SEPTIC SYSTEM AND PWS WELL REPORT

THE NICHEWAUG INN
PETERSHAM, MA

PREPARED FOR:

THE TOWN OF PETERSHAM
NICHEWAUG INN TASK FORCE
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2009 Septic + Well

Report on the Septic System and PWS Well
The Nichewaug Inn
Petersham, MA
Prepared For:
The Town of Petersham
Nichewaug Inn Task Force
December 2009

History

The Property was used as a Catholic School until it closed in the mid 1970's. The student population at the time was approximately 200 of which 100 was thought to have been boarding students. School staff is approximately 50 of which about 25 may have lived on site.

The property is served by an artesian well located near the garage on the northwest side of the Inn. At the present time, no detailed information is available regarding the depth, construction, or yield of this well. The well was designated PWS ID# 1234-009 by the Massachusetts Department of Environmental Protection. The well is currently considered to be inactive and would require testing to determine its construction, depth, yield, and water quality as part of any request to return it to active service. There is no site on the property which could meet the DEP standards for a fully compliant water source due to the proximity of buildings and septic systems.

The existing septic system consists of septic tanks, pump chambers and an unconfined, under-drained sand filter. The sand filter portion of the system is believed to be located in the seasonal groundwater table, which results in poor performance due to groundwater inflow in the wetter times of year. The bottom drain is believed to flow in the direction of the Town Common. This system would need to be completely replaced to meet current regulations as part of a redevelopment of the property.

Title 5 Flows

Based on information provided, the design flows for Title 5 (310 CMR 15.00) for the purpose of considering a replacement system would be as follows

Student Population 200		
Resident Students	100 x 65 gpd / student	= 6500 gpd
Day students	100 x 15 gpd / student	= 1500 gpd
Staff Population 50		
Resident Staff	25 x 65 gpd / person	= 1625 gpd
Day Staff	25 x 15 gpd / person	= 375
	Total Daily Flow	**10,000 gpd**

This would be a base number for considering the limits of a potential repair of the existing system which is not compliant with current regulations.

In the1950's when the current system was constructed, Massachusetts did not have a septic code for construction of systems. The first code was enacted in 1968 as Article XI

of the State Environmental Code, this was replaced in 1978 by Title 5 (310 CMR 15.00). It has since been revised twice, once in 1996 and again in 2005.

Currently, the maximum flows allowed under Title 5 design are 10,000 gallons per day for new construction or 15,000 gallons per day for an existing failed system 310 CMR 15.006. The limiting factor in this case is 10,000 due to previous documented flows.

A system design greater than 10,000 gallons per day would require a Groundwater Discharge Permit. We would recommend any redevelopment of the property generate less than 10,000 gallons per day of sewage This permit requires much more stringent testing of the proposed site conditions with combined engineering and construction costs in excess of $1,000,000 dollars. The operating costs and requirements are also more stringent and more costly. The existing soils, topography and other site conditions would not be likely to meet the more stringent requirements of a Groundwater discharge Permit which would include a hydro-geological study.

Potential System Design

There is a valid Title 5 percolation test and soil evaluation on record for the area of the tennis courts in the rear of the property. The recorded percolation rate is 32 minutes per inch and the Highest seasonal high water table is 22 inches. The soils are indicated as sandy loams. Based on Title 5 15.243 a sandy loam is a class II soil and Title 5 15.242 lists the allowable loading rate for a class II soil using a pressure distribution system and a percolation rate of 40 minutes per inch as .29 gallons per day S.F. (Pressure distribution is required for systems with a flow of 2000 gpd or greater Title 5 310CMR 15.231 (1)).

Using the above loading rate conditions would require the following leach area for a conventional pressure dosed system sized to handle the following daily flows

1. 4000 gallons per day	1/.29 4000 gpd =	13,793 square feet
2. 6,000 gallons per day	1/.29 x 6000 gpd =	20,690 square feet
3. 8000 gallons per day	1/.29 x 8000 gpd=	27,586 square feet

Typical leach field dimensions for these flows would be in the range of

1. 4,ooo gallons per day (13,793 s.f.) 2 fields 100 feet by 70 feet
2. 6,000 gallons per day (20,690 s.f.) 3 fields 100 feet by 70 feet
3. 8,000 gallons per day (27,586 s.f.) 4 fields 100 feet by 70 feet

As a result of the groundwater depth and required groundwater separation any proposed system would be built in fill any of the above could be built in a trench configuration which would further reduce the coverage of the soil adsorption system on the ground. This would however raise the total height of the fill required. Under Title 5 310 CMR 15.405 there is also the potential of a 25% reduction in required leach area as a Local Upgrade Approval for a system being constructed as a repair.

