and more than the 2-year travel-time distance from wastewater disposal systems; at least 200 feet from property lines and roads [except for the single-purpose light-duty access road to the wells and storage reservoir]; and at least 150 feet from streams and wetlands [to avoid the potential requirement of being considered and tested for "groundwater under the direct influence of surface water"]. The wells should also be located as far as possible from existing neighboring wells, to minimize the potential for unacceptable levels of interference from the project wells on existing neighboring wells. A large portion of the property is substantially uphill of the proposed housing and wastewater disposal sites, and is far from existing neighboring wells, so there are a number of suitable well sites that meet these isolation distances.

Choice of Well Sites: There are no initial geologic indications that would direct the choice of well sites for the project to any specific portion of the property. The bedrock type throughout the entire property and beyond is mapped by the Vermont Geological Survey as marble and dolostone [map symbol "Os"], and there are no mapped faults on or near the property. Existing wells near the property vary widely in their reported yields, without a strong observable pattern.

Accordingly, the initial first one or two well sites could be chosen based on convenience to the potential water storage site and/or convenience for drill-rig access, and distances as far as possible from existing neighboring wells. Alternatively, we could conduct a fracture-trace analysis using aerial ortho-photographs to see if there appear to be potential indications of linear features that might correlate to water-bearing fractures in the bedrock. Perhaps the fracture-trace analysis procedure could be a second well-location step, if the first one or two wells located on "convenience" sites do not provide adequate yields.

Detailed evaluations by pumping tests will be required for each project well, to evaluate its long-term safe yield, potential interference impacts on existing neighboring wells, and water quality.

[END].

U:\PROJECTS - WHEM\Dorset Town, Raptor Lane Housing\Preliminary Evaluation for WW, WS 12-02-2024\Report Pieces\2024-12-03 MEMO UPDATED, PrelimEval, Onsite WW Disposal, PCWS SourceWells - C.Heindel, WHEM TEXT.docx

Attachments:

- Table: Preliminary Estimations of Hydrogeologic Capacity for Wastewater Disposal [WHEM, dated 11/21/2024];
- Conceptual Development Site Plan [EKCE, dated 11/15/2024; annotated by C. Heindel, 12/02/2024];
- Hydrogeologic Details of Individual Wastewater Disposal Areas for Housing Pods 1 through 8;
- Hydrogeologic Details at Un-allocated Wastewater Disposal Sites B4, D2, D3 and E-South.

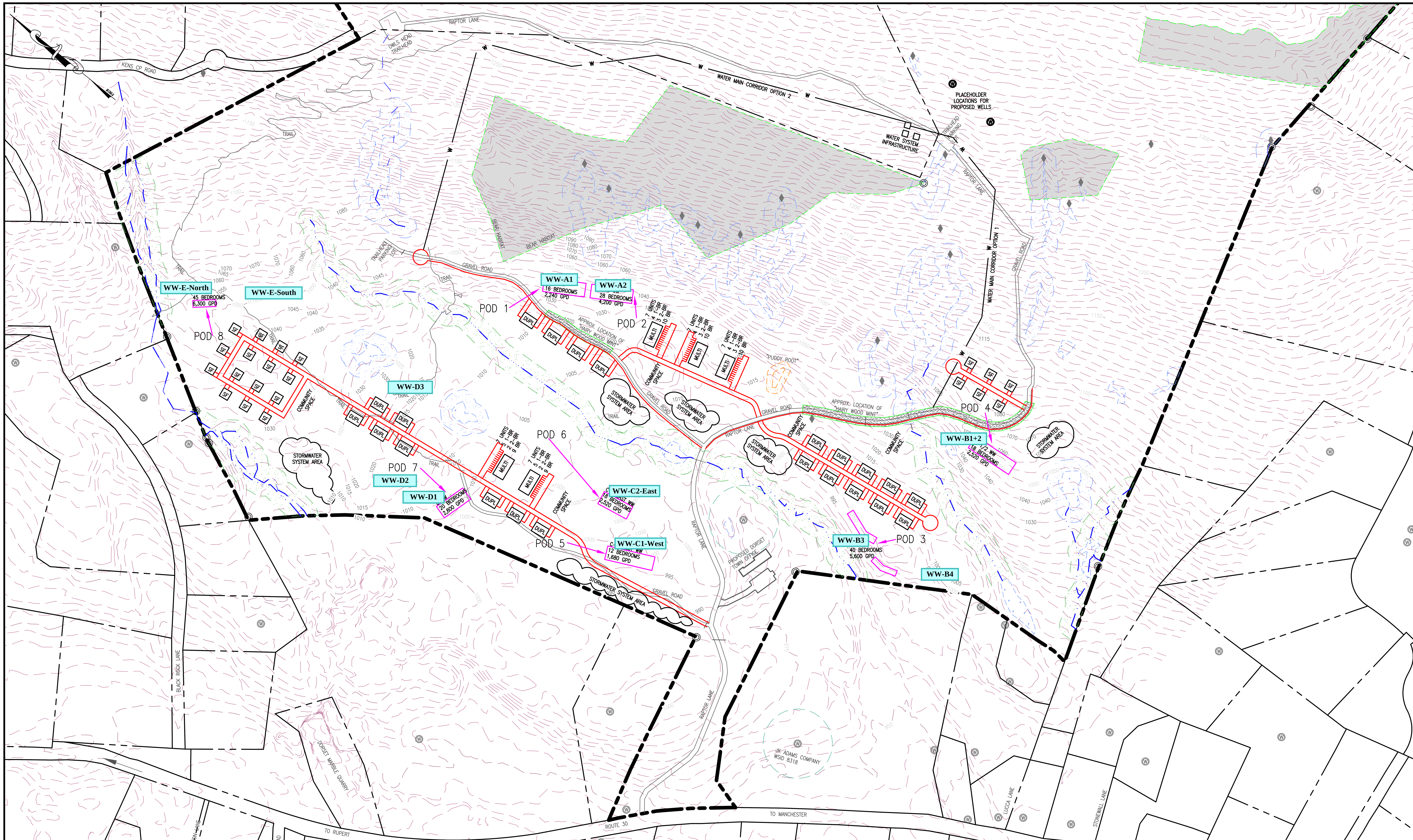
PRELIMINARY ESTIMATIONS of
HYDROGEOLOGIC CAPACITY for WASTEWATER DISPOSAL:
Housing Pods #1 through #8; and Un-allocated Wastewater Disposal Sites
Raptor Lane
Dorset, VT

Housing Pod	Wastewater Design Flows, gpd	Wastewater Disposal Site	Available "h": Transmitting Soil, BGS ft.	Hydraulic Gradient "i" [Ground Slope] ft./ft. [percent]	Estimated K-sat., ft/day	Estimated Cross-Slope Length, ft.	Estimated Max. Hydro-geologic Capacity, gpd	Estimated Linear Loading Rate, gpd/ft.
		A1 and A2 combined:	2.8	13%	30	370	30,222	81.7
1	2,240	A1						
2	4,200	A2						
3	5,600	B3-North and B3-South, combined:						
		B3-NORTH	0.5	11%	40	165	2,715	16.5
		B3-SOUTH	0.5	19%	40	120	3,411	28.4
4	2,520	B1 and B2 combined	1.0	13%	30	285	8,314	29.2
5	1,680	C1-West	1.5	3%	30	190	1,919	10.1
6	2,520	C2-East	2.0	5%	30	120	2,693	22.4
7	2,800	D	1.5	7%	30	120	2,827	23.6
8	6,300	E-NORTH	2.0	6%	40	290	10,413	35.9
Total:	**27,860**	**gpd**						
Un-Allocated WW Sites:		B4	0.2	8%	40	210	1,005	4.8
		D2	1.0	5%	20	150	1,122	7.5
		D3	0.5	14%	40	140	2,932	20.9
		E-SOUTH	2.3	5%	100	110	9,462	86.0

Basis and Assumptions:

1. WS&PWS Rule [Nov. 6, 2023]; site-specific hydrogeologic analysis, per Section 1-903-r[1][B] [General Requirements; Hydrogeologic Analyses].
2. Wastewater Design Flows and Disposal System Type: Septic Tank Effluent disposed in mound wastewater systems [per project engineer Enman-Kesselring, 11/15/2024].
3. Data for h, estimated K-sat.: interpreted by C.Heindel, WHEM from test pit logs from 2004 [by Bruno Assoc.]; and 2024 [by EKCE].
4. Estimated K-sat. values: Chosen by C.Heindel from Table 1, *Hydraulic Loading Method …*; VTDEC, 2003.
5. Hydraulic gradients, cross-slope lengths: measured by C. Heindel, WHEM on EKCE site plans.
6. Calculation Method of hydrogeologic capacity: Darcy's Law:
   + Estimated Max. Hydrogeologic Capacity: Q, in gpd = K x i x [L x h].
   + Linear Loading Rate, in gpd/ft.: [Max Hydro Capacity] / [Cross-Slope Length].

C. Heindel; Last revised: 12-03-2024;
[U:\PROJECTS - WHEM\Dorset Town, Raptor Lane Housing\WW Evaluations\Table - Summary, PRELIM WW Capacities, Dorset Raptor Lane - C.Heindel, 12-03-2024.xlsx.



REFERENCES

1. THIS PLAN IS NOT A BOUNDARY SURVEY. PROPERTY LINES ARE APPROXIMATE BASED ON PARCEL MAP INFORMATION FROM THE STATE OF VERMONT NATURAL RESOURCES ATLAS.
2. THE VERTICAL DATUM IS APPROXIMATE BASED ON ELEVATION DATA DOWNLOADED FROM THE STATE OF VERMONT OPEN GEODATA PORTAL LIDAR FINDER.
3. PROPERTY LINES, EASEMENTS, AND OTHER REAL PROPERTY DESCRIPTIONS PROVIDED IN THIS PERMIT APPLICATION ARE FOR THE USE OF LOCAL, STATE, AND FEDERAL PERMIT PROGRAMS ONLY. THEY DO NOT DEFINE LEGAL RIGHTS OR MEET LEGAL REQUIREMENTS FOR A LAND SURVEY AS DESCRIBED IN 26 V.S.A. SUBSECTION 2502(4), AND SHALL NOT BE USED IN LIEU OF A SURVEY AS THE BASIS OF ANY LAND TRANSFER OR ESTABLISHMENT OF ANY PROPERTY RIGHT.
4. RARE AND THREATENED SPECIES MAPPING, WETLAND, WETLAND BUFFER, VERNAL POOL, RIVER, BEAR SCARRED TREE, IRON PINS, CULVERTS, SPRING, RICH FERN, TRANSITION HARDWOOD LIMESTONE FOREST, AND MESIC RED OAK–NORTHERN HARDWOOD FOREST MAPPING IS ALL DEPICTED BASED ON INFORMATION PROVIDED BY VHB THROUGH SHAPE FILES DATED MAY 14, 2024 AND DEPICTED ON PLAN TITLED "NATURAL RESOURCES MAP" DATED OCTOBER 28, 2019.
5. TEST PIT LOCATIONS AND PERMITTED WASTEWATER SYSTEMS ARE DEPICTED BASED ON PLANS PERMITTED BY BRUNO ASSOCIATES WITH THE PROJECT NAME OWL'S FOOT SUBDIVISION, APPROVAL DATE BY THE STATE OF JULY 23, 2004.
6. PROPOSED TOWN OFFICE BUILDING, WELL, AND WASTEWATER SYSTEM DEPICTED BASED ON PLANS BY ENGINEERING VENTURES, CONSTRUCTION DOCUMENTS SET, DATED FEBRUARY 1, 2024.

LEGEND

APPROX. LOCATION OF PROPERTY LINE
EDGE OF STREAM
EXISTING 10' CONTOUR
EXISTING 50' CONTOUR
EXISTING WELL (ANR)
PUBLIC WATER SUPPLY WELL SHIELD
NATURAL SPRING (VHB)
IRON PIN FOUND (VHB)
EXISTING CULVERT
WETLAND BUFFER
WETLAND
STREAM BUFFER
HAIRY WOOD MINT
PUTTY ROOT BUFFER
BEAR HABITAT
SF SINGLE FAMILY HOME
DUPL DUPLEX BUILDING
MULTI MULTI-FAMILY BUILDING

GRAPHIC SCALE
200 0 100 200 400 800
(IN FEET)
1 inch = 200 ft.
PLOT SIZE 24" x 36"

CREATION DATE: 11/15/24
RELEASE DATE: 11/15/24
ISSUED FOR REPORT
REVISIONS:
12/02/2024: WW Disposal Sites annotated. C.Heindel, WHEM.

THE CERTIFICATION ON THIS DRAWING ONLY INDICATES THE VT REGISTERED PROFESSIONAL ENGINEER RESPONSIBLE FOR PREPARATION AND IS NOT ISSUED FOR CONSTRUCTION UNLESS NOTED IN THE REVISION BOX

REGULATORY APPROVAL STAMP

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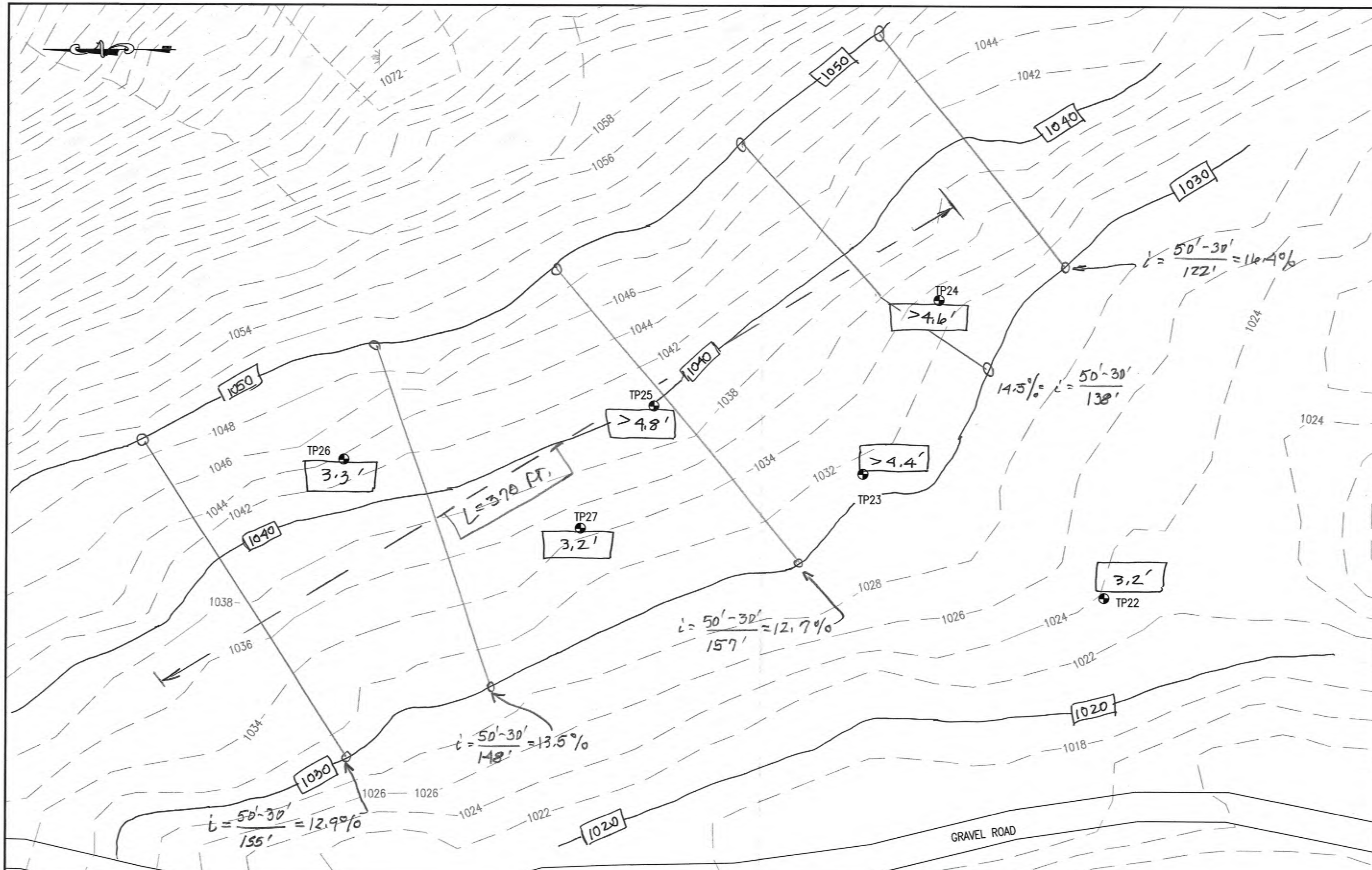
TOWN OF DORSET HOUSING STUDY

RAPTOR LANE
DORSET, VERMONT

CONCEPTUAL DEVELOPMENT SITE PLAN

SCALE: AS NOTED
DESIGN BY: PMG
DRAWN BY: KMFG
SHEET NO: C3
PROJECT NO: 2406



HYDROGEO. NOTES

3.2' DEPTH TO LIM. COND., FT.

o—o i HYDR. GRAD. (GROUND SLOPE)

C. H. WHEM. 7/12/24

GRAPHIC SCALE

PLOT SIZE 11" x 17"

40 0 20 40 80 160

(IN FEET)

1 inch = 40 ft.

3

CREATION DATE: 7/9/24

RELEASE DATE: 7/9/24

ISSUED FOR PROGRESS REVIEW

REVISIONS:

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TOWN OF DORSET HOUSING STUDY

RAPTOR LANE
DORSET, VERMONT

WASTEWATER LOCATION A

SCALE: AS NOTED

DESIGN BY: PMG

DRAWN BY: KMFG

SHEET NO: EX1

PROJECT NO: 2406

HYDROGEOLOGIC CAPACITY CALCULATIONS: WW Areas A1 and A2 combined
Wastewater Disposal
Dorset Raptor Lane
Dorset, VT

WAITE HEINDEL
Environmental Management

Assumptions:
1. Use Nov. 6, 2023 WS&PWS Rule.
2. Site-specific hydrogeologic analysis, per Section 1-903-r[1][B] [General Requirements; Hydrogeologic Analyses].
3. Effluent type: **Septic Tank Effluent**

A. <u>Calculations of Max Design Flow, using Darcy's Law</u>: Q = K * i * (L * h) * 7.48

Parameter	Description	Value	units	Calculations
K	hydr. conduct.	30	ft/day	est., from Table 1, *Hydraulic Loading Method for Detailed Soil Descriptions in Vermont*, 2003:
				Soil Texture Description: fine sandy loam; Category: 3
				Soil Structure: Shape: granular
				Soil Structure: Grade: 3 [friable = strong]
i	hydr. grad.	13%	ft/ft	Hydraulic Gradient is based on ground slope
L	cross-slope length	370	ft.	Available L, from Site Plan
h	Unsat. soil	2.8	ft.	Available depth of unsaturated transmitting soil BGS, minus 0.5-ft. freeboard: from Section B below
SOLVE FOR MAX HYDROGEOLOGIC CAPACITY, Q				
Q	**Max. Hydrogeol. Capacity**	**30,222**	**GPD**	by Darcy's Law: Q = K x i x (L x h) 7.48:
				h: 2.8 ftl; from Section B below.
				K: 30 ft/day
				i: 0.130 ft/ft
				L: 370 ft
				convert: 7.48 gal/cu.ft.
				Solve for Q = 30,222 GPD

B. <u>Calculate h, available thickness of unsat. transmitting soil, for effluent type listed in Assumption #3 above:</u>

TP providing basis of Limit. Cond. [LC] beneath WW Footprint:	Depth to Limiting Condition, ft.	Subtract Required Freeboard, ft.	Equals **Available h, ft.**
TP-26	3.3	0.5	**2.8**

<u>NOTE</u>: Required freeboard is based on MOUND wastewater disposal system, not in-ground system.

C. <u>SOLVE FOR LINEAR LOADING RATE [LLR]:</u>

1. MAX Hydrogeologic Capacity:
   30,222 GPD, from calculation of Q, above.
2. Cross-slope length used in calculation of Q, above:
   370 ft. [L].

Solve for LLR: 81.7 GPD/ft.

C. Heindel; Last revised: 10-30-2024;
[U:\PROJECTS - WHEM\Dorset Town, Raptor Lane Housing\WW Evaluations\WW Area A\Calcs, WW Capacity Estimate, Dorset Raptor Lane, WW Areas A1, A2 combined - CH, 10-30-2024.xlsx,
Tab = MaxQ, for known L, h].