In addition a system built utilizing one of the approved alternative technologies as defined by DEP can be installed with as much as a 50% percent reduction in required leach area due to the additional treatment the system provides. As an example a 4,000 gallon per day system would need only one 100 foot by 70 foot leach field.

There is also a system called a bottomless Sand Filter which was approved during the last year as a piloted technology which is expected to be approved for remedial use in the next year. Depending on the final approval the required sand filter size might be in the range the following

1. 4,000 gallons per day 1333 square feet or 20 feet x 70 feet
2. 6,000 gallons per day 2,000 square feet or 20 feet x 100 feet
3. 8,000 gallons per day 2,667 square feet or 30feet x 90 feet

Potential Uses

The following are some possible categories of future use and the flows associated with them.

Housing for the elderly 150 gallons per unit up to two bedrooms. Forty units would represent a daily flow of 6,000 gallons per day.

Low Income housing 110 gallons per bedroom. Fifty four units would equal a daily flow of 5,940 gallons.

Hotel 110 gallons per bedroom. Fifty four bedrooms would equal a daily flow of 5,940 gallons.

Office Building (except medical offices) 75 gallons per 1,000 square feet. Ten thousand square feet would equal a daily flow of 750 gallons.

Retail store 50 gallons per 1,000 square feet. Ten thousand square feet would give daily flow of 500 gallons.

Schools Use. The number varies according to age and facilities. Fifteen gallons per day per student or staff is a conservative initial estimate. Four hundred students and staff would equal a daily flow of 6,000 gallons.

Recommendations

Some appropriate combination of housing possibly elderly and low income combined with office or retail space might be the best use of the spaces available. Due to the existing residences surrounding the site and the need to have a public water supply for the property, a septic solution that provides a higher degree of treatment than a basic Title 5 system should be installed on this site. Due to the limited area available and the need to maintain maximum separation between septic systems and wells a daily flow of about 6,000 gallons would seem appropriate for the site. Based on these conditions we would favor a system which combined the Orenco Vericomm control panel, Orenco Ad-Vantex treatment pods and Bottomless Sand Filters for the following reasons.

1. The Vericom control, through use of a dedicated telephone line, allows 24 hour a day monitoring of system functions and operation. Alarms or malfunctions are immediately noted and alerts are sent out to the appropriate personnel. The designated operator can change and adjust many system parameters remotely to correct or enhance system performance.

2. The Ad-Vantex unit is a modular pod utilizing a Geo-Textile fabric as a trickling filter media upon where the bugs that treat the sewage attach and thrive in an aerobic environment. These compact units have large surface areas on which effluent is time dosed according to existing flows. They are easily maintained and can be cleaned and restarted as necessary without excavation.
3. The Bottomless Sand Filter is currently the system with the smallest footprint on the ground expected to be available for use on sites such as this. It is not currently state approved but is under study for remedial use.

The Public Water Supply issues connected with this property should be resolved with the DEP before designing a septic system for the property. If the present well is allowed to be put back into service, the new septic system will likely be required to provide nitrogen reduction (with possible added cost depending on the design used). As stated previously in this report, the existing well would have to be thoroughly tested and evaluated before DEP would consider allowing its use again. In the event that the well could not be reactivated another water source would have to be developed. This would result in additional negotiations with DEP to determine an acceptable site and the additional cost of drilling and testing the new well.

Opinion of Costs

Well
The testing which DEP would likely require of the existing well is estimated as follows.

1. Remove the existing well pump for service and to measure well depth.
2. Reinstall pump and one inch diameter tube for data logger.
3. Perform step test to determine pumping rate for prolonged test.
4. Install data logger and perform 48 hour pump test.
5. Take water samples during well test.
6. Lab analysis of water samples.
7. Report on well.

Estimated Cost $11,000

Septic System

Option #1 Title 5 System with local upgrade 25% reduction in area

Estimated Cost $215,000

Option # 2 Title 5 System with local upgrade one foot reduction in groundwater separation

Estimated Cost $208,000

Option #3 Title 5 Approved Innovative Alternative System

Estimated Cost $161,500

Option #4 Bottomless Sand Filter (currently piloted but, in the process of being approval for remedial use by DEP)

Estimated Cost **$132,000**

Schematics

Included in this report are four schematics of how each of four design conditions might appear in the area of the existing tennis courts.