Table 1. Hydraulic Loading Method for Detailed Soil Descriptions in Vermont (2003)

				Hydraulic Loading Rate (gpd/square foot) (Sorted by hydraulic gradient and % ground surface slope range as noted) based on midpoint of slope range							
Soil Texture[1]	Soil Structure[2]		K[3]	0.01	0.03	0.05	0.07	0.09	0.125	0.175	0.25
	Shape	Grade	(ft/day)	0-2%	2.1-4%	4.1-6%	6.1-8%	8.1-10%	10.1-15%	15.1-20%	20.1-30%
1 Coarse Sand, Sand,		0SG	100	7.5	22.4	37.4	52.4	67.3	93.5	130.9	187.0
Loamy Coarse Sand, Loamy Sand											
2 Fine Sand, Very Fine Sand,	--	0SG	50	3.7	11.2	18.7	26.2	33.7	46.8	65.5	93.5
Loamy Fine Sand, Loamy Very Fine Sand											
Coarse Sandy Loam, Loamy Sand											
	--	0M	50	3.7	11.2	18.7	26.2	33.7	46.8	65.5	93.5
	PL	1	25	1.9	5.6	9.4	13.1	16.8	23.4	32.7	46.8
	PL	2,3	25	1.9	5.6	9.4	13.1	16.8	23.4	32.7	46.8
	PR/BK/GR	1	40	3.0	9.0	15.0	20.9	26.9	37.4	52.4	74.8
	PR/BK/GR	2,3	50	3.7	11.2	18.7	26.2	33.7	46.8	65.5	93.5
3 Fine Sandy Loam, Very Fine Sandy Loam	--	0M	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PL	1,2,3	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PR/BK/GR	1	20	1.5	4.5	7.5	10.5	13.5	18.7	26.2	37.4
	PR/BK/GR	2,3	30	2.2	6.7	11.2	15.7	20.2	28.1	39.3	56.1
4 Loam	--	0M	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PL	1,2,3	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PR/BK/GR	1	15	1.1	3.4	5.6	7.9	10.1	14.0	19.6	28.1
	PR/BK/GR	2,3	20	1.5	4.5	7.5	10.5	13.5	18.7	26.2	37.4
5 Silt Loam	--	0M	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PL	1,2,3	5	0.4	1.1	1.9	2.6	3.4	4.7	6.5	9.4
	PR/BK/GR	1	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PR/BK/GR	2,3	20	1.5	4.5	7.5	10.5	13.5	18.7	26.2	37.4
6 Sandy Clay Loam, Clay Loam, Silty Clay Loam	--	0M	5	0.4	1.1	1.9	2.6	3.4	4.7	6.5	9.4
	PL	1,2,3	5	0.4	1.1	1.9	2.6	3.4	4.7	6.5	9.4
	PR/BK/GR	1	8	0.6	1.8	3.0	4.2	5.4	7.5	10.5	15.0
	PR/BK/GR	2,3	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
7 Sandy Clay, Clay, Silty Clay	--	0M	3	0.2	0.7	1.1	1.6	2.0	2.8	3.9	5.6
	PL	1,2,3	3	0.2	0.7	1.1	1.6	2.0	2.8	3.9	5.6
	PR/BK/GR	1	5	0.4	1.1	1.9	2.6	3.4	4.7	6.5	9.4
	PR/BK/GR	2,3	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7

Note: 1. Soil texture and structure columns are based on Tyler and Kuns (2000).

2. Structure Abbreviations: Shapes: PL = platy; BK = blocky; PR = prismatic; GR = granular
Grade: 0 = structureless; SG = single grain; M = massive; 1 = weak; 2 = moderate; 3 = strong

3. K = hydraulic conductivity (estimated)

VT DEC, 2003.

WW-A, Dorset Raptor Lane.
CH. 7/12/2024.

TP 20:
0"-8" DARK BROWN FINE SANDY LOAM TOPSOIL.
8"-32" REDDISH-BROWN FINE SANDY LOAM, FRIABLE, ROOTS, FEW STONES COMMON 12" TO 36" BOULDERS.
32"-58" BROWN LOAMY SAND VERY FRIABLE, FEW TO COMMON STONES.

NO EVIDENCE OF SEASONAL HIGH GROUND WATER.
NO LEDGE TO DEPTH.

TP 21:
0"-6" DARK BROWN FINE SANDY LOAM TOPSOIL.
6"-36" REDDISH-BROWN FINE SANDY LOAM, FRIABLE, ROOTS, FEW STONES COMMON 12" TO 36" BOULDERS.
36"-55" BROWN LOAMY SAND VERY FRIABLE, FEW TO COMMON STONES.

NO EVIDENCE OF SEASONAL HIGH GROUND WATER.
NO LEDGE TO DEPTH.

PERCOLATION RATES:
PT Q: 5.9 MINUTES PER INCH AT 18" DEPTH.
PT R: 4.9 MINUTES PER INCH AT 16" DEPTH.
PT S: 3.2 MINUTES PER INCH AT 18" DEPTH.
PT T: 5.4 MINUTES PER INCH AT 20" DEPTH.

ww-A.
TPs 22-27.
CH annotations,
7/11/24.

SOILS INFORMATION
(Gothered December & April of 2004)

TEST PITS:

TP 22:
0"-6" DARK BROWN FINE SANDY LOAM TOPSOIL.
6"-36" REDDISH-BROWN FINE SANDY LOAM, FRIABLE, ROOTS, FEW STONES COMMON 12" TO 36" BOULDERS.
36"-52" BROWN LOAMY SAND VERY FRIABLE, FEW TO COMMON STONES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 38". SHWT= 3.2'
WATER TABLE AT 38". gw = 3.2'
NO LEDGE TO DEPTH.
> 4.4' no I to 4.4'

TP 23:

0"-8" DARK BROWN FINE SANDY LOAM TOPSOIL.
8"-28" REDDISH-BROWN FINE SANDY LOAM, FRIABLE, ROOTS, FEW STONES COMMON 12" TO 36" BOULDERS.
28"-52" BROWN LOAMY SAND VERY FRIABLE, FEW TO COMMON STONES. 23

NO EVIDENCE OF SEASONAL HIGH GROUND WATER. NO LEDGE TO DEPTH.

No SHWT; gw, BR, I to 4.4'

TP 24:

0"-8" DARK BROWN FINE SANDY LOAM TOPSOIL.
8"-32" REDDISH-BROWN FINE SANDY LOAM, FRIABLE, ROOTS, FEW STONES COMMON 12" TO 36" BOULDERS.
32"-55" BROWN LOAMY SAND VERY FRIABLE, FEW TO COMMON STONES. 24

NO EVIDENCE OF SEASONAL HIGH GROUND WATER. NO LEDGE TO DEPTH.

No SHWT; gw, BR, I to 4.6'

TP 25:

0"-10" DARK BROWN FINE SANDY LOAM TOPSOIL.
10"-30" REDDISH-BROWN FINE SANDY LOAM, FRIABLE, ROOTS, FEW STONES COMMON 12" TO 36" BOULDERS.
30"-58" BROWN LOAMY SAND VERY FRIABLE, FEW TO COMMON STONES. 25

NO EVIDENCE OF SEASONAL HIGH GROUND WATER. NO LEDGE TO DEPTH.

No SHWT; gw, BR, I to 4.8'

TP 26:

0"-8" DARK BROWN FINE SANDY LOAM TOPSOIL.
8"-30" REDDISH-BROWN FINE SANDY LOAM, FRIABLE, ROOTS, FEW STONES COMMON 12" TO 36" BOULDERS.
30"-40" BROWN LOAMY SAND VERY FRIABLE, FEW TO COMMON STONES.
40"-50" TAN SILTY FINE SAND, FIRM, MOTTLED, MOIST. 26

ESTIMATED SEASONAL HIGH GROUND WATER AT 40". SHWT = 3.3' / I = 3.3'
NO LEDGE TO DEPTH.

No gw, BR to 4.2'

TP 27:

0"-8" DARK BROWN FINE SANDY LOAM TOPSOIL.
8"-28" REDDISH-BROWN FINE SANDY LOAM, FRIABLE, ROOTS, FEW STONES COMMON 12" TO 36" BOULDERS.
28"-52" BROWN LOAMY SAND VERY FRIABLE, FEW TO COMMON STONES, GETS WET AT 38".

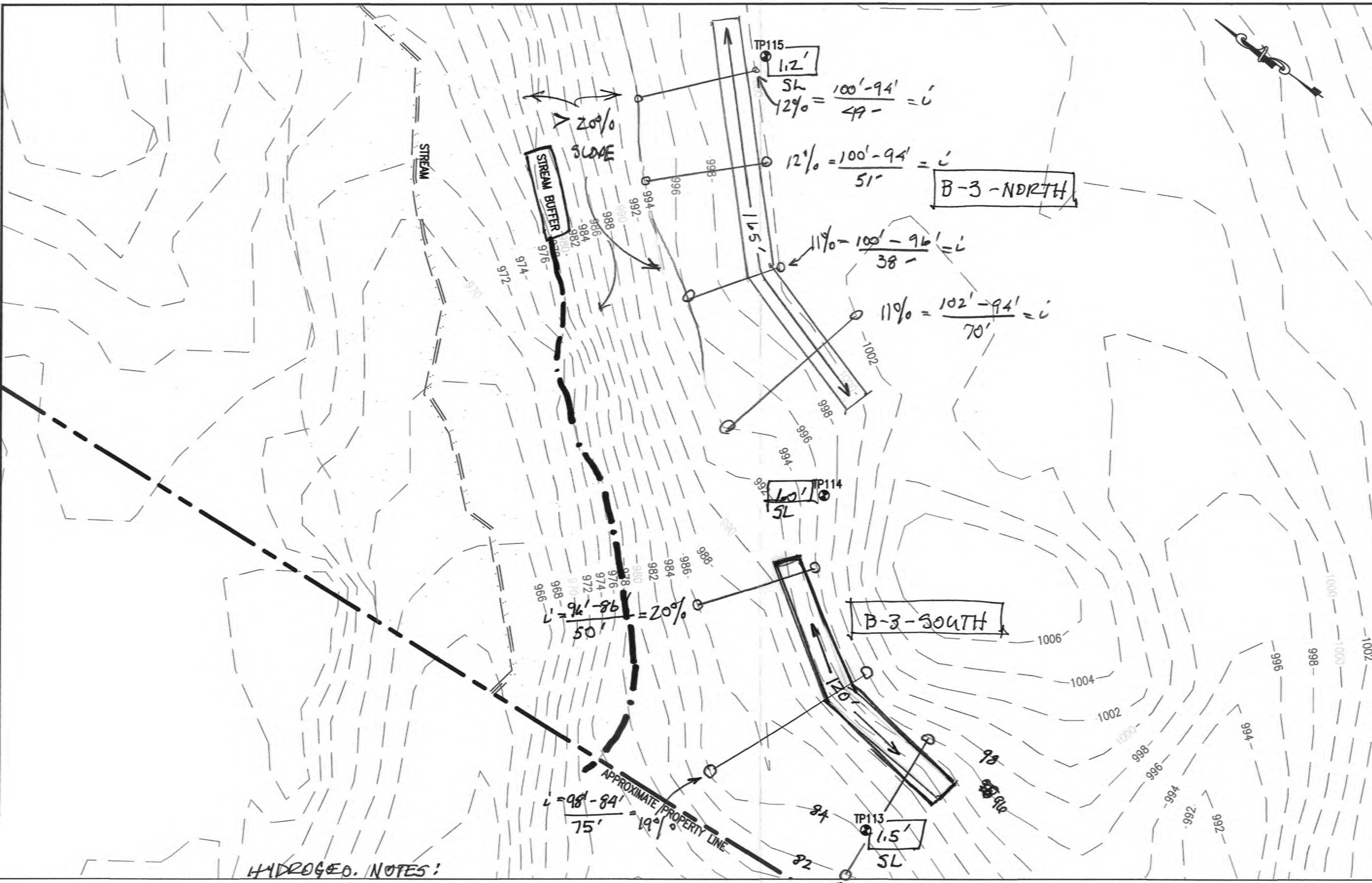
SHWT, gw = 3.2' 27

POSSIBLE SEASONAL HIGH GROUND WATER AT 38". NO LEDGE TO DEPTH.

NO I, BR to 4.3'

PERCOLATION RATES:

PT M: 4.2 MINUTES PER INCH AT 16" DEPTH.
PT N: 4.0 MINUTES PER INCH AT 16" DEPTH.
PT O: 5.9 MINUTES PER INCH AT 18" DEPTH.
PT P: 5.2 MINUTES PER INCH AT 18" DEPTH.



HYDROGEO. NOTES:

Transmitting Soil:

SL = Sandy Loam, SAB (2).

$\boxed{1.0'}$ Limiting Condition Depth, FT.

L. Heindel. 10/23/2024.

~~23~~ 24

$i' = \frac{98'-82'}{65'} = 22\%$

GRAPHIC SCALE

PLOT SIZE 11" x 17"

40 0 20 40 80 160

(IN FEET)

1 inch = 40 ft.

CREATION DATE	10/21/24
RELEASE DATE	10/21/24
ISSUED FOR PROGRESS REVIEW	
REVISIONS:	

THE CERTIFICATION ON THIS DRAWING ONLY INDICATES THE VT REGISTERED PROFESSIONAL ENGINEER RESPONSIBLE FOR PREPARATION AND IS NOT ISSUED FOR CONSTRUCTION UNLESS NOTED IN THE REVISION BOX

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TOWN OF DORSET HOUSING STUDY

RAPTOR LANE
DORSET, VERMONT

WASTEWATER LOCATION B-3

SCALE	AS NOTED
DESIGN BY	PMG
DRAWN BY	KMFG
SHEET NO	EX8
PROJECT NO	2406

PRELIMINARY HYDROGEOLOGIC CAPACITY CALCULATIONS: WW Area B-3-SOUTH

Wastewater Disposal
Dorset Raptor Lane
Dorset, VT

Assumptions:
1. Use Nov. 6, 2023 WS&PWS Rule.
2. Site-specific hydrogeologic analysis, per Section 1-903-r[1][B] [General Requirements; Hydrogeologic Analyses].
3. Effluent type: **Septic Tank Effluent**

A. Calculations of Max Design Flow, using Darcy's Law: Q = K * i * (L * h) * 7.48

Parameter	Description	Value	units	Calculations
K	hydr. conduct.	40	ft/day	est., from Table 1, *Hydraulic Loading Method for Detailed Soil Descriptions in Vermont*, 2003: Soil Texture Description: sandy loam; Category: 2 Soil Structure: Shape: subangular blocky Soil Structure: Grade: 2 [friable = moderate]
i	hydr. grad.	19%	ft/ft	Hydraulic Gradient is based on ground slope
L	cross-slope length	120	ft.	Available L, from Site Plan
h	Unsat. soil	0.5	ft.	Available depth of unsaturated transmitting soil BGS, minus 0.5-ft. freeboard: from Section B below
SOLVE FOR MAX HYDROGEOLOGIC CAPACITY, Q				
Q	**Max. Hydrogeol. Capacity**	**3,411**	**GPD**	by Darcy's Law: Q = K x i x (L x h) 7.48: h: 0.5 ftl; from Section B below. K: 40 ft/day i: 0.19 ft/ft L: 120 ft convert: 7.48 gal/cu.ft. **Solve for Q = 3,411 GPD**

B. Calculate h, available thickness of unsat. transmitting soil, for effluent type listed in Assumption #3 above:

TP providing basis of Limit. Cond. [LC] beneath WW Footprint:	Depth to Limiting Condition, ft.	Subtract Required Freeboard, ft.	Equals **Available h, ft.**
TP-114	1.0	0.5	**0.5**

NOTE: Required freeboard is based on MOUND wastewater disposal system, not in-ground system.

C. SOLVE FOR LINEAR LOADING RATE [LLR]:

1. MAX Hydrogeologic Capacity:
   3,411 GPD, from calculation of Q, above.
2. Cross-slope length used in calculation of Q, above:
   120 ft. [L].

Solve for LLR: 28.4 GPD/ft.

C. Heindel; Last revised: 10-23-2024;
[U:\PROJECTS - WHEM\Dorset Town, Raptor Lane Housing\WW Evaluations\WW Area B3\Calcs, WW Capacity Esimate, Dorset Raptor Lane, WW Area B3 - CH, 10-23-2024.xlsx, Tab = B3-SOUTH MaxQ, for known L, h].

PRELIMINARY **HYDROGEOLOGIC CAPACITY CALCULATIONS: WW Area B-3-NORTH**

Wastewater Disposal

Dorset Raptor Lane

Dorset, VT

Assumptions:

1. Use Nov. 6, 2023 WS&PWS Rule.
2. Site-specific hydrogeologic analysis, per Section 1-903-r[1][B] [General Requirements; Hydrogeologic Analyses].
3. Effluent type: **Septic Tank Effluent**

A. Calculations of Max Design Flow, using Darcy's Law: Q = K * i * (L * h) * 7.48

Parameter	Description	Value	units	Calculations
K	hydr. conduct.	40	ft/day	est., from Table 1, *Hydraulic Loading Method for Detailed Soil Descriptions in Vermont*, 2003:
				Soil Texture Description: sandy loam; Category: 2
				Soil Structure: Shape: subangular blocky
				Soil Structure: Grade: 2 [friable = moderate]
i	hydr. grad.	11%	ft/ft	Hydraulic Gradient is based on ground slope
L	cross-slope length	165	ft.	Available L, from Site Plan
h	Unsat. soil	0.5	ft.	Available depth of unsaturated transmitting soil BGS, minus 0.5-ft. freeboard: from Section B below
SOLVE FOR MAX HYDROGEOLOGIC CAPACITY, Q				
Q	**Max. Hydrogeol. Capacity**	**2,715**	**GPD**	by Darcy's Law: Q = K x i x (L x h) 7.48:
				h: 0.5 ftl; from Section B below.
				K: 40 ft/day
				i: 0.11 ft/ft
				L: 165 ft
				convert: 7.48 gal/cu.ft.
				Solve for Q = 2,715 GPD

B. Calculate h, available thickness of unsat. transmitting soil, for effluent type listed in Assumption #3 above:

TP providing basis of Limit. Cond. [LC] beneath WW Footprint:	Depth to Limiting Condition, ft.	Subtract Required Freeboard, ft.	Equals **Available h, ft.**
TP-114	1.0	0.5	**0.5**

NOTE: Required freeboard is based on MOUND wastewater disposal system, not in-ground system.

C. SOLVE FOR LINEAR LOADING RATE [LLR]:

1. MAX Hydrogeologic Capacity:
   2,715 GPD, from calculation of Q, above.
2. Cross-slope length used in calculation of Q, above:
   165 ft. [L].

Solve for LLR: 16.5 GPD/ft.

C. Heindel; Last revised: 10-24-2024;
[U:\PROJECTS - WHEM\Dorset Town, Raptor Lane Housing\WW Evaluations\WW Area B3\Calcs, WW Capacity Esimate, Dorset Raptor Lane, WW Area B3 - CH, 10-23-2024.xlsx, Tab = B3-NORTH MaxQ, for known L, h].

ENMAN •KESSELRING CONSULTING ENGINEERS, P.C.

SOIL DESCRIPTION FORM

Test Pit Summary

Client:	Town of Dorset
By:	Patrick Griffin, P.E.
Location:	D-2 near Pod 7
Approx. Slope:	5-10%

Job #:	2406
Date:	9/19/2024
Weather:	Sunny, 65 degrees F
Excavation method: Excavator	

TP #	Depth (in)	Color	Texture	Structure	Consistence	Mottles	Remarks (ledge depth, root depth, cobbles, etc.)
101	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-24	10 YR 4/4	Loam (L)	SAB	Very Friable	No	20% cobbles, 10% stones
	24-30	10 YR 5/6	Medium to coarse gravel	Granular	Loose	No	
	30-72	10 YR 6/4	Silt Loam (> CDS)	SAB	Firm	Yes at 30", Faint	20% cobbles, 10% stones
	2.5'						Roots to 36", no ledge rock encountered
	Limiting Layer: 30"						
102	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-18	10 YR 4/4	Loam $\boxed{L}$	SAB	Very friable	No	20% cobbles, 10% stones
	18-48	10 YR 6/4	Silt Loam	SAB	Firm	Yes at 18", Faint	20% cobbles, 10% stones
	1.5'						No ledge rock encountered
							Roots to 24", no ledge rock encountered
	Limiting Layer: 18" 1.5'						

CH NOTES. 10/2024.

ENMAN •KESSELRING CONSULTING ENGINEERS, P.C.

SOIL DESCRIPTION FORM

Test Pit Summary

Client:	Town of Dorset
By:	Patrick Griffin, P.E.
Location:	D-3, E, B-3, B-4
Approx. Slope:	Varies

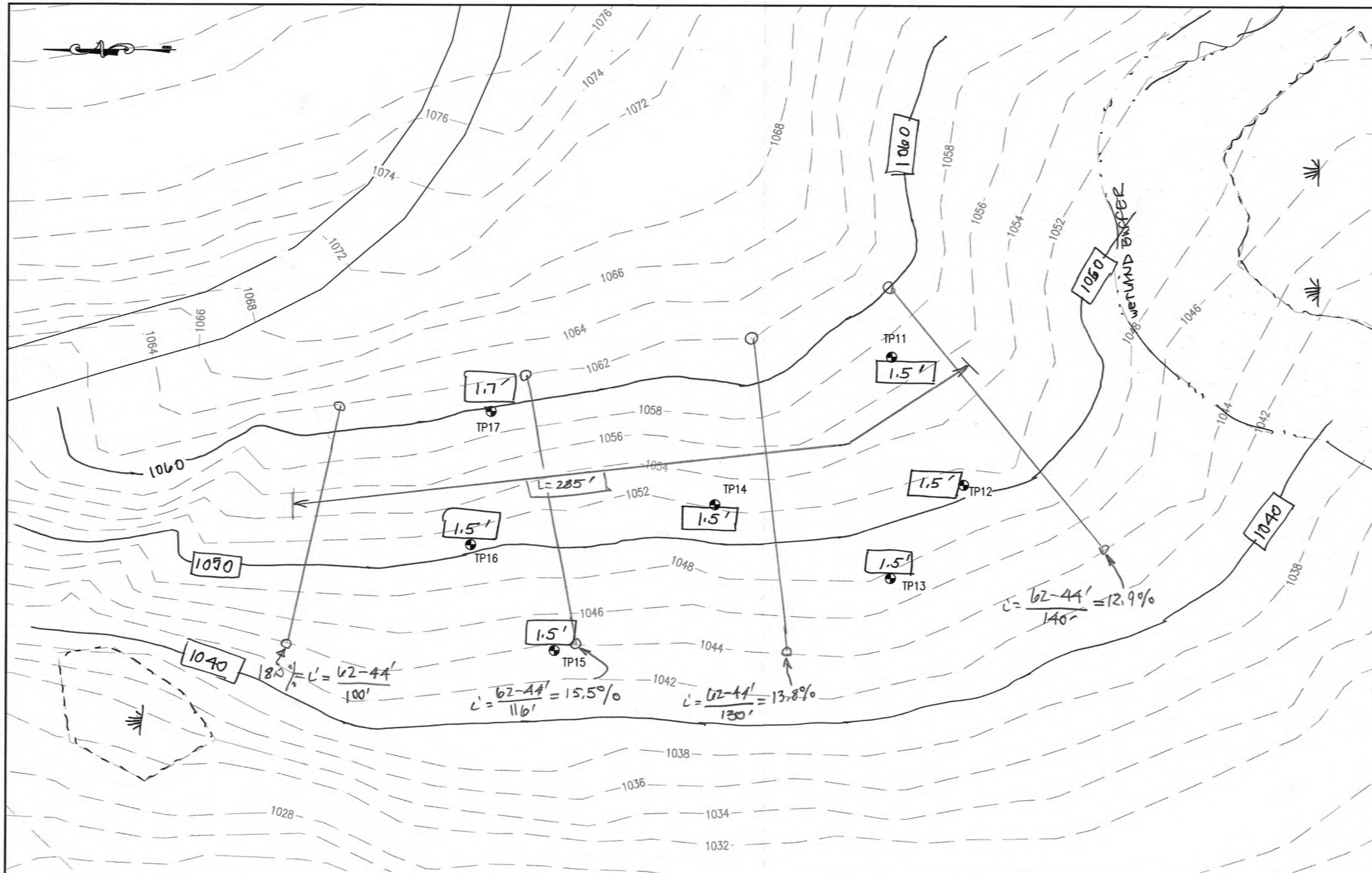
Job #:	2406
Date:	10/21/2024
Weather:	Sunny, 50 degrees F
Excavation method: Excavator	

TP #	Depth (in)	Color	Texture	Structure	Consistence	Mottles	Remarks (ledge depth, root depth, cobbles, etc.)
103	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-18	10 YR 5/6	Sandy Loam SL	SAB	Very Friable	No	
	18-48	10 YR 5/3	Silt Loam	SAB	Firm	No	10% stones, 10% gravel
							Roots to 24", no ledge rock encountered
	Limiting Layer: 18" ✓ 1.5'						
104	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-14	10 YR 5/6	Sandy Loam SL	SAB	Very Friable	No	
	14-42	10 YR 5/3	Silt Loam	SAB	Firm	No	20% stones, 20% gravel
							Roots to 24", ledge rock refusal at 42"
	Limiting Layer: 14" ✓ 1.2'						
105	0-2	10 YR 3/3	Loam	SAB	Friable	No	
	2-6	10 YR 5/6	Sandy Loam SL	SAB	Very Friable	No	
	6-54	10 YR 5/3	Silt Loam	SAB	Firm	No	20% stones, 20% gravel
							Roots to 24", no ledge rock encountered
	Limiting Layer: 6" 0.5'						
106	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-12	10 YR 5/6	Sandy Loam SL	SAB	Very Friable	No	
	12-38	10 YR 5/3	Silt Loam	SAB	Firm	No	20% stones, 20% gravel
							Roots to 30", ledge rock refusal at 38"
	Limiting Layer: 12" ✓ 1.0'						
107	0-4	10 YR 3/3	Loam	SAB	Friable	No	
	4-12	10 YR 3/6	Sandy Loam	SAB	Friable	No	10% cobbles
	12-48	10 YR 3/4	Gravelly Sand COS	Granular	Loose	No	40% cobbles and stones
							Roots to 36", ledge rock refusal at 48"
	Limiting Layer: 48" ✓ 4.0						BR = 4.0'
108	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-18	10 YR 3/4	Sandy Loam	SAB	Friable	No	10% cobbles and stones
	18-34	10 YR 5/6	Loamy Sand LS	SAB	Friable	No	10% cobbles and stones
							Roots to 24", ledge rock refusal at 34"
	Limiting Layer: 34" 2.8' BR						BR at 2.8'
109	0-5	10 YR 3/3	Loam	SAB	Friable	No	
	5-30	10 YR 4/4	Sandy Loam	SAB	Friable	No	10% cobbles
	30-60	10 YR 3/4	Gravelly Sand COS	Granular	Loose	No	20% cobbles and stones
	> 5.0'						Roots to 36", no ledge rock encountered
	Limiting Layer: none identified to 5.0'						

CH NOTES, 10/2024.

110	0-5	10 YR 3/3	Loam	SAB	Friable	No	
	5-24	10 YR 4/4	Sandy Loam	SAB	Friable	No	10% cobbles
	24-36	10 YR 3/4	Gravelly Sand CDS	Granular	Loose	No	20% cobbles and stones
							Roots to 30", ledge rock refusal at 36"
	Limiting Layer: 36" 3.0' BR						BR at 3.0'
111	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-24	10 YR 4/4	Sandy Loam	SAB	Friable	No	10% cobbles
	24-60	10 YR 3/4	Gravelly Sand CDS	Granular	Loose	No	20% cobbles and stones
							Roots to 36", ledge rock refusal at 60"
	Limiting Layer: 60" BR, 5.0'						BR at 5.0'
112	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-30	10 YR 4/4	Sandy Loam SL	SAB	Friable	No	10% cobbles
							Roots to 24", ledge rock refusal at 30"
	Limiting Layer: 30" 2.5'						BR at 2.5'
113	0-2	10 YR 3/3	Loam	SAB	Friable	No	
	2-18	10 YR 3/4	Sandy Loam SL	SAB	Friable	No	
	18-42	10 YR 5/3	Sandy Loam Till	SAB	Firm	No	
	1.5'						Roots to 24", no ledge rock encountered
	Limiting Layer: 18" = 1.5'						
114	0-2	10 YR 3/3	Loam	SAB	Friable	No	
	2-12	10 YR 3/4	Sandy Loam SL	SAB	Friable	No	
	12-36	10 YR 5/3	Sandy Loam Till	SAB	Firm	No	
	1.0'						Roots to 30", no ledge rock encountered
	Limiting Layer: 12" = 1.0'						
115	0-2	10 YR 3/3	Loam	SAB	Friable	No	
	2-14	10 YR 3/4	Sandy Loam SL	SAB	Friable	No	
	14-36	10 YR 5/3	Sandy Loam Till	SAB	Firm	No	
	1.2'						Roots to 24", no ledge rock encountered
	Limiting Layer: 14" = 1.2'						
116	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-8	10 YR 3/4	Sandy Loam SL	SAB	Friable	No	
	8-48	10 YR 5/3	Sandy Loam Till	SAB	Firm	No	
	0.7'						Roots to 14", no ledge rock encountered
	Limiting Layer: 8" = 0.7'						
117	0-2	10 YR 3/3	Loam	SAB	Friable	No	
	2-12	10 YR 3/4	Sandy Loam SL	SAB	Friable	No	
	12-42	10 YR 5/3	Sandy Loam Till	SAB	Firm	No	
	1.0'						Roots to 24", no ledge rock encountered
	Limiting Layer: 12" = 1.0'						

CH NOTES, 10/2024.



HYDROGEO. NOTES

$\boxed{1.5'}$ DEPTH TO LIM. COND., ft.

i HYDR. GRAD. (GROUND SLOPE)

C. HEINDEL, WHEM. 7/12/2024.

GRAPHIC SCALE

PLOT SIZE 11" x 17"

40 0 20 40 80 160

(IN FEET)

1 inch = 40 ft.

CREATION DATE: 7/9/24

RELEASE DATE: 7/9/24

ISSUED FOR PROGRESS REVIEW

REVISIONS:

THE CERTIFICATION ON THIS DRAWING ONLY INDICATES THE VT REGISTERED PROFESSIONAL ENGINEER RESPONSIBLE FOR PREPARATION AND IS NOT ISSUED FOR CONSTRUCTION UNLESS NOTED IN THE REVISION BOX

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TOWN OF DORSET HOUSING STUDY

RAPTOR LANE
DORSET, VERMONT

WASTEWATER LOCATION B

SCALE: AS NOTED

DESIGN BY: PMG

DRAWN BY: KMFG

SHEET NO: EX2

PROJECT NO: 2406

HYDROGEOLOGIC CAPACITY CALCULATIONS: WW Areas B1 and B2 combined
Wastewater Disposal
Dorset Raptor Lane
Dorset, VT

Assumptions:
1. Use Nov. 6, 2023 WS&PWS Rule.
2. Site-specific hydrogeologic analysis, per Section 1-903-r[1][B] [General Requirements; Hydrogeologic Analyses].
3. Effluent type: **Septic Tank Effluent**

A. Calculations of Max Design Flow, using Darcy's Law: Q = K * i * (L * h) * 7.48

Parameter	Description	Value	units	Calculations
K	hydr. conduct.	30	ft/day	est., from Table 1, *Hydraulic Loading Method for Detailed Soil Descriptions in Vermont*, 2003: Soil Texture Description: fine sandy loam; Category: 3 Soil Structure: Shape: granular Soil Structure: Grade: 3 [friable = strong]
i	hydr. grad.	13%	ft/ft	Hydraulic Gradient is based on ground slope
L	cross-slope length	285	ft.	Available L, from Site Plan
h	Unsat. soil	1.0	ft.	Available depth of unsaturated transmitting soil BGS, minus 0.5-ft. freeboard: from Section B below
SOLVE FOR MAX HYDROGEOLOGIC CAPACITY, Q				
Q	**Max. Hydrogeol. Capacity**	**8,314**	**GPD**	by Darcy's Law: Q = K x i x (L x h) 7.48: h: 1.0 ftl; from Section B below. K: 30 ft/day i: 0.130 ft/ft L: 285 ft convert: 7.48 gal/cu.ft. **Solve for Q = 8,314 GPD**

B. Calculate h, available thickness of unsat. transmitting soil, for effluent type listed in Assumption #3 above:

TP providing basis of Limit. Cond. [LC] beneath WW Footprint:	Depth to Limiting Condition, ft.	Subtract Required Freeboard, ft.	Equals **Available h, ft.**
TP-11-16	1.5	0.5	**1.0**

NOTE: Required freeboard is based on MOUND wastewater disposal system, not in-ground system.

C. SOLVE FOR LINEAR LOADING RATE [LLR]:

1. MAX Hydrogeologic Capacity:
   8,314 GPD, from calculation of Q, above.
2. Cross-slope length used in calculation of Q, above:
   285 ft. [L].

Solve for LLR: 29.2 GPD/ft.

C. Heindel; Last revised: 10-30-2024;
[U:\PROJECTS - WHEM\Dorset Town, Raptor Lane Housing\WW Evaluations\WW Area B\Calcs, WW Capacity Estimate, Dorset Raptor Lane, WW Areas B1, B2 - CH, 10-30-2024.xlsx,
Tab = MaxQ, for known L, h].

Table 1. Hydraulic Loading Method for Detailed Soil Descriptions in Vermont (2003)

				Hydraulic Loading Rate (gpd/square foot) (Sorted by hydraulic gradient and % ground surface slope range as noted) based on midpoint of slope range							
Soil Texture[1]	Soil Structure[2]		K^3	0.01	0.03	0.05	0.07	0.09	0.125	0.175	0.25
	Shape	Grade	(ft/day)	0-2%	2.1-4%	4.1-6%	6.1-8%	8.1-10%	10.1-15%	15.1-20%	20.1-30%
1 Coarse Sand, Sand,		0SG	100	7.5	22.4	37.4	52.4	67.3	93.5	130.9	187.0
Loamy Coarse Sand, Loamy Sand											
2 Fine Sand, Very Fine Sand,	--	0SG	50	3.7	11.2	18.7	26.2	33.7	46.8	65.5	93.5
Loamy Fine Sand, Loamy Very Fine Sand											
Coarse Sandy Loam, Loamy Sand											
	--	0M	50	3.7	11.2	18.7	26.2	33.7	46.8	65.5	93.5
	PL	1	25	1.9	5.6	9.4	13.1	16.8	23.4	32.7	46.8
	PL	2,3	25	1.9	5.6	9.4	13.1	16.8	23.4	32.7	46.8
	PR/BK/GR	1	40	3.0	9.0	15.0	20.9	26.9	37.4	52.4	74.8
	PR/BK/GR	2,3	50	3.7	11.2	18.7	26.2	33.7	46.8	65.5	93.5
3 Fine Sandy Loam, Very Fine Sandy Loam	--	0M	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PL	1,2,3	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PR/BK/GR	1	20	1.5	4.5	7.5	10.5	13.5	18.7	26.2	37.4
	PR/BK/GR	2,3	30	2.2	6.7	11.2	15.7	20.2	28.1	39.3	56.1
4 Loam	--	0M	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PL	1,2,3	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PR/BK/GR	1	15	1.1	3.4	5.6	7.9	10.1	14.0	19.6	28.1
	PR/BK/GR	2,3	20	1.5	4.5	7.5	10.5	13.5	18.7	26.2	37.4
5 Silt Loam	--	0M	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PL	1,2,3	5	0.4	1.1	1.9	2.6	3.4	4.7	6.5	9.4
	PR/BK/GR	1	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PR/BK/GR	2,3	20	1.5	4.5	7.5	10.5	13.5	18.7	26.2	37.4
6 Sandy Clay Loam, Clay Loam, Silty Clay Loam	--	0M	5	0.4	1.1	1.9	2.6	3.4	4.7	6.5	9.4
	PL	1,2,3	5	0.4	1.1	1.9	2.6	3.4	4.7	6.5	9.4
	PR/BK/GR	1	8	0.6	1.8	3.0	4.2	5.4	7.5	10.5	15.0
	PR/BK/GR	2,3	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
7 Sandy Clay, Clay, Silty Clay	--	0M	3	0.2	0.7	1.1	1.6	2.0	2.8	3.9	5.6
	PL	1,2,3	3	0.2	0.7	1.1	1.6	2.0	2.8	3.9	5.6
	PR/BK/GR	1	5	0.4	1.1	1.9	2.6	3.4	4.7	6.5	9.4
	PR/BK/GR	2,3	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7

Note: 1. Soil texture and structure columns are based on Tyler and Kuns (2000).
2. Structure Abbreviations: Shapes: PL = platy; BK = blocky; PR = prismatic; GR = granular
Grade: 0 = structureless; SG = single grain; M = massive; 1 = weak; 2 = moderate; 3 = strong
3. K = hydraulic conductivity (estimated)

VT DEC, 2003.

WW-B, Dorset Raptor Lane.

CH. 7/12/2024.

SOILS INFORMATION

(Gathered December & April of 2004)

TEST PITS:

WW-B.
TPs 11-17.
CH annotations,
7-11-2024.

TP 11:

0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-18" REDDISH-BROWN FINE SANDY LOAM, FRIABLE, ROOTS, FEW STONES.
18"-50" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 18"/22" (CONTACT VARIES).
NO LEDGE TO DEPTH.

I, SHWT = 1.5'
No GW, BR to 4.2'
11

TP 12:

0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-18" REDDISH-BROWN FINE SANDY LOAM, FRIABLE, ROOTS, FEW STONES.
18"-48" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 18"/22" (CONTACT VARIES).
NO LEDGE TO DEPTH.

I, SHWT = 1.5'
No GW, BR to 4.0'
12

TP 13:

0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-18" REDDISH-BROWN FINE SANDY LOAM, FRIABLE, ROOTS, FEW STONES.
18"-55" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 18"/31" (CONTACT VARIES).
NO LEDGE TO DEPTH.

I, SHWT = 1.5'
No GW, BR to 4.6'
13

TP 14:

0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-18" REDDISH-BROWN FINE SANDY LOAM, FRIABLE, ROOTS, FEW STONES.
18"-66" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 18"/48" (CONTACT VARIES).
NO LEDGE TO DEPTH.

I, SHWT = 1.5'
No GW, BR to 5.5'
14

TP 15:

0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-18" REDDISH-BROWN FINE SANDY LOAM, FRIABLE, ROOTS, FEW STONES.
18"-48" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 18"/20" (CONTACT VARIES).
SEEPS AT 30".
NO LEDGE TO DEPTH.

I, SHWT = 1.5'
GW = 2.5'
No BR to 4.0'
15

TP 16:
0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-18" REDDISH-BROWN FINE SANDY LOAM, FRIABLE, ROOTS, FEW STONES.
18"-50" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 18"/20" (CONTACT VARIES).
SEEPS AT 30".
NO LEDGE TO DEPTH.

I, SHWT = 1.5'
gw = 2.5'
No BR to 4.2'
16

TP 17:
0"-6" DARK BROWN FINE SANDY LOAM TOPSOIL.
6"-20" REDDISH-BROWN FINE SANDY LOAM, FRIABLE, ROOTS, FEW STONES.
20"-44" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 20".
NO LEDGE TO DEPTH.

I, SHWT = 1.7'
No gw, BR to 3.7'
17

PERCOLATION RATES:
PT U: 18 MINUTES PER INCH AT 20" DEPTH.
PT V: 14 MINUTES PER INCH AT 18" DEPTH.
PT W: 14 MINUTES PER INCH AT 20" DEPTH.
PT X: 22 MINUTES PER INCH AT 22" DEPTH.

SOILS INFORMATION
(Gathered December & April of 2004)

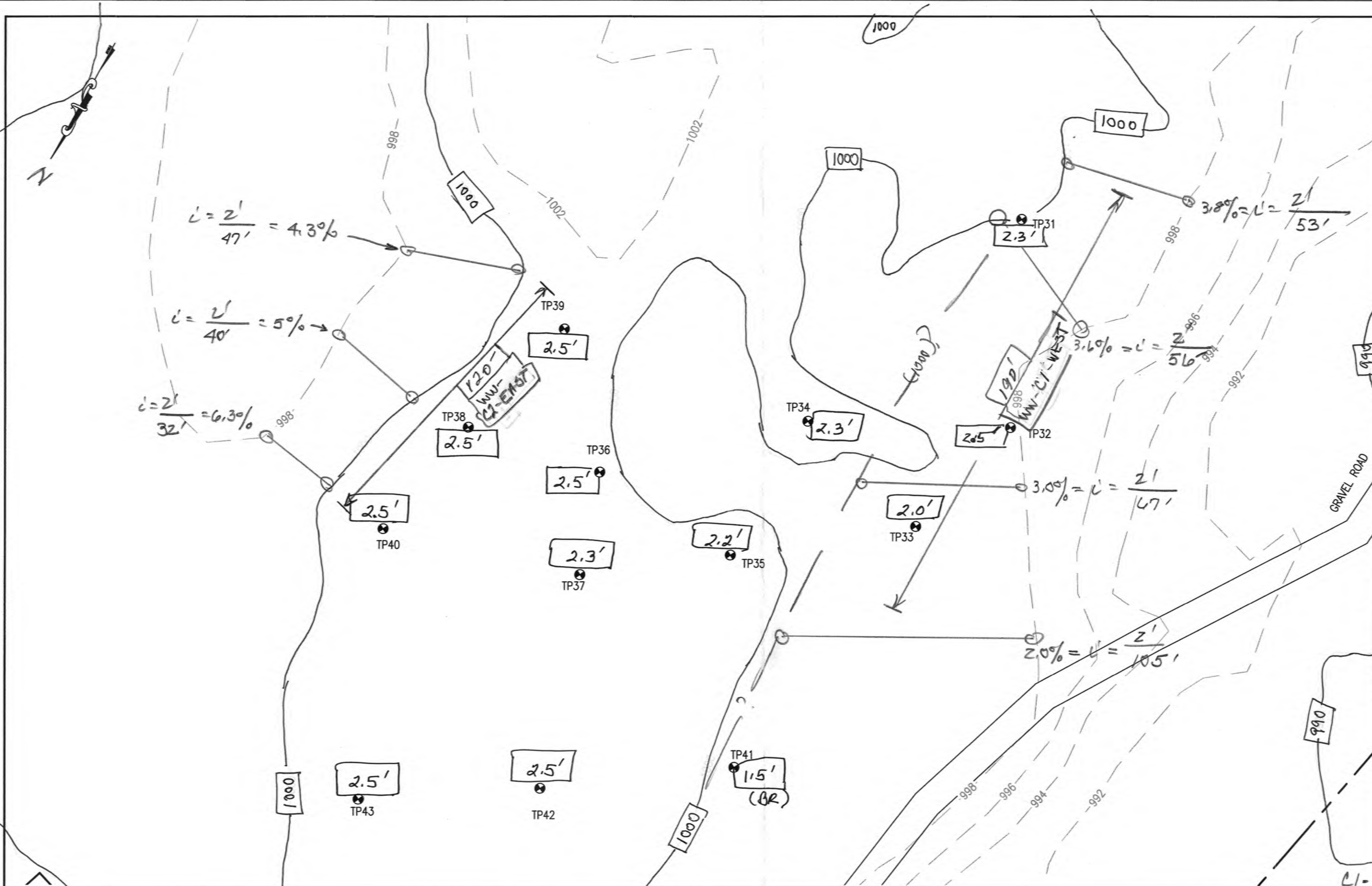
TEST PITS:

TP 18:
0"-10" DARK BROWN FINE SANDY LOAM TOPSOIL.
10"-60" REDDISH-BROWN FINE SANDY LOAM, FRIABLE, ROOTS, FEW STONES COMMON 12" TO 36" BOULDERS.

ESTIMATED SEASONAL HIGH GROUND WATER AT 50".
WATER TABLE AT 50".
NO LEDGE TO DEPTH.

TP 19:
0"-6" DARK BROWN FINE SANDY LOAM TOPSOIL.
6"-36" REDDISH-BROWN FINE SANDY LOAM, FRIABLE, ROOTS, FEW STONES COMMON 12" TO 36" BOULDERS.
36"-52" BROWN LOAMY SAND VERY FRIABLE, FEW TO COMMON STONES.

NO EVIDENCE OF SEASONAL HIGH GROUND WATER.
NO LEDGE TO DEPTH.



HYDROGEOLOGIC NOTES

2.5' DEPTH TO HM. COND., ft.

i Hydr. Cond. (Ground slope)

C. Heindel, WHEM, 7/15/2024.

GRAPHIC SCALE

PLOT SIZE 11" x 17"

40 0 20 40 80 160

(IN FEET)

1 inch = 40 ft.

CREATION DATE:	7/9/24
RELEASE DATE:	7/9/24
ISSUED FOR PROGRESS REVIEW	
REVISIONS:	

THE CERTIFICATION ON THIS DRAWING ONLY INDICATES THE VT REGISTERED PROFESSIONAL ENGINEER RESPONSIBLE FOR PREPARATION AND IS NOT ISSUED FOR CONSTRUCTION UNLESS NOTED IN THE REVISION BOX.

REGULATORY APPROVAL STAMP

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TOWN OF DORSET HOUSING STUDY

RAPTOR LANE
DORSET, VERMONT

WASTEWATER LOCATION C

C1-WEST + C2-EAST

SCALE:	AS NOTED
DESIGN BY:	PMG
DRAWN BY:	KMFG
SHEET NO:	EX3 UPDATED 10/24
PROJECT NO:	2406

WW-C-EAST (C2) + WEST (C1) / 7/2024

HYDROGEOLOGIC CAPACITY CALCULATIONS: WW Area C1-WEST
Wastewater Disposal
Dorset Raptor Lane
Dorset, VT

Assumptions:
1. Use Nov. 6, 2023 WS&PWS Rule.
2. Site-specific hydrogeologic analysis, per Section 1-903-r[1][B] [General Requirements; Hydrogeologic Analyses].
3. Effluent type: **Septic Tank Effluent**

A. Calculations of Max Design Flow, using Darcy's Law: Q = K * i * (L * h) * 7.48

Parameter	Description	Value	units	Calculations
K	hydr. conduct.	30	ft/day	est., from Table 1, *Hydraulic Loading Method for Detailed Soil Descriptions in Vermont*, 2003:
				Soil Texture Description: fine sandy loam; Category: 3 Soil Structure: Shape: granular Soil Structure: Grade: 3 [friable = strong]
i	hydr. grad.	3%	ft/ft	Hydraulic Gradient is based on ground slope
L	cross-slope length	190	ft.	Available L, from Site Plan
h	Unsat. soil	1.5	ft.	Available depth of unsaturated transmitting soil BGS, minus 0.5-ft. freeboard: from Section B below
SOLVE FOR MAX HYDROGEOLOGIC CAPACITY, Q				
Q	**Max. Hydrogeol. Capacity**	**1,919**	**GPD**	by Darcy's Law: Q = K x i x (L x h) 7.48: h: 1.5 ftl; from Section B below. K: 30 ft/day i: 0.030 ft/ft L: 190 ft convert: 7.48 gal/cu.ft. **Solve for Q = 1,919 GPD**

B. Calculate h, available thickness of unsat. transmitting soil, for effluent type listed in Assumption #3 above:

TP providing basis of Limit. Cond. [LC] beneath WW Footprint:	Depth to Limiting Condition, ft.	Subtract Required Freeboard, ft.	Equals **Available h, ft.**
TP-33	2.0	0.5	**1.5**

NOTE: Required freeboard is based on MOUND wastewater disposal system, not in-ground system.

C. SOLVE FOR LINEAR LOADING RATE [LLR]:

1. MAX Hydrogeologic Capacity:
   1,919 GPD, from calculation of Q, above.
2. Cross-slope length used in calculation of Q, above:
   190 ft. [L].

Solve for LLR: 10.1 GPD/ft.

Table 1. Hydraulic Loading Method for Detailed Soil Descriptions in Vermont (2003)

				Hydraulic Loading Rate (gpd/square foot) (Sorted by hydraulic gradient and % ground surface slope range as noted) based on midpoint of slope range							
Soil Texture[1]	Soil Structure[2]		K[3]	0.01	0.03	0.05	0.07	0.09	0.125	0.175	0.25
	Shape	Grade	(ft/day)	0-2%	2.1-4%	4.1-6%	6.1-8%	8.1-10%	10.1-15%	15.1-20%	20.1-30%
1 Coarse Sand, Sand,		0SG	100	7.5	22.4	37.4	52.4	67.3	93.5	130.9	187.0
Loamy Coarse Sand, Loamy Sand											
2 Fine Sand, Very Fine Sand,	--	0SG	50	3.7	11.2	18.7	26.2	33.7	46.8	65.5	93.5
Loamy Fine Sand, Loamy Very Fine Sand											
Coarse Sandy Loam, Loamy Sand											
	--	0M	50	3.7	11.2	18.7	26.2	33.7	46.8	65.5	93.5
	PL	1	25	1.9	5.6	9.4	13.1	16.8	23.4	32.7	46.8
	PL	2,3	25	1.9	5.6	9.4	13.1	16.8	23.4	32.7	46.8
	PR/BK/GR	1	40	3.0	9.0	15.0	20.9	26.9	37.4	52.4	74.8
	PR/BK/GR	2,3	50	3.7	11.2	18.7	26.2	33.7	46.8	65.5	93.5
* 3 Fine Sandy Loam, Very Fine Sandy Loam	--	0M	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PL	1,2,3	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PR/BK/GR	1	20	1.5	4.5	7.5	10.5	13.5	18.7	26.2	37.4
	PR/BK/GR	2,3	30	2.2	6.7	11.2	15.7	20.2	28.1	39.3	56.1
4 Loam	--	0M	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PL	1,2,3	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PR/BK/GR	1	15	1.1	3.4	5.6	7.9	10.1	14.0	19.6	28.1
	PR/BK/GR	2,3	20	1.5	4.5	7.5	10.5	13.5	18.7	26.2	37.4
5 Silt Loam	--	0M	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PL	1,2,3	5	0.4	1.1	1.9	2.6	3.4	4.7	6.5	9.4
	PR/BK/GR	1	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PR/BK/GR	2,3	20	1.5	4.5	7.5	10.5	13.5	18.7	26.2	37.4
6 Sandy Clay Loam, Clay Loam, Silty Clay Loam	--	0M	5	0.4	1.1	1.9	2.6	3.4	4.7	6.5	9.4
	PL	1,2,3	5	0.4	1.1	1.9	2.6	3.4	4.7	6.5	9.4
	PR/BK/GR	1	8	0.6	1.8	3.0	4.2	5.4	7.5	10.5	15.0
	PR/BK/GR	2,3	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
7 Sandy Clay, Clay, Silty Clay	--	0M	3	0.2	0.7	1.1	1.6	2.0	2.8	3.9	5.6
	PL	1,2,3	3	0.2	0.7	1.1	1.6	2.0	2.8	3.9	5.6
	PR/BK/GR	1	5	0.4	1.1	1.9	2.6	3.4	4.7	6.5	9.4
	PR/BK/GR	2,3	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7

Note: 1. Soil texture and structure columns are based on Tyler and Kuns (2000).
2. Structure Abbreviations: Shapes: PL = platy; BK = blocky; PR = prismatic; GR = granular
Grade: 0 = structureless; SG = single grain; M = massive; 1 = weak; 2 = moderate; 3 = strong
3. K = hydraulic conductivity (estimated)

VT DEC, 2003.

WW-C, EAST and WEST, Dorset Raptor Lane.

CH. 7/15/2024.

TP 27:
0"-8" DARK BROWN FINE SANDY LOAM TOPSOIL.
8"-28" REDDISH-BROWN FINE SANDY LOAM, FRIABLE, ROOTS, FEW STONES COMMON 12" TO 36" BOULDERS.
28"-52" BROWN LOAMY SAND VERY FRIABLE, FEW TO COMMON STONES, GETS WET AT 38".

POSSIBLE SEASONAL HIGH GROUND WATER AT 38".
NO LEDGE TO DEPTH.

PERCOLATION RATES:
PT I: 6.0 MINUTES PER INCH AT 18" DEPTH.
PT J: 4.3 MINUTES PER INCH AT 16" DEPTH.
PT K: 5.5 MINUTES PER INCH AT 20" DEPTH.
PT L: 5.8 MINUTES PER INCH AT 18" DEPTH.

SOILS INFORMATION

(Gathered December & April of 2004)

WW-C.
TPs 31-43.
CH annotations,
7-11-2024.

TEST PITS:

TP 31:
0"-8" DARK BROWN FINE SANDY LOAM TOPSOIL.
8"-28" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
28"-48" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

I, SHWT = 2.3'
NO gw, BR to 4.0'
31

ESTIMATED SEASONAL HIGH GROUND WATER AT 28".
NO LEDGE TO DEPTH.

TP 32:
0"-6" DARK BROWN FINE SANDY LOAM TOPSOIL.
6"-30" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
30"-42" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

I, SHWT = 2.5'
NO gw, BR to 3.5'
32

ESTIMATED SEASONAL HIGH GROUND WATER AT 30".
NO LEDGE TO DEPTH.

TP 33:
0"-8" DARK BROWN FINE SANDY LOAM TOPSOIL.
8"-24" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
24"-40" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

I, SHWT = 2.0'
NO gw, BR to 3.3'
33

ESTIMATED SEASONAL HIGH GROUND WATER AT 24".
NO LEDGE TO DEPTH.

TP 34:

0"-6" DARK BROWN FINE SANDY LOAM TOPSOIL.
6"-27" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
27"-46" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

1, SHWT = 2.3'
NO gw, BR to 3.8'
34

ESTIMATED SEASONAL HIGH GROUND WATER AT 27".
NO LEDGE TO DEPTH.

TP 35:

0"-6" DARK BROWN FINE SANDY LOAM TOPSOIL.
6"-26" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.

NO I, SHWT, gw to 2.2'
BR = 2.2'
35

NO EVIDENCE OF SEASONAL HIGH GROUND WATER.
LEDGE AT 26".

TP 36:

0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-30" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
30"-48" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

1, SHWT = 2.5'
NO gw, BR to 4.0'
36

ESTIMATED SEASONAL HIGH GROUND WATER AT 30".
NO LEDGE TO DEPTH.

TP 37:

0"-6" DARK BROWN FINE SANDY LOAM TOPSOIL.
6"-27" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.

NO I, SHWT, gw to 2.3'
BR = 2.3'
37

NO EVIDENCE OF SEASONAL HIGH GROUND WATER.
LEDGE AT 27"/40" (CONTACT VARIES).

TP 38:

0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-30" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
30"-48" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

1, SHWT = 2.5'
NO gw, BR to 4.0'
38

ESTIMATED SEASONAL HIGH GROUND WATER AT 30".
NO LEDGE TO DEPTH.

TP 39:

0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-30" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
30"-46" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

1, SHWT = 2.5'
NO GW, BR to 3.8'
39

ESTIMATED SEASONAL HIGH GROUND WATER AT 30".
NO LEDGE TO DEPTH.

TP 40:

0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-30" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
30"-46" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

1, SHWT = 2.5'
NO gw, BR to 3.8'
40

ESTIMATED SEASONAL HIGH GROUND WATER AT 30".
NO LEDGE TO DEPTH.

TP 41:
0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-18" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.

NO EVIDENCE OF SEASONAL HIGH GROUND WATER.
LEDGE AT 18".

NO I, SHWT, gw to 1.5'
BR = 1.5'

41

TP 42:
0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-30" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
30"-48" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 30".
NO LEDGE TO DEPTH.

I, SHWT = 2.5'
NO gw, BR
to 4.0'

42

TP 43:
0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-30" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
30"-50" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 30".
NO LEDGE TO DEPTH.

~~II~~, SHWT = 2.5'
NO gw, BR
to 4.2'

43

PERCOLATION RATES:
PT A: 6 MINUTES PER INCH AT 20" DEPTH.
PT B: 11 MINUTES PER INCH AT 20" DEPTH.
PT C: 11 MINUTES PER INCH AT 22" DEPTH.
PT D: 9 MINUTES PER INCH AT 18" DEPTH.

END OF WW-C.

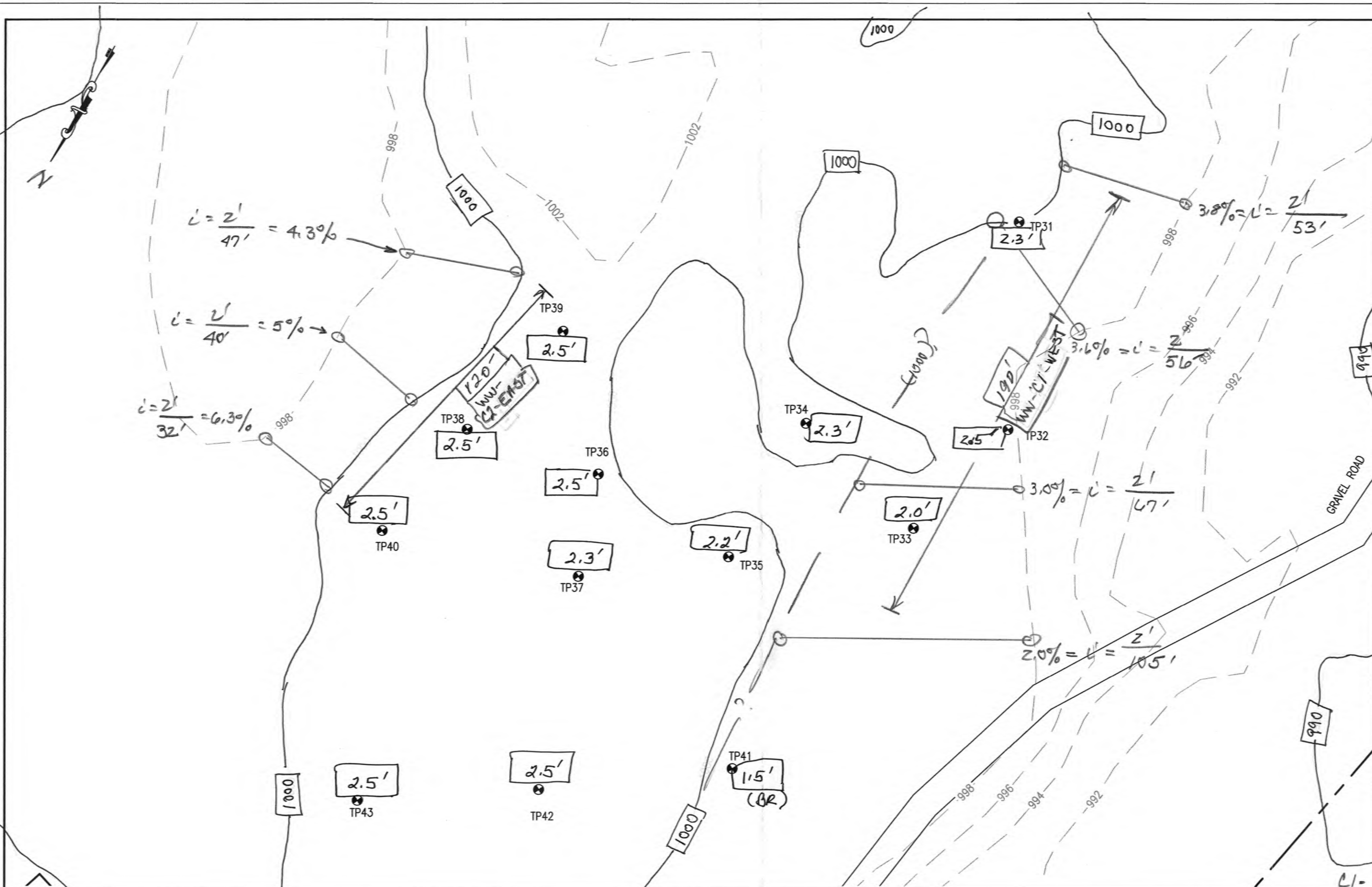
SOILS INFORMATION

(Gathered December & April of 2004)

TEST PITS:

TP 44:
0"-8" DARK BROWN FINE SANDY LOAM TOPSOIL.
8"-25" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
25"-41" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 25".
NO LEDGE TO DEPTH.



CREATION DATE: 7/9/24

RELEASE DATE: 7/9/24

ISSUED FOR PROGRESS REVIEW

REVISIONS:

25

THE CERTIFICATION ON THIS DRAWING ONLY INDICATES THE VT REGISTERED PROFESSIONAL ENGINEER RESPONSIBLE FOR PREPARATION AND IS NOT ISSUED FOR CONSTRUCTION UNLESS NOTED IN THE REVISION BOX.

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TOWN OF DORSET HOUSING STUDY
RAPTOR LANE
DORSET, VERMONT

WASTEWATER LOCATION C
C1-WEST + C2-EAST

HYDROGEOLOGIC NOTES

2.5' DEPTH TO HM. COND., ft.

i Hydr. Cond. (Ground slope)

C. Heindel, WHEM, 7/15/2024.

GRAPHIC SCALE
PLOT SIZE 11" x 17"

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

SCALE: AS NOTED

DESIGN BY: PMG

DRAWN BY: KMFG

SHEET NO: EX3 UPDATED 10/24

PROJECT NO: 2406

WW-C EAST (C2) + WEST (C1) 7/2024

HYDROGEOLOGIC CAPACITY CALCULATIONS: WW Area C2-EAST
Wastewater Disposal
Dorset Raptor Lane
Dorset, VT

Assumptions:
1. Use Nov. 6, 2023 WS&PWS Rule.
2. Site-specific hydrogeologic analysis, per Section 1-903-r[1][B] [General Requirements; Hydrogeologic Analyses].
3. Effluent type: **Septic Tank Effluent**

A. Calculations of Max Design Flow, using Darcy's Law: Q = K * i * (L * h) * 7.48

Parameter	Description	Value	units	Calculations
K	hydr. conduct.	30	ft/day	est., from Table 1, *Hydraulic Loading Method for Detailed Soil Descriptions in Vermont*, 2003:
				Soil Texture Description: fine sandy loam; Category: 3
				Soil Structure: Shape: granular
				Soil Structure: Grade: 3 [friable = strong]
i	hydr. grad.	5%	ft/ft	Hydraulic Gradient is based on ground slope
L	cross-slope length	120	ft.	Available L, from Site Plan
h	Unsat. soil	2.0	ft.	Available depth of unsaturated transmitting soil BGS, minus 0.5-ft. freeboard: from Section B below
SOLVE FOR MAX HYDROGEOLOGIC CAPACITY, Q				
Q	**Max. Hydrogeol. Capacity**	**2,693**	**GPD**	by Darcy's Law: Q = K x i x (L x h) 7.48:
				h: 2.0 ftl; from Section B below.
				K: 30 ft/day
				i: 0.050 ft/ft
				L: 120 ft
				convert: 7.48 gal/cu.ft.
				Solve for Q = 2,693 GPD

B. Calculate h, available thickness of unsat. transmitting soil, for effluent type listed in Assumption #3 above:

TP providing basis of Limit. Cond. [LC] beneath WW Footprint:	Depth to Limiting Condition, ft.	Subtract Required Freeboard, ft.	Equals **Available h, ft.**
TP-38,39,40	2.5	0.5	**2.0**

NOTE: Required freeboard is based on MOUND wastewater disposal system, not in-ground system.

C. SOLVE FOR LINEAR LOADING RATE [LLR]:

1. MAX Hydrogeologic Capacity:
   2,693 GPD, from calculation of Q, above.
2. Cross-slope length used in calculation of Q, above:
   120 ft. [L].

Solve for LLR: 22.4 GPD/ft.

C. Heindel; Last revised: 10-30-2024;
[U:\PROJECTS - WHEM\Dorset Town, Raptor Lane Housing\WW Evaluations\July 2024 - OUTDATED in some areas by Oct. 2024 Evals\WW Areas C East and West\Calcs, WW Capacity Esimate, Dorset Raptor Lane, WW Area C2-EAST - CH,

Table 1. Hydraulic Loading Method for Detailed Soil Descriptions in Vermont (2003)

Soil Texture[1]	Soil Structure[2] Shape	Grade	K[3] (ft/day)	0.01 0-2%	0.03 2.1-4%	0.05 4.1-6%	0.07 6.1-8%	0.09 8.1-10%	0.125 10.1-15%	0.175 15.1-20%	0.25 20.1-30%
				Hydraulic Loading Rate (gpd/square foot) (Sorted by hydraulic gradient and % ground surface slope range as noted) based on midpoint of slope range							
1 Coarse Sand, Sand, Loamy Coarse Sand, Loamy Sand		0SG	100	7.5	22.4	37.4	52.4	67.3	93.5	130.9	187.0
2 Fine Sand, Very Fine Sand, Loamy Fine Sand, Loamy Very Fine Sand	--	0SG	50	3.7	11.2	18.7	26.2	33.7	46.8	65.5	93.5
Coarse Sandy Loam, Loamy Sand											
	--	0M	50	3.7	11.2	18.7	26.2	33.7	46.8	65.5	93.5
	PL	1	25	1.9	5.6	9.4	13.1	16.8	23.4	32.7	46.8
	PL	2,3	25	1.9	5.6	9.4	13.1	16.8	23.4	32.7	46.8
	PR/BK/GR	1	40	3.0	9.0	15.0	20.9	26.9	37.4	52.4	74.8
	PR/BK/GR	2,3	50	3.7	11.2	18.7	26.2	33.7	46.8	65.5	93.5
* 3 Fine Sandy Loam, Very Fine Sandy Loam	--	0M	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PL	1,2,3	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PR/BK/GR	1	20	1.5	4.5	7.5	10.5	13.5	18.7	26.2	37.4
	PR/BK/GR	2,3	30	2.2	6.7	11.2	15.7	20.2	28.1	39.3	56.1
4 Loam	--	0M	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PL	1,2,3	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PR/BK/GR	1	15	1.1	3.4	5.6	7.9	10.1	14.0	19.6	28.1
	PR/BK/GR	2,3	20	1.5	4.5	7.5	10.5	13.5	18.7	26.2	37.4
5 Silt Loam	--	0M	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PL	1,2,3	5	0.4	1.1	1.9	2.6	3.4	4.7	6.5	9.4
	PR/BK/GR	1	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
	PR/BK/GR	2,3	20	1.5	4.5	7.5	10.5	13.5	18.7	26.2	37.4
6 Sandy Clay Loam, Clay Loam, Silty Clay Loam	--	0M	5	0.4	1.1	1.9	2.6	3.4	4.7	6.5	9.4
	PL	1,2,3	5	0.4	1.1	1.9	2.6	3.4	4.7	6.5	9.4
	PR/BK/GR	1	8	0.6	1.8	3.0	4.2	5.4	7.5	10.5	15.0
	PR/BK/GR	2,3	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7
7 Sandy Clay, Clay, Silty Clay	--	0M	3	0.2	0.7	1.1	1.6	2.0	2.8	3.9	5.6
	PL	1,2,3	3	0.2	0.7	1.1	1.6	2.0	2.8	3.9	5.6
	PR/BK/GR	1	5	0.4	1.1	1.9	2.6	3.4	4.7	6.5	9.4
	PR/BK/GR	2,3	10	0.7	2.2	3.7	5.2	6.7	9.4	13.1	18.7

Note: 1. Soil texture and structure columns are based on Tyler and Kuns (2000).
2. Structure Abbreviations: Shapes: PL = platy; BK = blocky; PR = prismatic; GR = granular
Grade: 0 = structureless; SG = single grain; M = massive; 1 = weak; 2 = moderate; 3 = strong
3. K = hydraulic conductivity (estimated)

VT DEC, 2003.
WW-C, EAST and WEST, Dorset Raptor Lane.
CH. 7/15/2024.

TP 27:
0"-8" DARK BROWN FINE SANDY LOAM TOPSOIL.
8"-28" REDDISH-BROWN FINE SANDY LOAM, FRIABLE, ROOTS, FEW STONES COMMON 12" TO 36" BOULDERS.
28"-52" BROWN LOAMY SAND VERY FRIABLE, FEW TO COMMON STONES, GETS WET AT 38".

POSSIBLE SEASONAL HIGH GROUND WATER AT 38".
NO LEDGE TO DEPTH.

PERCOLATION RATES:
PT I: 6.0 MINUTES PER INCH AT 18" DEPTH.
PT J: 4.3 MINUTES PER INCH AT 16" DEPTH.
PT K: 5.5 MINUTES PER INCH AT 20" DEPTH.
PT L: 5.8 MINUTES PER INCH AT 18" DEPTH.

SOILS INFORMATION

(Gathered December & April of 2004)

WW-C.
TPs 31-43.
CH annotations,
7-11-2024.

TEST PITS:

TP 31:
0"-8" DARK BROWN FINE SANDY LOAM TOPSOIL.
8"-28" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
28"-48" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

I, SHWT = 2.3'
NO gw, BR to 4.0'
31

ESTIMATED SEASONAL HIGH GROUND WATER AT 28".
NO LEDGE TO DEPTH.

TP 32:
0"-6" DARK BROWN FINE SANDY LOAM TOPSOIL.
6"-30" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
30"-42" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

I, SHWT = 2.5'
NO gw, BR to 3.5'
32

ESTIMATED SEASONAL HIGH GROUND WATER AT 30".
NO LEDGE TO DEPTH.

TP 33:
0"-8" DARK BROWN FINE SANDY LOAM TOPSOIL.
8"-24" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
24"-40" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

I, SHWT = 2.0'
NO gw, BR to 3.3'
33

ESTIMATED SEASONAL HIGH GROUND WATER AT 24".
NO LEDGE TO DEPTH.

TP 34:

0"-6" DARK BROWN FINE SANDY LOAM TOPSOIL.
6"-27" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
27"-46" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 27".
NO LEDGE TO DEPTH.

1, SHWT = 2.3'
NO gw, BR to 3.8'
34

TP 35:

0"-6" DARK BROWN FINE SANDY LOAM TOPSOIL.
6"-26" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.

NO EVIDENCE OF SEASONAL HIGH GROUND WATER.
LEDGE AT 26".

NO I, SHWT, gw to 2.2'
BR = 2.2'
35

TP 36:

0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-30" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
30"-48" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 30".
NO LEDGE TO DEPTH.

1, SHWT = 2.5'
NO gw, BR to 4.0'
36

TP 37:

0"-6" DARK BROWN FINE SANDY LOAM TOPSOIL.
6"-27" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.

NO EVIDENCE OF SEASONAL HIGH GROUND WATER.
LEDGE AT 27"/40" (CONTACT VARIES).

NO I, SHWT, gw to 2.3'
BR = 2.3'
37

TP 38:

0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-30" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
30"-48" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 30".
NO LEDGE TO DEPTH.

1, SHWT = 2.5'
NO gw, BR to 4.0'
38

TP 39:

0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-30" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
30"-46" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 30".
NO LEDGE TO DEPTH.

1, SHWT = 2.5'
No GW, BR to 3.8'
39

TP 40:

0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-30" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
30"-46" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 30".
NO LEDGE TO DEPTH.

1, SHWT = 2.5'
NO gw, BR to 3.8'
40

TP 41:
0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-18" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.

NO EVIDENCE OF SEASONAL HIGH GROUND WATER.
LEDGE AT 18".

NO I, SHWT, gw to 1.5'
BR = 1.5'

41

TP 42:
0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-30" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
30"-48" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 30".
NO LEDGE TO DEPTH.

I, SHWT = 2.5'
NO gw, BR to 4.0'

42

TP 43:
0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-30" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
30"-50" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 30".
NO LEDGE TO DEPTH.

~~II~~, SHWT = 2.5'
NO gw, BR to 4.2'

43

PERCOLATION RATES:
PT A: 6 MINUTES PER INCH AT 20" DEPTH.
PT B: 11 MINUTES PER INCH AT 20" DEPTH.
PT C: 11 MINUTES PER INCH AT 22" DEPTH.
PT D: 9 MINUTES PER INCH AT 18" DEPTH.

END OF WW-C.

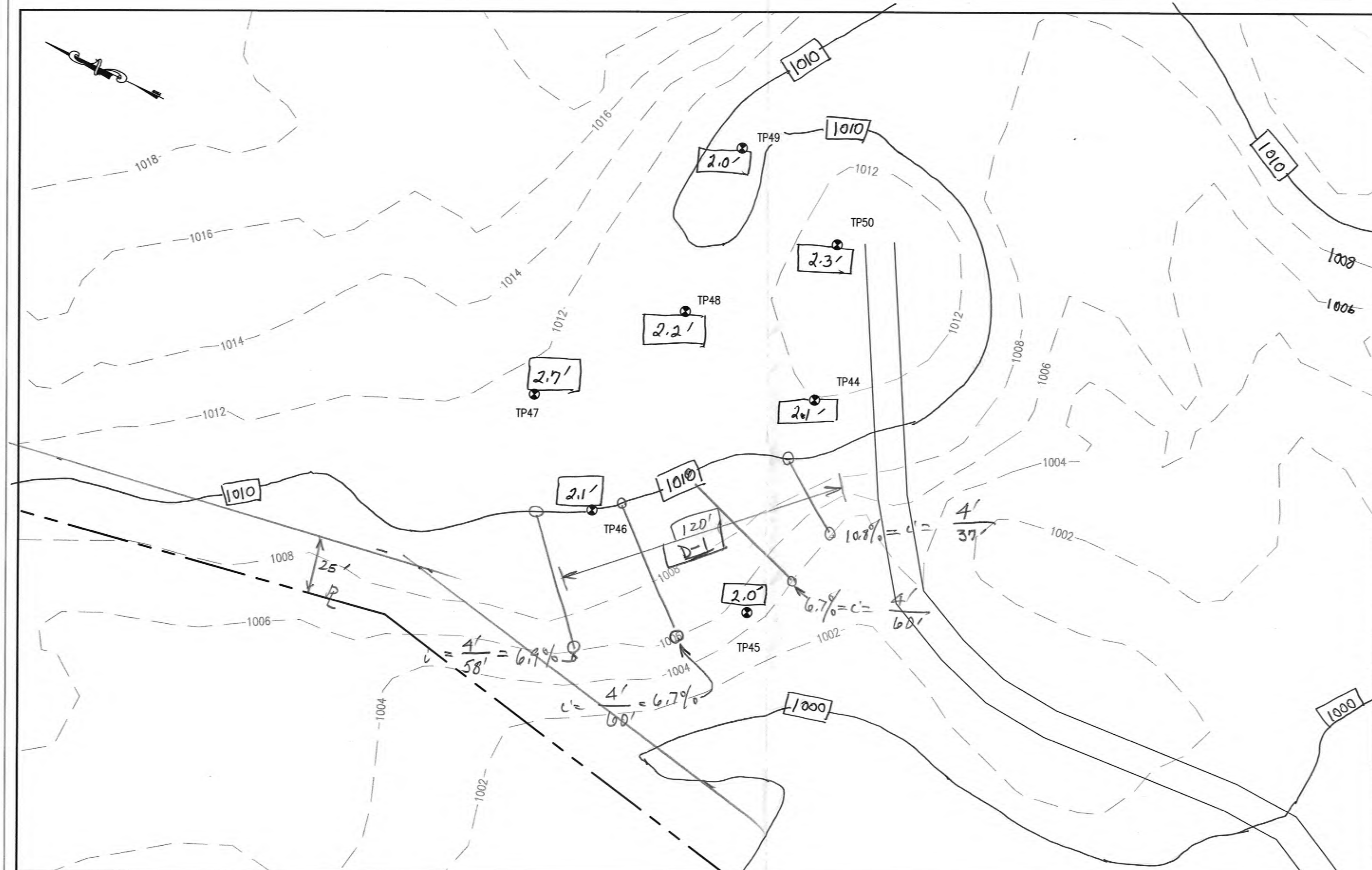
SOILS INFORMATION
(Gathered December & April of 2004)

TEST PITS:

TP 44:
0"-8" DARK BROWN FINE SANDY LOAM TOPSOIL.
8"-25" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
25"-41" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 25".
NO LEDGE TO DEPTH.

31



HYDROGEOLOGIC NOTES

| 2.2' | DEPTH TO LIM. COND., ft.

Hydr. Grad. (ground slope)

C. Heindel, WHEM. 7/15/2024.

GRAPHIC SCALE
PLOT SIZE 11" x 17"

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

CREATION DATE	7/9/24
RELEASE DATE	7/9/24
ISSUED FOR PROGRESS REVIEW	
REVISIONS:	

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TOWN OF DORSET HOUSING STUDY
RAPTOR LANE
DORSET, VERMONT

WASTEWATER LOCATION D-1

SCALE:	AS NOTED
DESIGN BY:	PMG
DRAWN BY:	KMFG
SHEET NO:	EX4
PROJECT NO:	2406

RENAMED 10/24 → WW-D1 (7/2024)

HYDROGEOLOGIC CAPACITY CALCULATIONS: WW Area D1
Wastewater Disposal
Dorset Raptor Lane
Dorset, VT

Assumptions:
1. Use Nov. 6, 2023 WS&PWS Rule.
2. Site-specific hydrogeologic analysis, per Section 1-903-r[1][B] [General Requirements; Hydrogeologic Analyses].
3. Effluent type: **Septic Tank Effluent**

A. Calculations of Max Design Flow, using Darcy's Law: Q = K * i * (L * h) * 7.48

Parameter	Description	Value	units	Calculations
K	hydr. conduct.	30	ft/day	est., from Table 1, *Hydraulic Loading Method for Detailed Soil Descriptions in Vermont*, 2003:
				Soil Texture Description: fine sandy loam; Category: 3
				Soil Structure: Shape: granular
				Soil Structure: Grade: 3 [friable = strong]
i	hydr. grad.	7%	ft/ft	Hydraulic Gradient is based on ground slope
L	cross-slope length	120	ft.	Available L, from Site Plan
h	Unsat. soil	1.5	ft.	Available depth of unsaturated transmitting soil BGS, minus 0.5-ft. freeboard: from Section B below
SOLVE FOR MAX HYDROGEOLOGIC CAPACITY, Q				
Q	**Max. Hydrogeol. Capacity**	**2,827**	**GPD**	by Darcy's Law: Q = K x i x (L x h) 7.48:
				h: 1.5 ftl; from Section B below.
				K: 30 ft/day
				i: 0.070 ft/ft
				L: 120 ft
				convert: 7.48 gal/cu.ft.
				Solve for Q = 2,827 GPD

B. Calculate h, available thickness of unsat. transmitting soil, for effluent type listed in Assumption #3 above:

TP providing basis of Limit. Cond. [LC] beneath WW Footprint:	Depth to Limiting Condition, ft.	Subtract Required Freeboard, ft.	Equals **Available h, ft.**
TP-45	2.0	0.5	**1.5**

NOTE: Required freeboard is based on MOUND wastewater disposal system, not in-ground system.

C. SOLVE FOR LINEAR LOADING RATE [LLR]:

1. MAX Hydrogeologic Capacity:
   2,827 GPD, from calculation of Q, above.
2. Cross-slope length used in calculation of Q, above:
   120 ft. [L].

Solve for LLR: 23.6 GPD/ft.

C. Heindel; Last revised:10-30-2024;
[U:\PROJECTS - WHEM\Dorset Town, Raptor Lane Housing\WW Evaluations\WW Area D\Calcs, WW Capacity Estimate, Dorset Raptor Lane, WW Area D1 - CH, 10-30-2024.xlsx, Tab = MaxQ, for known L, h].

TP 41:
0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-18" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.

NO EVIDENCE OF SEASONAL HIGH GROUND WATER.
LEDGE AT 18".

TP 42:
0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-30" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
30"-48" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 30".
NO LEDGE TO DEPTH.

TP 43:
0"-4" DARK BROWN FINE SANDY LOAM TOPSOIL.
4"-30" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
30"-50" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 30".
NO LEDGE TO DEPTH.

PERCOLATION RATES:
PT A: 6 MINUTES PER INCH AT 20" DEPTH.
PT B: 11 MINUTES PER INCH AT 20" DEPTH.
PT C: 11 MINUTES PER INCH AT 22" DEPTH.
PT D: 9 MINUTES PER INCH AT 18" DEPTH.

SOILS INFORMATION

(Gathered December & April of 2004)

TEST PITS:

TP 44:
0"-8" DARK BROWN FINE SANDY LOAM TOPSOIL.
8"-25" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
25"-41" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 25".
NO LEDGE TO DEPTH.

TP 45:

0"-8" DARK BROWN FINE SANDY LOAM TOPSOIL.
8"-24" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
24"-45" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 24".
NO LEDGE TO DEPTH.

TP 46:

0"-8" DARK BROWN FINE SANDY LOAM TOPSOIL.
8"-25" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
25"-51" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 25".
NO LEDGE TO DEPTH.

TP 47:

0"-6" DARK BROWN FINE SANDY LOAM TOPSOIL.
6"-32" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
32"-53" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 32".
NO LEDGE TO DEPTH.

TP 48:

0"-6" DARK BROWN FINE SANDY LOAM TOPSOIL.
6"-26" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
26"-52" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 26".
NO LEDGE TO DEPTH.

TP 49:

0"-6" DARK BROWN FINE SANDY LOAM TOPSOIL.
6"-24" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
24"-41" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 24".
NO LEDGE TO DEPTH.

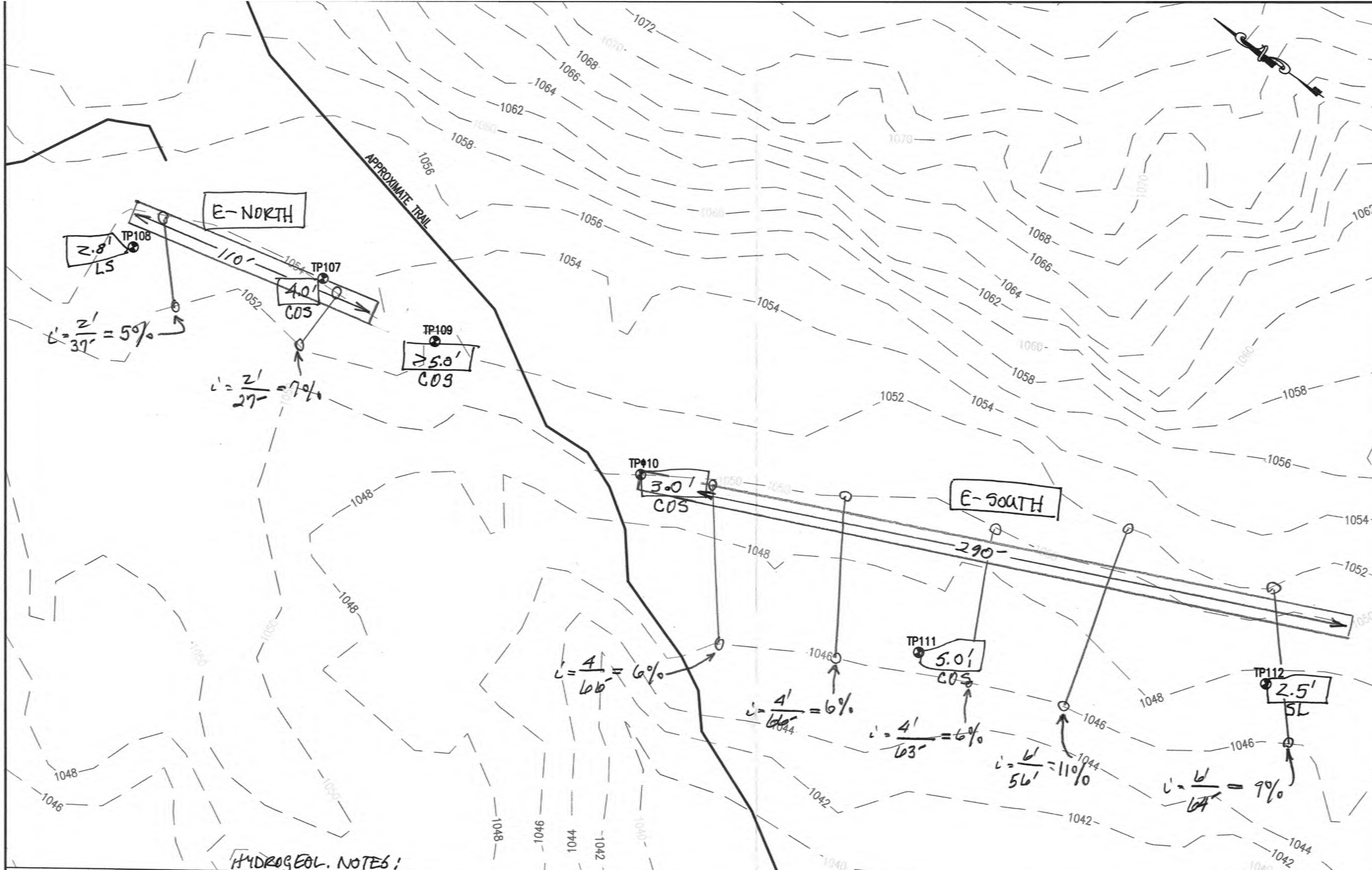
TP 50:

0"-6" DARK BROWN FINE SANDY LOAM TOPSOIL.
6"-28" BRIGHT REDDISH-BROWN FINE SANDY LOAM, VERY FRIABLE, ROOTS.
28"-53" TAN FINE SAND TILL, FIRM IN PLACE, LOOSE IN HAND, FEW STONES, NO ROOTS, COMMON FAINT MOTTLES.

ESTIMATED SEASONAL HIGH GROUND WATER AT 28".
NO LEDGE TO DEPTH.

PERCOLATION RATES:

PT E: 12 MINUTES PER INCH AT 24" DEPTH.
PT F: 15 MINUTES PER INCH AT 20" DEPTH.
PT G: 9 MINUTES PER INCH AT 20" DEPTH.
PT H: 14 MINUTES PER INCH AT 18" DEPTH.



HYDROGEOL. NOTES:

Transmitting Soils:

LS = loamy sand (1)

COS = Coarse sand (1)

SL = sandy loam (2)

$\boxed{3.0'}$ Limiting condition depth, ft.

$\boxed{>5.0'}$ No limit. cond., to depth shown.

L. HEINDEL, 10/29/2024

GRAPHIC SCALE

PLOT SIZE 11" x 17"

40 0 20 40 80 160

(IN FEET)

1 inch = 40 ft.

CREATION DATE	10/21/24
RELEASE DATE	10/21/24
ISSUED FOR PROGRESS REVIEW	35
REVISIONS:	

THE CERTIFICATION ON THIS DRAWING ONLY INDICATES THE VT REGISTERED PROFESSIONAL ENGINEER RESPONSIBLE FOR PREPARATION AND IS NOT ISSUED FOR CONSTRUCTION UNLESS NOTED IN THE REVISION BOX.

REGULATORY APPROVAL STAMP

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TOWN OF DORSET HOUSING STUDY

RAPTOR LANE
DORSET, VERMONT

WASTEWATER LOCATION E

SCALE:	AS NOTED
DESIGN BY:	PMG
DRAWN BY:	KMFG
SHEET NO:	EX5
PROJECT NO:	2406

PRELIMINARY HYDROGEOLOGIC CAPACITY CALCULATIONS: WW Area E-NORTH
Wastewater Disposal
Dorset Raptor Lane
Dorset, VT

Assumptions:
1. Use Nov. 6, 2023 WS&PWS Rule.
2. Site-specific hydrogeologic analysis, per Section 1-903-r[1][B] [General Requirements; Hydrogeologic Analyses].
3. Effluent type: **Septic Tank Effluent**

A. Calculations of Max Design Flow, using Darcy's Law: Q = K * i * (L * h) * 7.48

Parameter	Description	Value	units	Calculations
K	hydr. conduct.	100	ft/day	est., from Table 1, *Hydraulic Loading Method for Detailed Soil Descriptions in Vermont*, 2003: Soil Texture Description: loamy sand, coarse sand; Category: 1 Soil Structure: Shape: structureless, single grain Soil Structure: Grade:
i	hydr. grad.	5%	ft/ft	Hydraulic Gradient is based on ground slope
L	cross-slope length	110	ft.	Available L, from Site Plan
h	Unsat. soil	2.3	ft.	Available depth of unsaturated transmitting soil BGS, minus 0.5-ft. freeboard: from Section B below
SOLVE FOR MAX HYDROGEOLOGIC CAPACITY, Q				
Q	**Max. Hydrogeol. Capacity**	**9,462**	**GPD**	by Darcy's Law: Q = K x i x (L x h) 7.48: h: 2.3 ftl; from Section B below. K: 100 ft/day i: 0.05 ft/ft L: 110 ft convert: 7.48 gal/cu.ft. **Solve for Q = 9,462 GPD**

B. Calculate h, available thickness of unsat. transmitting soil, for effluent type listed in Assumption #3 above:

TP providing basis of Limit. Cond. [LC] beneath WW Footprint:	Depth to Limiting Condition, ft.	Subtract Required Freeboard, ft.	Equals **Available h, ft.**
TP-108	2.8	0.5	**2.3**

NOTE: Required freeboard is based on MOUND wastewater disposal system, not in-ground system.

C. SOLVE FOR LINEAR LOADING RATE [LLR]:

1. MAX Hydrogeologic Capacity:
   9,462 GPD, from calculation of Q, above.
2. Cross-slope length used in calculation of Q, above:
   110 ft. [L].

Solve for LLR: 86.0 GPD/ft.

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SOIL DESCRIPTION FORM

Test Pit Summary

Client:	Town of Dorset
By:	Patrick Griffin, P.E.
Location:	D-2 near Pod 7
Approx. Slope:	5-10%

Job #:	2406
Date:	9/19/2024
Weather:	Sunny, 65 degrees F
Excavation method: Excavator	

TP #	Depth (in)	Color	Texture	Structure	Consistence	Mottles	Remarks (ledge depth, root depth, cobbles, etc.)
101	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-24	10 YR 4/4	Loam (L)	SAB	Very Friable	No	20% cobbles, 10% stones
	24-30	10 YR 5/6	Medium to coarse gravel	Granular	Loose	No	
	30-72	10 YR 6/4	Silt Loam (> CDS)	SAB	Firm	Yes at 30", Faint	20% cobbles, 10% stones
	2.5'						Roots to 36", no ledge rock encountered
	Limiting Layer: 30"						
102	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-18	10 YR 4/4	Loam $\boxed{L}$	SAB	Very friable	No	20% cobbles, 10% stones
	18-48	10 YR 6/4	Silt Loam	SAB	Firm	Yes at 18", Faint	20% cobbles, 10% stones
	1.5'						No ledge rock encountered
							Roots to 24", no ledge rock encountered
	Limiting Layer: 18" 1.5'						

CH NOTES. 10/2024.

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SOIL DESCRIPTION FORM

Test Pit Summary

Client:	Town of Dorset
By:	Patrick Griffin, P.E.
Location:	D-3, E, B-3, B-4
Approx. Slope:	Varies

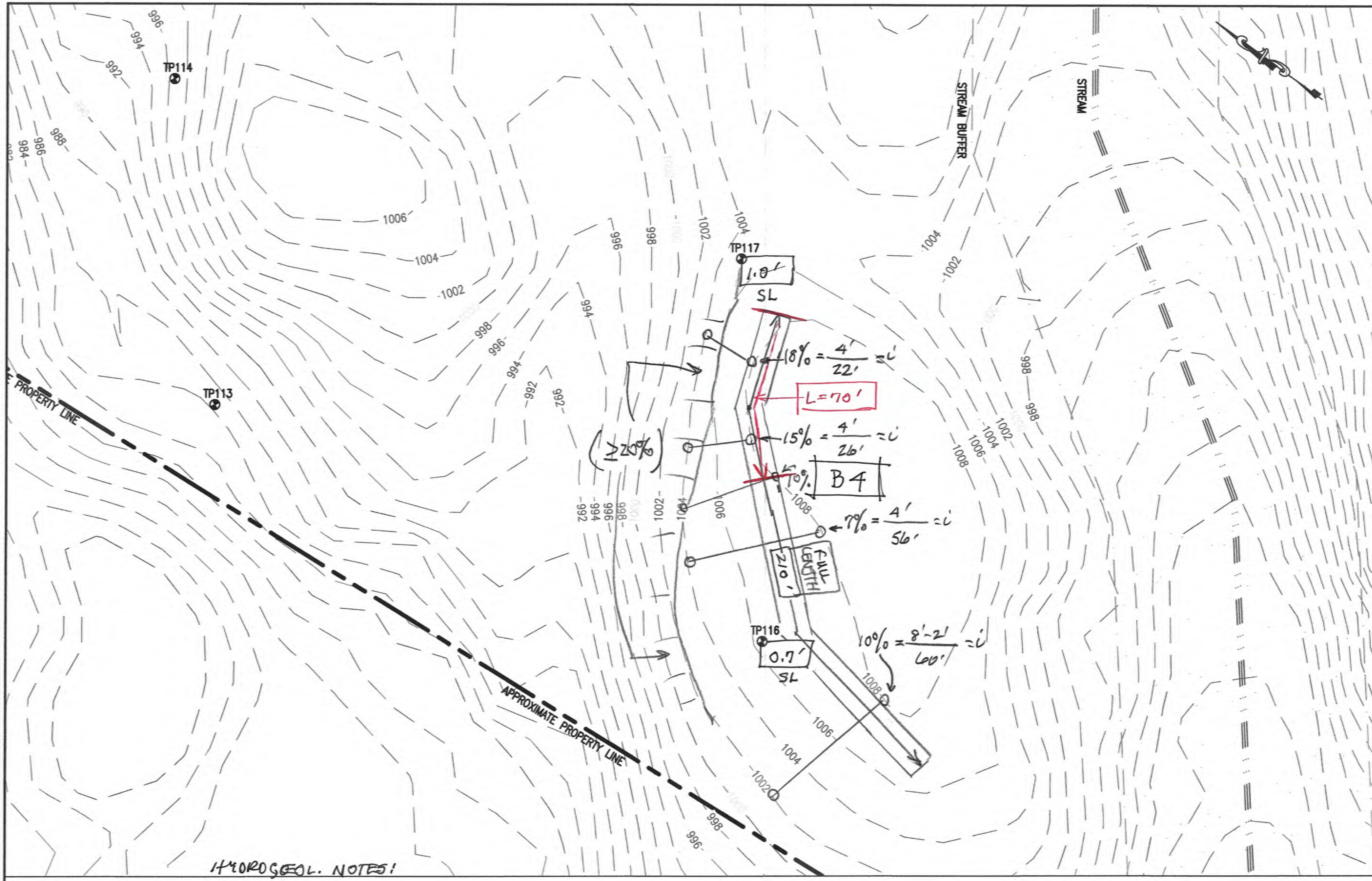
Job #:	2406
Date:	10/21/2024
Weather:	Sunny, 50 degrees F
Excavation method: Excavator	

TP #	Depth (in)	Color	Texture	Structure	Consistence	Mottles	Remarks (ledge depth, root depth, cobbles, etc.)
103	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-18	10 YR 5/6	Sandy Loam SL	SAB	Very Friable	No	
	18-48	10 YR 5/3	Silt Loam	SAB	Firm	No	10% stones, 10% gravel
							Roots to 24", no ledge rock encountered
	Limiting Layer: 18" ✓ 1.5'						
104	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-14	10 YR 5/6	Sandy Loam SL	SAB	Very Friable	No	
	14-42	10 YR 5/3	Silt Loam	SAB	Firm	No	20% stones, 20% gravel
							Roots to 24", ledge rock refusal at 42"
	Limiting Layer: 14" ✓ 1.2'						
105	0-2	10 YR 3/3	Loam	SAB	Friable	No	
	2-6	10 YR 5/6	Sandy Loam SL	SAB	Very Friable	No	
	6-54	10 YR 5/3	Silt Loam	SAB	Firm	No	20% stones, 20% gravel
							Roots to 24", no ledge rock encountered
	Limiting Layer: 6" 0.5'						
106	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-12	10 YR 5/6	Sandy Loam SL	SAB	Very Friable	No	
	12-38	10 YR 5/3	Silt Loam	SAB	Firm	No	20% stones, 20% gravel
							Roots to 30", ledge rock refusal at 38"
	Limiting Layer: 12" ✓ 1.0'						
107	0-4	10 YR 3/3	Loam	SAB	Friable	No	
	4-12	10 YR 3/6	Sandy Loam	SAB	Friable	No	10% cobbles
	12-48	10 YR 3/4	Gravelly Sand COS	Granular	Loose	No	40% cobbles and stones
							Roots to 36", ledge rock refusal at 48"
	Limiting Layer: 48" ✓ 4.0						BR = 4.0'
108	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-18	10 YR 3/4	Sandy Loam	SAB	Friable	No	10% cobbles and stones
	18-34	10 YR 5/6	Loamy Sand LS	SAB	Friable	No	10% cobbles and stones
							Roots to 24", ledge rock refusal at 34"
	Limiting Layer: 34" 2.8' BR						BR at 2.8'
109	0-5	10 YR 3/3	Loam	SAB	Friable	No	
	5-30	10 YR 4/4	Sandy Loam	SAB	Friable	No	10% cobbles
	30-60	10 YR 3/4	Gravelly Sand COS	Granular	Loose	No	20% cobbles and stones
	>5.0'						Roots to 36", no ledge rock encountered
	Limiting Layer: none identified to 5.0'						

CH NOTES, 10/2024.

110	0-5	10 YR 3/3	Loam	SAB	Friable	No	
	5-24	10 YR 4/4	Sandy Loam	SAB	Friable	No	10% cobbles
	24-36	10 YR 3/4	Gravelly Sand CDS	Granular	Loose	No	20% cobbles and stones
							Roots to 30", ledge rock refusal at 36"
	Limiting Layer: 36" 3.0' BR						BR at 3.0'
111	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-24	10 YR 4/4	Sandy Loam	SAB	Friable	No	10% cobbles
	24-60	10 YR 3/4	Gravelly Sand CDS	Granular	Loose	No	20% cobbles and stones
							Roots to 36", ledge rock refusal at 60"
	Limiting Layer: 60" ✓ BR, 5.0'						BR at 5.0'
112	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-30	10 YR 4/4	Sandy Loam SL	SAB	Friable	No	10% cobbles
							Roots to 24", ledge rock refusal at 30"
	Limiting Layer: 30" 2.5'						BR at 2.5'
113	0-2	10 YR 3/3	Loam	SAB	Friable	No	
	2-18	10 YR 3/4	Sandy Loam SL	SAB	Friable	No	
	18-42	10 YR 5/3	Sandy Loam Till	SAB	Firm	No	
	1.5'						Roots to 24", no ledge rock encountered
	Limiting Layer: 18" = 1.5'						
114	0-2	10 YR 3/3	Loam	SAB	Friable	No	
	2-12	10 YR 3/4	Sandy Loam SL	SAB	Friable	No	
	12-36	10 YR 5/3	Sandy Loam Till	SAB	Firm	No	
	1.0'						Roots to 30", no ledge rock encountered
	Limiting Layer: 12" = 1.0'						
115	0-2	10 YR 3/3	Loam	SAB	Friable	No	
	2-14	10 YR 3/4	Sandy Loam SL	SAB	Friable	No	
	14-36	10 YR 5/3	Sandy Loam Till	SAB	Firm	No	
	1.2'						Roots to 24", no ledge rock encountered
	Limiting Layer: 14" = 1.2'						
116	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-8	10 YR 3/4	Sandy Loam SL	SAB	Friable	No	
	8-48	10 YR 5/3	Sandy Loam Till	SAB	Firm	No	
	0.7'						Roots to 14", no ledge rock encountered
	Limiting Layer: 8" = 0.7'						
117	0-2	10 YR 3/3	Loam	SAB	Friable	No	
	2-12	10 YR 3/4	Sandy Loam SL	SAB	Friable	No	
	12-42	10 YR 5/3	Sandy Loam Till	SAB	Firm	No	
	1.0'						Roots to 24", no ledge rock encountered
	Limiting Layer: 12" = 1.0'						

CH NOTES, 10/2024.



HYDROGEOL. NOTES:

Transmitting Soil:

SL = Sandy Loam

$\boxed{0.7'}$ Limiting Condition Depth, ft.

C. Heindel 10/28/2024.

GRAPHIC SCALE

PLOT SIZE 11" x 17"

40 0 20 40 80 160

(IN FEET)

1 inch = 40 ft.

CREATION DATE: 10/21/24 40

RELEASE DATE: 10/21/24

ISSUED FOR PROGRESS REVIEW

REVISIONS:

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TOWN OF DORSET HOUSING STUDY

RAPTOR LANE
DORSET, VERMONT

WASTEWATER LOCATION B-4

SCALE: AS NOTED

DESIGN BY: PMG

DRAWN BY: KMFG

SHEET NO: EX9

PROJECT NO: 2406

PRELIMINARY HYDROGEOLOGIC CAPACITY CALCULATIONS: WW Area B-4,
Wastewater Disposal **[Full Length]**
Dorset Raptor Lane
Dorset, VT

Assumptions:
1. Use Nov. 6, 2023 WS&PWS Rule.
2. Site-specific hydrogeologic analysis, per Section 1-903-r[1][B] [General Requirements; Hydrogeologic Analyses].
3. Effluent type: **Septic Tank Effluent**

A. Calculations of Max Design Flow, using Darcy's Law: Q = K * i * (L * h) * 7.48

Parameter	Description	Value	units	Calculations
K	hydr. conduct.	40	ft/day	est., from Table 1, *Hydraulic Loading Method for Detailed Soil Descriptions in Vermont*, 2003:
				Soil Texture Description: sandy loam; Category: 2
				Soil Structure: Shape: subangular blocky
				Soil Structure: Grade: 2 [friable = moderate]
i	hydr. grad.	8%	ft/ft	Hydraulic Gradient is based on ground slope
L	cross-slope length	210	ft.	Available L, from Site Plan
h	Unsat. soil	0.2	ft.	Available depth of unsaturated transmitting soil BGS, minus 0.5-ft. freeboard: from Section B below
SOLVE FOR MAX HYDROGEOLOGIC CAPACITY, Q				
Q	**Max. Hydrogeol. Capacity**	**1,005**	**GPD**	by Darcy's Law: Q = K x i x (L x h) 7.48:
				h: 0.2 ftl; from Section B below.
				K: 40 ft/day
				i: 0.08 ft/ft
				L: 210 ft
				convert: 7.48 gal/cu.ft.
				Solve for Q = 1,005 GPD

B. Calculate h, available thickness of unsat. transmitting soil, for effluent type listed in Assumption #3 above:

TP providing basis of Limit. Cond. [LC] beneath WW Footprint:	Depth to Limiting Condition, ft.	Subtract Required Freeboard, ft.	Equals **Available h, ft.**
TP-116	0.7	0.5	**0.2**

NOTE: Required freeboard is based on MOUND wastewater disposal system, not in-ground system.

C. SOLVE FOR LINEAR LOADING RATE [LLR]:

1. MAX Hydrogeologic Capacity:
   1,005 GPD, from calculation of Q, above.
2. Cross-slope length used in calculation of Q, above:
   210 ft. [L].

Solve for LLR: 4.8 GPD/ft.

C. Heindel; Last revised: 10-28-2024;
[U:\PROJECTS - WHEM\Dorset Town, Raptor Lane Housing\WW Evaluations\WW Area B4\Calcs, WW Capacity Estimate, Dorset Raptor Lane, WW Area B4 - CH, 10-28-2024.xlsx, Tab = B4 - Max Q, for full L, h].

PRELIMINARY HYDROGEOLOGIC CAPACITY CALCULATIONS: WW Area B-4,
Wastewater Disposal [North End]
Dorset Raptor Lane
Dorset, VT

Assumptions:
1. Use Nov. 6, 2023 WS&PWS Rule.
2. Site-specific hydrogeologic analysis, per Section 1-903-r[1][B] [General Requirements; Hydrogeologic Analyses].
3. Effluent type: **Septic Tank Effluent**

A. Calculations of Max Design Flow, using Darcy's Law: Q = K * i * (L * h) * 7.48

Parameter	Description	Value	units	Calculations
K	hydr. conduct.	40	ft/day	est., from Table 1, *Hydraulic Loading Method for Detailed Soil Descriptions in Vermont*, 2003:
				Soil Texture Description: sandy loam; Category: 2 Soil Structure: Shape: subangular blocky Soil Structure: Grade: 2 [friable = moderate]
i	hydr. grad.	10%	ft/ft	Hydraulic Gradient is based on ground slope
L	cross-slope length	70	ft.	Available L, from Site Plan
h	Unsat. soil	0.5	ft.	Available depth of unsaturated transmitting soil BGS, minus 0.5-ft. freeboard: from Section B below
SOLVE FOR MAX HYDROGEOLOGIC CAPACITY, Q				
Q	**Max. Hydrogeol. Capacity**	**1,047**	**GPD**	by Darcy's Law: Q = K x i x (L x h) 7.48: h: 0.5 ftl; from Section B below. K: 40 ft/day i: 0.10 ft/ft L: 70 ft convert: 7.48 gal/cu.ft. **Solve for Q = 1,047 GPD**

B. Calculate h, available thickness of unsat. transmitting soil, for effluent type listed in Assumption #3 above:

TP providing basis of Limit. Cond. [LC] beneath WW Footprint:	Depth to Limiting Condition, ft.	Subtract Required Freeboard, ft.	Equals **Available h, ft.**
TP-117	1.0	0.5	**0.5**

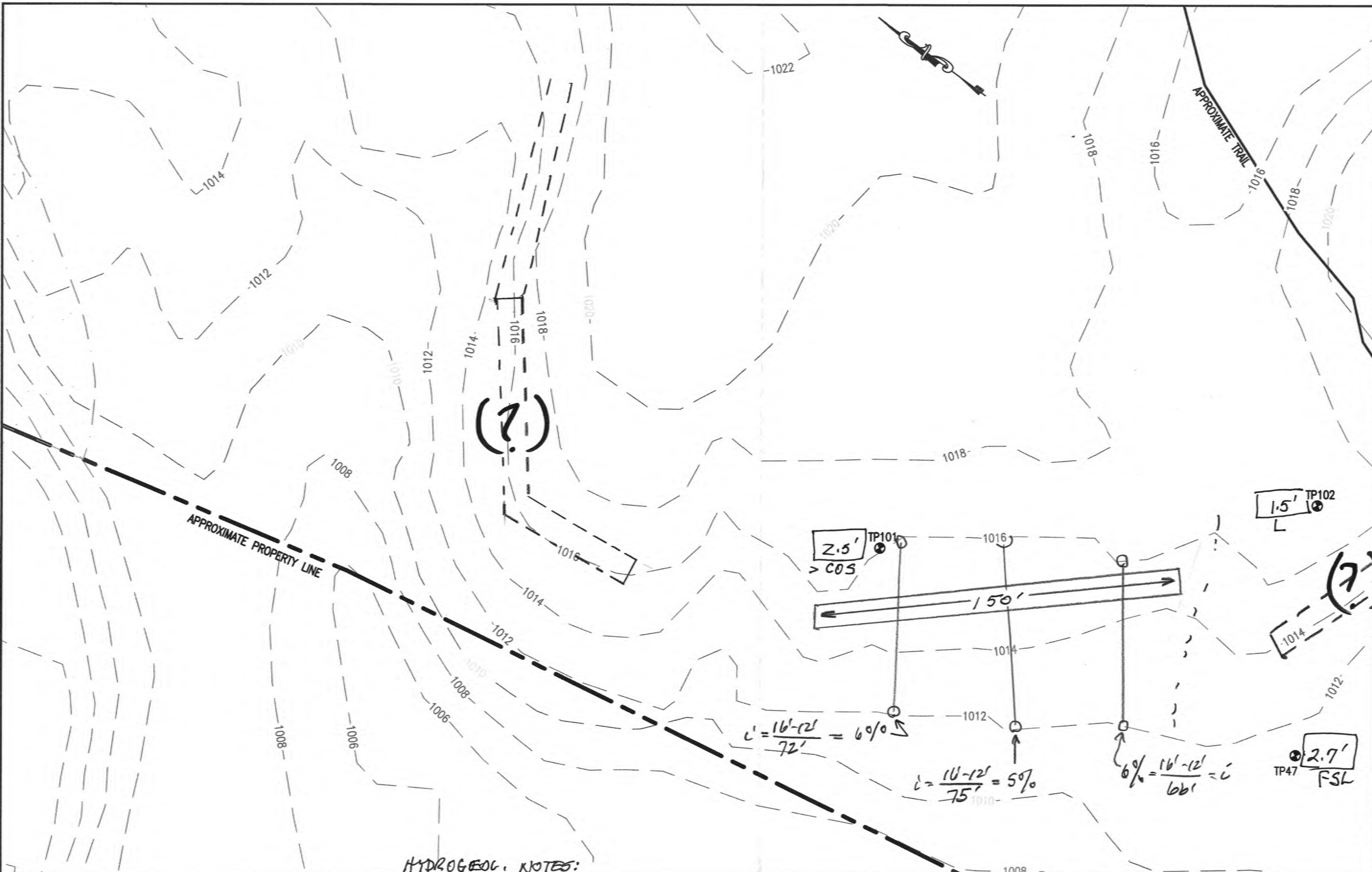
NOTE: Required freeboard is based on MOUND wastewater disposal system, not in-ground system.

C. SOLVE FOR LINEAR LOADING RATE [LLR]:

1. MAX Hydrogeologic Capacity:
   1,047 GPD, from calculation of Q, above.
2. Cross-slope length used in calculation of Q, above:
   70 ft. [L].

Solve for LLR: 15.0 GPD/ft.

C. Heindel; Last revised: 10-28-2024;
[U:\PROJECTS - WHEM\Dorset Town, Raptor Lane Housing\WW Evaluations\WW Area B4\Calcs, WW Capacity Estimate, Dorset Raptor Lane, WW Area B4 - CH, 10-28-2024.xlsx, Tab = B4 - Max Q, North End].



HYDROGEOL. NOTES:
Transmitting Soil:
L = Loam, SAB/ GR
$\boxed{1.5'}$ Limiting Condition Depth, ft.

C. Heindel. 10/29/2024

GRAPHIC SCALE
PLOT SIZE 11" x 17"

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

CREATION DATE	10/21/24
RELEASE DATE	10/21/24

ISSUED FOR PROGRESS REVIEW

REVISIONS:

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TOWN OF DORSET HOUSING STUDY
RAPTOR LANE
DORSET, VERMONT

WASTEWATER LOCATION D-2

SCALE:	AS NOTED
DESIGN BY:	PMG
DRAWN BY:	KMFG
SHEET NO:	EX6
PROJECT NO:	2406

PRELIMINARY HYDROGEOLOGIC CAPACITY CALCULATIONS: WW Area D-2
Wastewater Disposal
Dorset Raptor Lane
Dorset, VT

Assumptions:
1. Use Nov. 6, 2023 WS&PWS Rule.
2. Site-specific hydrogeologic analysis, per Section 1-903-r[1][B] [General Requirements; Hydrogeologic Analyses].
3. Effluent type: **Septic Tank Effluent**

A. Calculations of Max Design Flow, using Darcy's Law: Q = K * i * (L * h) * 7.48

Parameter	Description	Value	units	Calculations
K	hydr. conduct.	20	ft/day	est., from Table 1, *Hydraulic Loading Method for Detailed Soil Descriptions in Vermont*, 2003:
				Soil Texture Description: loam; Category: 4 Soil Structure: Shape: subangular blocky Soil Structure: Grade: 3 [very friable = strong]
i	hydr. grad.	5%	ft/ft	Hydraulic Gradient is based on ground slope
L	cross-slope length	150	ft.	Available L, from Site Plan
h	Unsat. soil	1.0	ft.	Available depth of unsaturated transmitting soil BGS, minus 0.5-ft. freeboard: from Section B below
SOLVE FOR MAX HYDROGEOLOGIC CAPACITY, Q				
Q	**Max. Hydrogeol. Capacity**	**1,122**	**GPD**	by Darcy's Law: Q = K x i x (L x h) 7.48: h: 1.0 ftl; from Section B below. K: 20 ft/day i: 0.05 ft/ft L: 150 ft convert: 7.48 gal/cu.ft. **Solve for Q = 1,122 GPD**

B. Calculate h, available thickness of unsat. transmitting soil, for effluent type listed in Assumption #3 above:

TP providing basis of Limit. Cond. [LC] beneath WW Footprint:	Depth to Limiting Condition, ft.	Subtract Required Freeboard, ft.	Equals **Available h, ft.**
TP-102	1.5	0.5	**1.0**

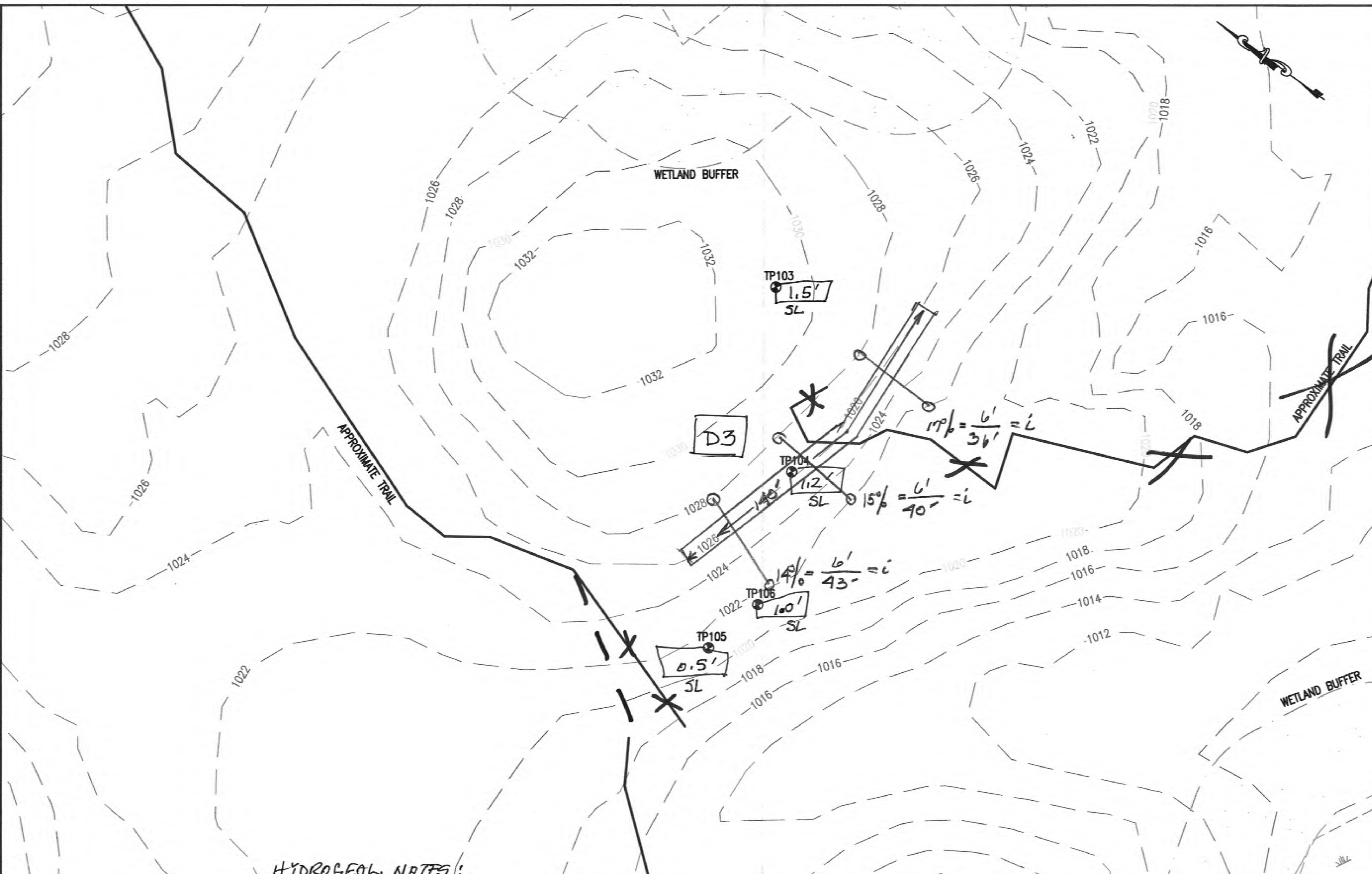
NOTE: Required freeboard is based on MOUND wastewater disposal system, not in-ground system.

C. SOLVE FOR LINEAR LOADING RATE [LLR]:

1. MAX Hydrogeologic Capacity:
   1,122 GPD, from calculation of Q, above.
2. Cross-slope length used in calculation of Q, above:
   150 ft. [L].

Solve for LLR: 7.5 GPD/ft.

C. Heindel; Last revised: 10-29-2024;
[U:\PROJECTS - WHEM\Dorset Town, Raptor Lane Housing\WW Evaluations\WW Area D\Calcs, WW Capacity Estimate, Dorset Raptor Lane, WW Area D2 - CH, 10-29-2024.xlsx, Tab = D2-central - Max Q, known L, h].



HYDROGEOL. NOTES:

Transmitting Soil:

SL = SANDY LOAM

$\boxed{1.0'}$ Transmitting soil depth, ft.

C. HEINDEL. 10/29/2024

GRAPHIC SCALE

PLOT SIZE 11" x 17"

40 0 20 40 80 160

(IN FEET)

1 inch = 40 ft.

CREATION DATE: 10/21/24

RELEASE DATE: 10/21/24

45

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TOWN OF DORSET HOUSING STUDY

RAPTOR LANE
DORSET, VERMONT

WASTEWATER LOCATION D-3

SCALE:	AS NOTED
DESIGN BY:	PMG
DRAWN BY:	KMFG
SHEET NO:	EX7
PROJECT NO:	2406

PRELIMINARY **HYDROGEOLOGIC CAPACITY CALCULATIONS: WW Area D-3**
Wastewater Disposal
Dorset Raptor Lane
Dorset, VT

Assumptions:
1. Use Nov. 6, 2023 WS&PWS Rule.
2. Site-specific hydrogeologic analysis, per Section 1-903-r[1][B] [General Requirements; Hydrogeologic Analyses].
3. Effluent type: **Septic Tank Effluent**

A. Calculations of Max Design Flow, using Darcy's Law: Q = K * i * (L * h) * 7.48

Parameter	Description	Value	units	Calculations		
K	hydr. conduct.	40	ft/day	est., from Table 1, *Hydraulic Loading Method for Detailed Soil Descriptions in Vermont* , 2003:		
				Soil Texture Description:	sandy loam	Category: 2
				Soil Structure: Shape:	subangular blocky	
				Soil Structure: Grade:	2 [friable = moderate]	
i	hydr. grad.	14%	ft/ft	Hydraulic Gradient is based on ground slope		
L	cross-slope length	140	ft.	Available L, from Site Plan		
h	Unsat. soil	0.5	ft.	Available depth of unsaturated transmitting soil BGS, minus 0.5-ft. freeboard: from Section B below		
SOLVE FOR MAX HYDROGEOLOGIC CAPACITY, Q						
Q	**Max. Hydrogeol. Capacity**	**2,932**	**GPD**	by Darcy's Law: Q = K x i x (L x h) 7.48:		
				h:	0.5	ftl; from Section B below.
				K:	40	ft/day
				i:	0.14	ft/ft
				L:	140	ft
				convert:	7.48	gal/cu.ft.
				Solve for Q =	**2,932**	**GPD**

B. Calculate h, available thickness of unsat. transmitting soil, for effluent type listed in Assumption #3 above:

TP providing basis of Limit. Cond. [LC] beneath WW Footprint:	Depth to Limiting Condition, ft.	Subtract Required Freeboard, ft.	Equals **Available h, ft.**
TP-106	1.0	0.5	**0.5**

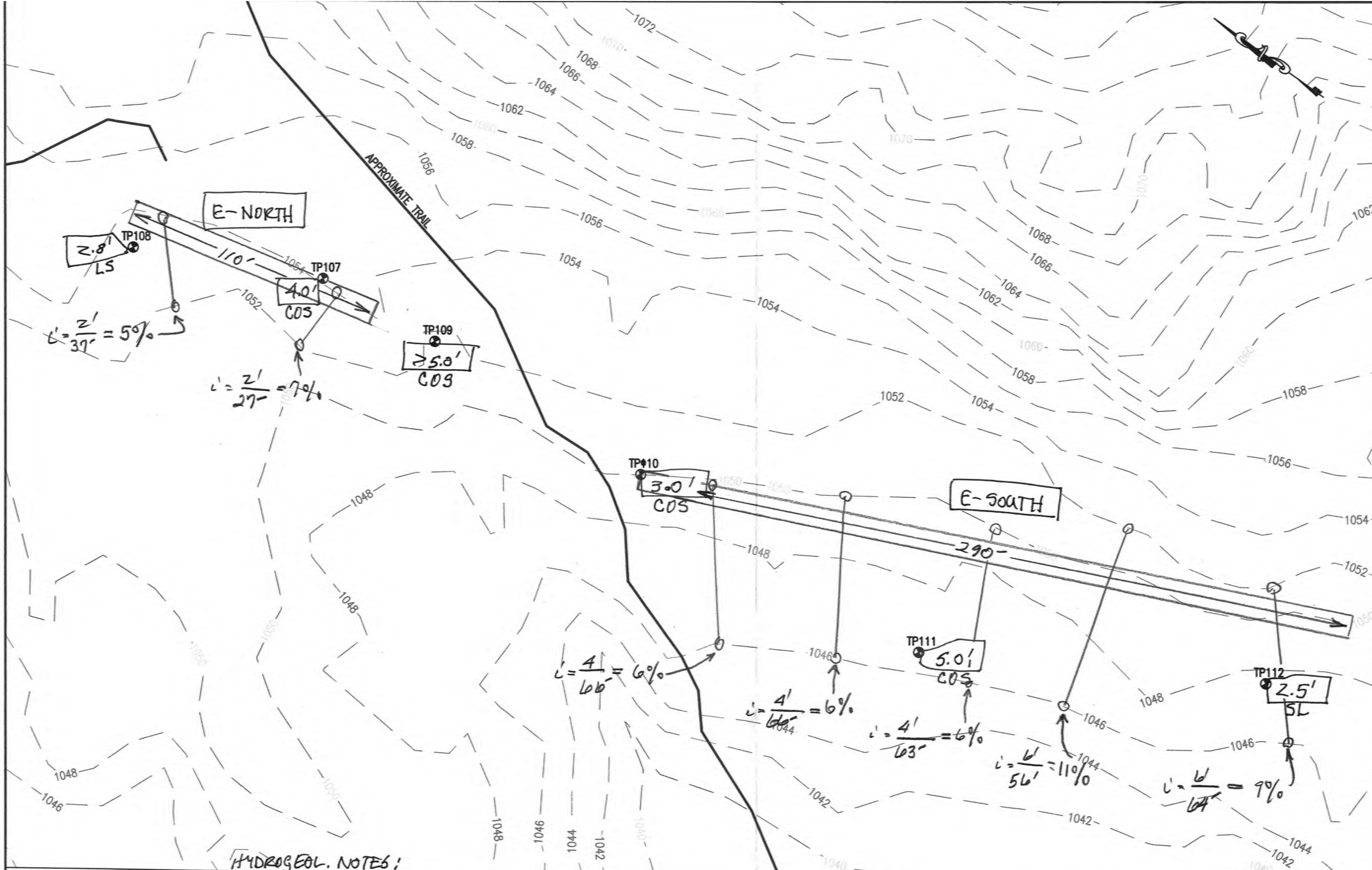
<u>NOTE</u>: Required freeboard is based on MOUND wastewater disposal system, not in-ground system.

C. SOLVE FOR LINEAR LOADING RATE [LLR]:

1. MAX Hydrogeologic Capacity:
   2,932 GPD, from calculation of Q, above.
2. Cross-slope length used in calculation of Q, above:
   140 ft. [L].

Solve for LLR: 20.9 GPD/ft.

C. Heindel; Last revised: 10-29-2024;
[U:\PROJECTS - WHEM\Dorset Town, Raptor Lane Housing\WW Evaluations\WW Area D\Calcs, WW Capacity Estimate, Dorset Raptor Lane, WW Area D3 - CH, 10-29-2024.xlsx, Tab = D2-central - Max Q, known L, h].



HYDROGEOL. NOTES:

Transmitting Soils:

LS = loamy sand (1)

COS = Coarse sand (1)

SL = sandy loam (2)

$\boxed{3.0'}$ Limiting condition depth, ft.

$\boxed{>5.0'}$ No limit. cond., to depth shown.

L. HEINDEL, 10/29/2024

GRAPHIC SCALE

PLOT SIZE 11" x 17"

40 0 20 40 80 160

(IN FEET)

1 inch = 40 ft.

CREATION DATE 10/21/24

RELEASE DATE 10/21/24

47

ISSUED FOR PROGRESS REVIEW

REVISIONS:

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TOWN OF DORSET HOUSING STUDY

RAPTOR LANE
DORSET, VERMONT

WASTEWATER LOCATION E

SCALE:	AS NOTED
DESIGN BY:	PMG
DRAWN BY:	KMFG
SHEET NO:	EX5
PROJECT NO:	2406

PRELIMINARY HYDROGEOLOGIC CAPACITY CALCULATIONS: WW Area E-SOUTH
Wastewater Disposal
Dorset Raptor Lane
Dorset, VT

Assumptions:
1. Use Nov. 6, 2023 WS&PWS Rule.
2. Site-specific hydrogeologic analysis, per Section 1-903-r[1][B] [General Requirements; Hydrogeologic Analyses].
3. Effluent type: **Septic Tank Effluent**

A. Calculations of Max Design Flow, using Darcy's Law: Q = K * i * (L * h) * 7.48

Parameter	Description	Value	units	Calculations
K	hydr. conduct.	40	ft/day	est., from Table 1, *Hydraulic Loading Method for Detailed Soil Descriptions in Vermont*, 2003:
				Soil Texture Description: sandy loam; Category: 2
				Soil Structure: Shape: subangular blocky
				Soil Structure: Grade: 2 [friable = moderate]
i	hydr. grad.	6%	ft/ft	Hydraulic Gradient is based on ground slope
L	cross-slope length	290	ft.	Available L, from Site Plan
h	Unsat. soil	2.0	ft.	Available depth of unsaturated transmitting soil BGS, minus 0.5-ft. freeboard: from Section B below
SOLVE FOR MAX HYDROGEOLOGIC CAPACITY, Q				
Q	**Max. Hydrogeol. Capacity**	**10,412**	**GPD**	by Darcy's Law: Q = K x i x (L x h) 7.48:
				h: 2.0 ftl; from Section B below.
				K: 40 ft/day
				i: 0.06 ft/ft
				L: 290 ft
				convert: 7.48 gal/cu.ft.
				Solve for Q = 10,412 GPD

B. Calculate h, available thickness of unsat. transmitting soil, for effluent type listed in Assumption #3 above:

TP providing basis of Limit. Cond. [LC] beneath WW Footprint:	Depth to Limiting Condition, ft.	Subtract Required Freeboard, ft.	Equals **Available h, ft.**
TP-112	2.5	0.5	**2.0**

NOTE: Required freeboard is based on MOUND wastewater disposal system, not in-ground system.

C. SOLVE FOR LINEAR LOADING RATE [LLR]:

1. MAX Hydrogeologic Capacity:
   10,412 GPD, from calculation of Q, above.
2. Cross-slope length used in calculation of Q, above:
   290 ft. [L].

Solve for LLR: 35.9 GPD/ft.

C. Heindel; Last revised: 10-29-2024;
[U:\PROJECTS - WHEM\Dorset Town, Raptor Lane Housing\WW Evaluations\WW Area E\Calcs, WW Capacity Estimate, Dorset Raptor Lane, WW Area E-North+South - CH, 10-29-2024.xlsx,
Tab = E-South - Max Q, known L, h].

ENMAN •KESSELRING CONSULTING ENGINEERS, P.C.

SOIL DESCRIPTION FORM

Test Pit Summary

Client:	Town of Dorset
By:	Patrick Griffin, P.E.
Location:	D-2 near Pod 7
Approx. Slope:	5-10%

Job #:	2406
Date:	9/19/2024
Weather:	Sunny, 65 degrees F
Excavation method: Excavator	

TP #	Depth (in)	Color	Texture	Structure	Consistence	Mottles	Remarks (ledge depth, root depth, cobbles, etc.)
101	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-24	10 YR 4/4	Loam (L)	SAB	Very Friable	No	20% cobbles, 10% stones
	24-30	10 YR 5/6	Medium to coarse gravel	Granular	Loose	No	
	30-72	10 YR 6/4	Silt Loam (> COS)	SAB	Firm	Yes at 30", Faint	20% cobbles, 10% stones
	2.5'						Roots to 36", no ledge rock encountered
	Limiting Layer: 30"						
102	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-18	10 YR 4/4	Loam L	SAB	Very friable	No	20% cobbles, 10% stones
	18-48	10 YR 6/4	Silt Loam	SAB	Firm	Yes at 18", Faint	20% cobbles, 10% stones
	1.5'						No ledge rock encountered
							Roots to 24", no ledge rock encountered
	Limiting Layer: 18" 1.5'						

CH NOTES. 10/2024.

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SOIL DESCRIPTION FORM

Test Pit Summary

Client:	Town of Dorset
By:	Patrick Griffin, P.E.
Location:	D-3, E, B-3, B-4
Approx. Slope:	Varies

Job #:	2406
Date:	10/21/2024
Weather:	Sunny, 50 degrees F
Excavation method: Excavator	

TP #	Depth (in)	Color	Texture	Structure	Consistence	Mottles	Remarks (ledge depth, root depth, cobbles, etc.)
103	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-18	10 YR 5/6	Sandy Loam SL	SAB	Very Friable	No	
	18-48	10 YR 5/3	Silt Loam	SAB	Firm	No	10% stones, 10% gravel
							Roots to 24", no ledge rock encountered
	Limiting Layer: 18" ✓ 1.5'						
104	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-14	10 YR 5/6	Sandy Loam SL	SAB	Very Friable	No	
	14-42	10 YR 5/3	Silt Loam	SAB	Firm	No	20% stones, 20% gravel
							Roots to 24", ledge rock refusal at 42"
	Limiting Layer: 14" ✓ 1.2'						
105	0-2	10 YR 3/3	Loam	SAB	Friable	No	
	2-6	10 YR 5/6	Sandy Loam SL	SAB	Very Friable	No	
	6-54	10 YR 5/3	Silt Loam	SAB	Firm	No	20% stones, 20% gravel
							Roots to 24", no ledge rock encountered
	Limiting Layer: 6" 0.5'						
106	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-12	10 YR 5/6	Sandy Loam SL	SAB	Very Friable	No	
	12-38	10 YR 5/3	Silt Loam	SAB	Firm	No	20% stones, 20% gravel
							Roots to 30", ledge rock refusal at 38"
	Limiting Layer: 12" ✓ 1.0'						
107	0-4	10 YR 3/3	Loam	SAB	Friable	No	
	4-12	10 YR 3/6	Sandy Loam	SAB	Friable	No	10% cobbles
	12-48	10 YR 3/4	Gravelly Sand COS	Granular	Loose	No	40% cobbles and stones
							Roots to 36", ledge rock refusal at 48"
	Limiting Layer: 48" ✓ 4.0						BR = 4.0'
108	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-18	10 YR 3/4	Sandy Loam	SAB	Friable	No	10% cobbles and stones
	18-34	10 YR 5/6	Loamy Sand LS	SAB	Friable	No	10% cobbles and stones
							Roots to 24", ledge rock refusal at 34"
	Limiting Layer: 34" 2.8' BR						BR at 2.8'
109	0-5	10 YR 3/3	Loam	SAB	Friable	No	
	5-30	10 YR 4/4	Sandy Loam	SAB	Friable	No	10% cobbles
	30-60	10 YR 3/4	Gravelly Sand COS	Granular	Loose	No	20% cobbles and stones
	> 5.0'						Roots to 36", no ledge rock encountered
	Limiting Layer: none identified to 5.0'						

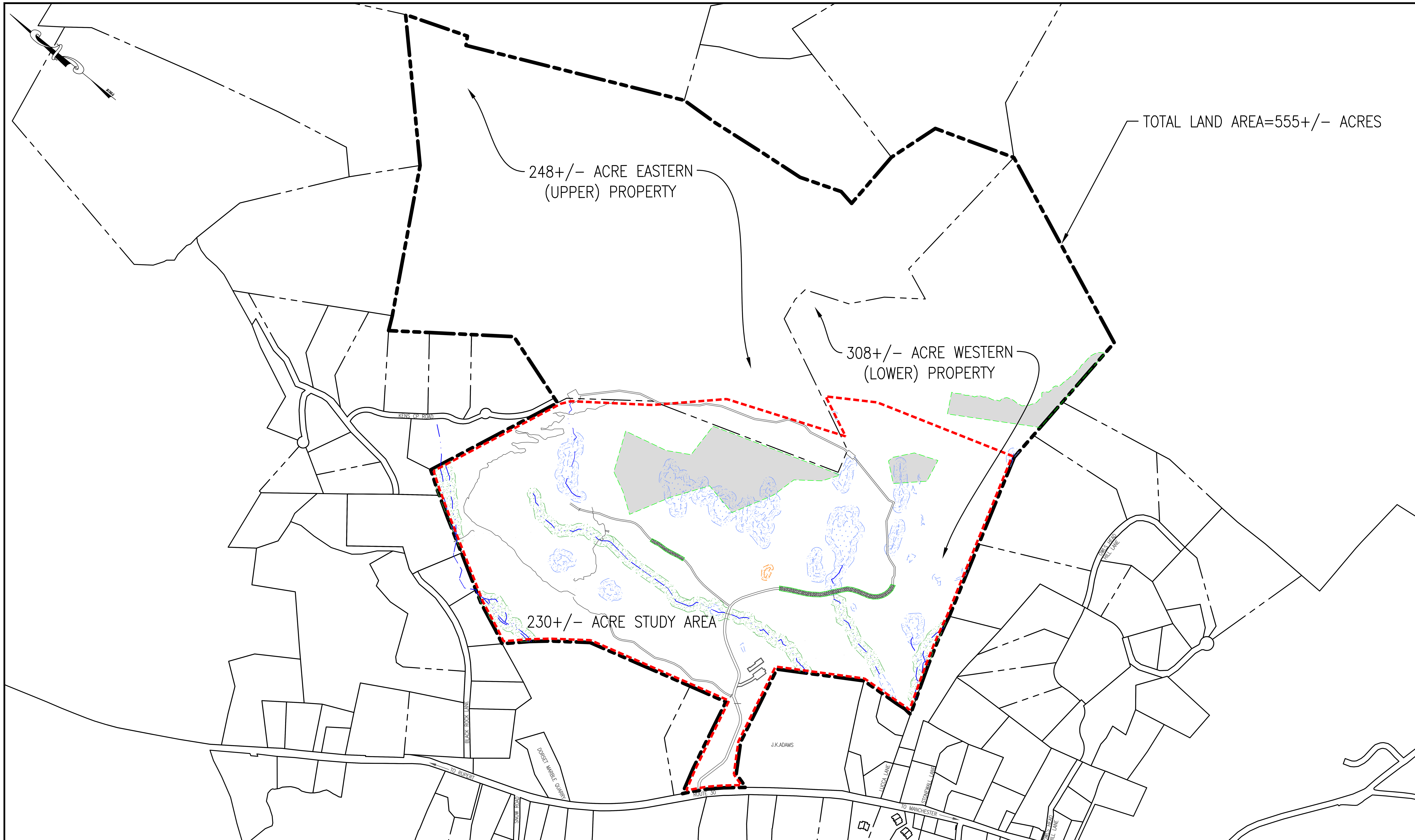
CH NOTES, 10/2024.

110	0-5	10 YR 3/3	Loam	SAB	Friable	No	
	5-24	10 YR 4/4	Sandy Loam	SAB	Friable	No	10% cobbles
	24-36	10 YR 3/4	Gravelly Sand CDS	Granular	Loose	No	20% cobbles and stones
							Roots to 30", ledge rock refusal at 36"
Limiting Layer: 36" 3.0' BR							BR at 3.0'
111	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-24	10 YR 4/4	Sandy Loam	SAB	Friable	No	10% cobbles
	24-60	10 YR 3/4	Gravelly Sand CDS	Granular	Loose	No	20% cobbles and stones
							Roots to 36", ledge rock refusal at 60"
Limiting Layer: 60" BR, 5.0'							BR at 5.0'
112	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-30	10 YR 4/4	Sandy Loam SL	SAB	Friable	No	10% cobbles
							Roots to 24", ledge rock refusal at 30"
Limiting Layer: 30" 2.5'							BR at 2.5'
113	0-2	10 YR 3/3	Loam	SAB	Friable	No	
	2-18	10 YR 3/4	Sandy Loam SL	SAB	Friable	No	
	18-42	10 YR 5/3	Sandy Loam Till	SAB	Firm	No	
	1.5'						Roots to 24", no ledge rock encountered
Limiting Layer: 18" = 1.5'							
114	0-2	10 YR 3/3	Loam	SAB	Friable	No	
	2-12	10 YR 3/4	Sandy Loam SL	SAB	Friable	No	
	12-36	10 YR 5/3	Sandy Loam Till	SAB	Firm	No	
	1.0'						Roots to 30", no ledge rock encountered
Limiting Layer: 12" = 1.0'							
115	0-2	10 YR 3/3	Loam	SAB	Friable	No	
	2-14	10 YR 3/4	Sandy Loam SL	SAB	Friable	No	
	14-36	10 YR 5/3	Sandy Loam Till	SAB	Firm	No	
	1.2'						Roots to 24", no ledge rock encountered
Limiting Layer: 14" = 1.2'							
116	0-3	10 YR 3/3	Loam	SAB	Friable	No	
	3-8	10 YR 3/4	Sandy Loam SL	SAB	Friable	No	
	8-48	10 YR 5/3	Sandy Loam Till	SAB	Firm	No	
	0.7'						Roots to 14", no ledge rock encountered
Limiting Layer: 8" = 0.7'							
117	0-2	10 YR 3/3	Loam	SAB	Friable	No	
	2-12	10 YR 3/4	Sandy Loam SL	SAB	Friable	No	
	12-42	10 YR 5/3	Sandy Loam Till	SAB	Firm	No	
	1.0'						Roots to 24", no ledge rock encountered
Limiting Layer: 12" = 1.0'							

CH NOTES, 10/2024.

Exhibit 3

Enman Kesselring Consulting Engineers Plans



CREATION DATE: 11/15/24

RELEASE DATE: 11/15/24

ISSUED FOR REPORT

REVISIONS:

THE CERTIFICATION ON THIS DRAWING ONLY INDICATES THE VT REGISTERED PROFESSIONAL ENGINEER RESPONSIBLE FOR PREPARATION AND IS NOT ISSUED FOR CONSTRUCTION UNLESS NOTED IN THE REVISION BOX.

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TOWN OF DORSET HOUSING STUDY

RAPTOR LANE
DORSET, VERMONT

OVERALL PROPERTY MAP

SCALE: AS NOTED

DESIGN BY: PMG

DRAWN BY: KMFG

SHEET NO: C1

PROJECT NO: 2406

REFERENCES

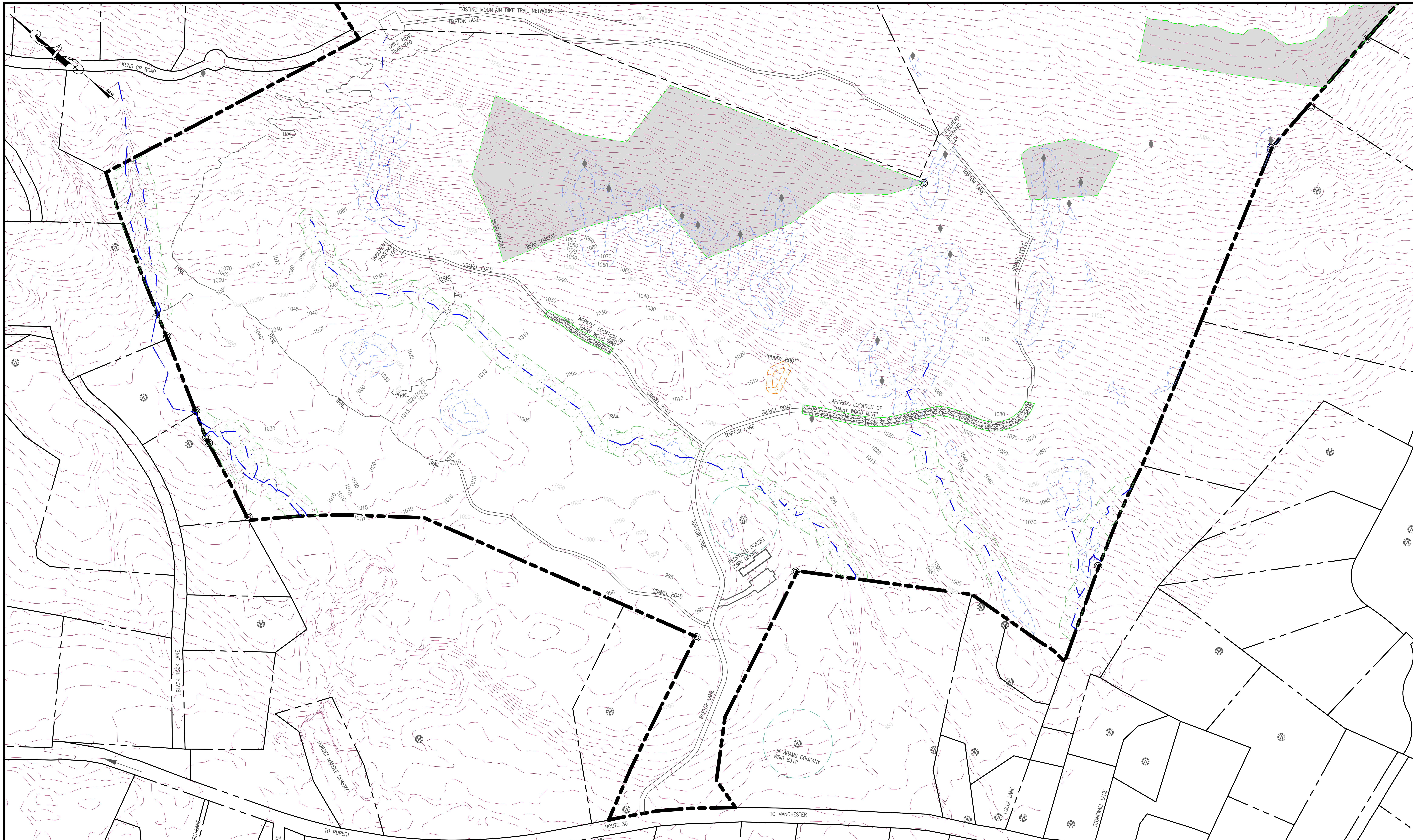
1. THIS PLAN IS NOT A BOUNDARY SURVEY. PROPERTY LINES ARE APPROXIMATE BASED ON PARCEL MAP INFORMATION FROM THE STATE OF VERMONT NATURAL RESOURCES ATLAS.
2. THE VERTICAL DATUM IS APPROXIMATE BASED ON ELEVATION DATA DOWNLOADED FROM THE STATE OF VERMONT OPEN GEODATA PORTAL LIDAR FINDER.
3. PROPERTY LINES, EASEMENTS, AND OTHER REAL PROPERTY DESCRIPTIONS PROVIDED IN THIS PERMIT APPLICATION ARE FOR THE USE OF LOCAL, STATE, AND FEDERAL PERMIT PROGRAMS ONLY. THEY DO NOT DEFINE LEGAL RIGHTS OR MEET LEGAL REQUIREMENTS FOR A LAND SURVEY AS DESCRIBED IN 26 V.S.A. SUBSECTION 2502(4), AND SHALL NOT BE USED IN LIEU OF A SURVEY AS THE BASIS OF ANY LAND TRANSFER OR ESTABLISHMENT OF ANY PROPERTY RIGHT.
4. RARE AND THREATENED SPECIES MAPPING, WETLAND, WETLAND BUFFER, VERNAL POOL, RIVER, BEAR SCARRED TREE, IRON PINS, CULVERTS, SPRING, RICH FERN, TRANSITION HARDWOOD LIMESTONE FOREST, AND MESIC RED OAK-NORTHERN HARDWOOD FOREST MAPPING IS ALL DEPICTED BASED ON INFORMATION PROVIDED BY VHB THROUGH SHAPE FILES DATED MAY 14, 2024 AND DEPICTED ON PLAN TITLED "NATURAL RESOURCES MAP" DATED OCTOBER 28, 2019.
5. TEST PIT LOCATIONS AND PERMITTED WASTEWATER SYSTEMS ARE DEPICTED BASED ON PLANS PERMITTED BY BRUNO ASSOCIATES WITH THE PROJECT NAME OWL'S FOOT SUBDIVISION, APPROVAL DATE BY THE STATE OF JULY 23, 2004.
6. PROPOSED TOWN OFFICE BUILDING, WELL, AND WASTEWATER SYSTEM DEPICTED BASED ON PLANS BY ENGINEERING VENTURES, CONSTRUCTION DOCUMENTS SET, DATED FEBRUARY 1, 2024.

LEGEND

APPROX. LOCATION OF PROPERTY LINE
EDGE OF STREAM
1010 EXISTING 5' CONTOUR
1000 EXISTING 25' CONTOUR
EXISTING WELL (ANR)
PUBLIC WATER SUPPLY WELL SHIELD
NATURAL SPRING (VHB)
IRON PIN FOUND (VHB)
WETLAND BUFFER
WETLAND
STREAM BUFFER
PROJECT STUDY AREA
HAIRY WOOD MINT
PUTTY ROOT BUFFER
BEAR HABITAT

GRAPHIC SCALE
400 0 200 400 800 1600
(IN FEET)
1 inch = 400 ft.

PLOT SIZE 24" x 36"



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EDGE OF STREAM
1010 EXISTING 5' CONTOUR
1000 EXISTING 25' CONTOUR
EXISTING WELL (ANR)
PUBLIC WATER SUPPLY WELL SHIELD
NATURAL SPRING (VHB)
IRON PIN FOUND (VHB)
WETLAND BUFFER
WETLAND
STREAM BUFFER
HAIRY WOOD MINT
PUTTY ROOT BUFFER
BEAR HABITAT
SF SINGLE FAMILY HOME
DUPL DUPLEX BUILDING
MULTI MULTI-FAMILY BUILDING

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft.
PLOT SIZE 24" x 36"

CREATION DATE: 11/15/24

RELEASE DATE: 11/15/24

ISSUED FOR REPORT

REVISIONS:

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TOWN OF DORSET HOUSING STUDY

RAPTOR LANE
DORSET, VERMONT

EXISTING CONDITIONS SITE PLAN

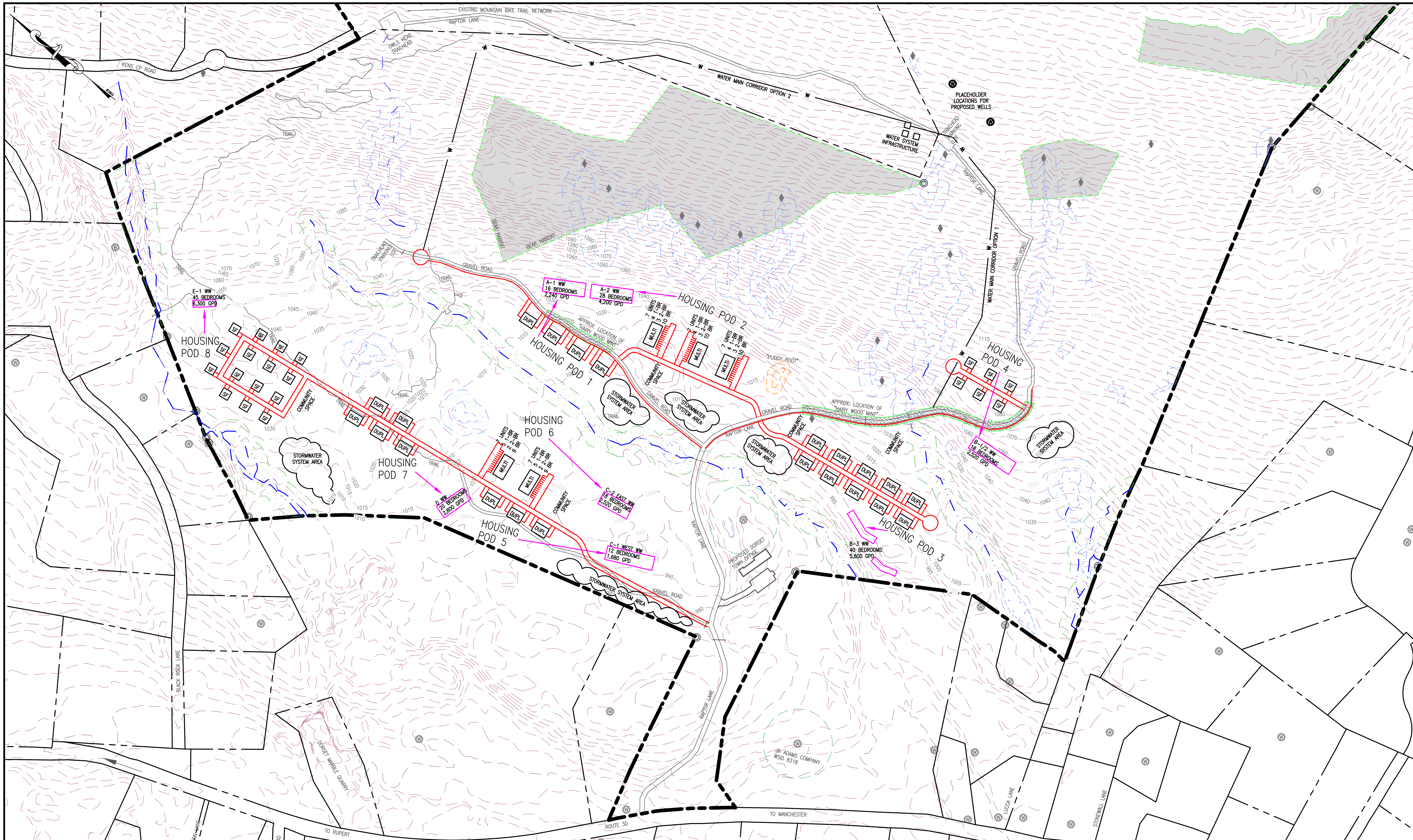
SCALE: AS NOTED

DESIGN BY: PMG

DRAWN BY: KMFG

SHEET NO: C2

PROJECT NO: 2406



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TOWN OF DORSET HOUSING STUDY

RAPTOR LANE
DORSET, VERMONT

CONCEPTUAL DEVELOPMENT SITE PLAN

SCALE: AS NOTED

DESIGN BY: PMG

DRAWN BY: KMFG

SHEET NO: C3

PROJECT NO: 2406

REFERENCES

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LEGEND

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EDGE OF STREAM
EXISTING 10' CONTOUR
EXISTING 50' CONTOUR
EXISTING WELL (ANR)
PUBLIC WATER SUPPLY WELL SHIELD
NATURAL SPRING (VHB)
IRON PIN FOUND (VHB)
EXISTING CULVERT
WETLAND BUFFER
WETLAND
STREAM BUFFER
HAIRY WOOD MINT
PUTTY ROOT BUFFER
BEAR HABITAT
SF SINGLE FAMILY HOME
DUPL DUPLEX BUILDING
MULTI MULTI-FAMILY BUILDING

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

PLOT SIZE 24" x 36"