Exhibit 1 - Local upgrade 25% reduction in required leach area.

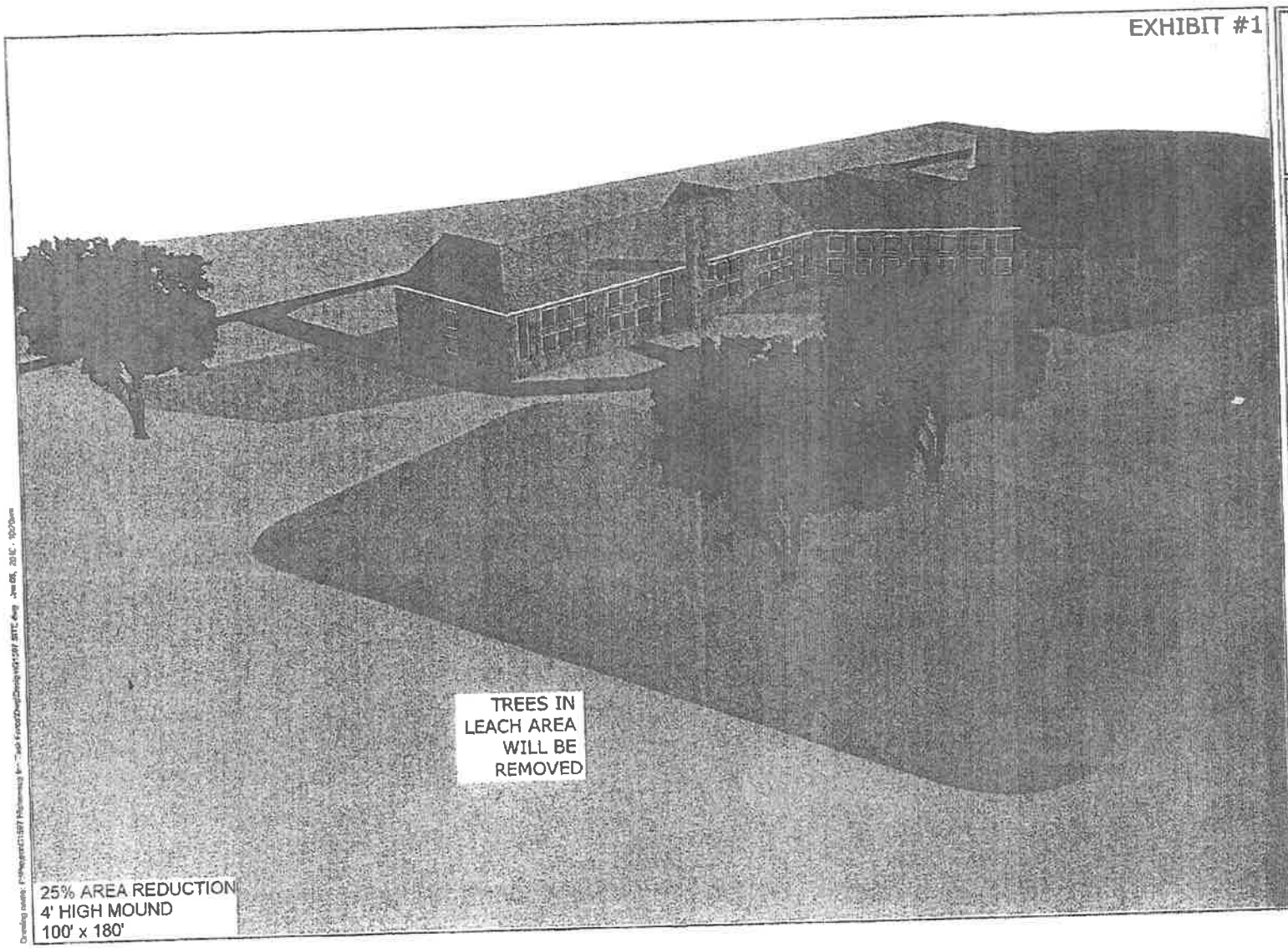
Exhibit 2 - Three foot separation of seasonal high groundwater.

Exhibit 3 - Innovative Alternative System 50% reduction in required leach area.

Exhibit 4 - Alternative System using Bottomless Sand Filter as final disposal.

The schematics are for visual purposes to help understand the relative impact of each of the chosen alternatives and are based on a design flow of 6,000 gallons per day for illustration purposes. The final design may reflect a different daily flow and/or other factors which may affect the redevelopment.

EXHIBIT #1



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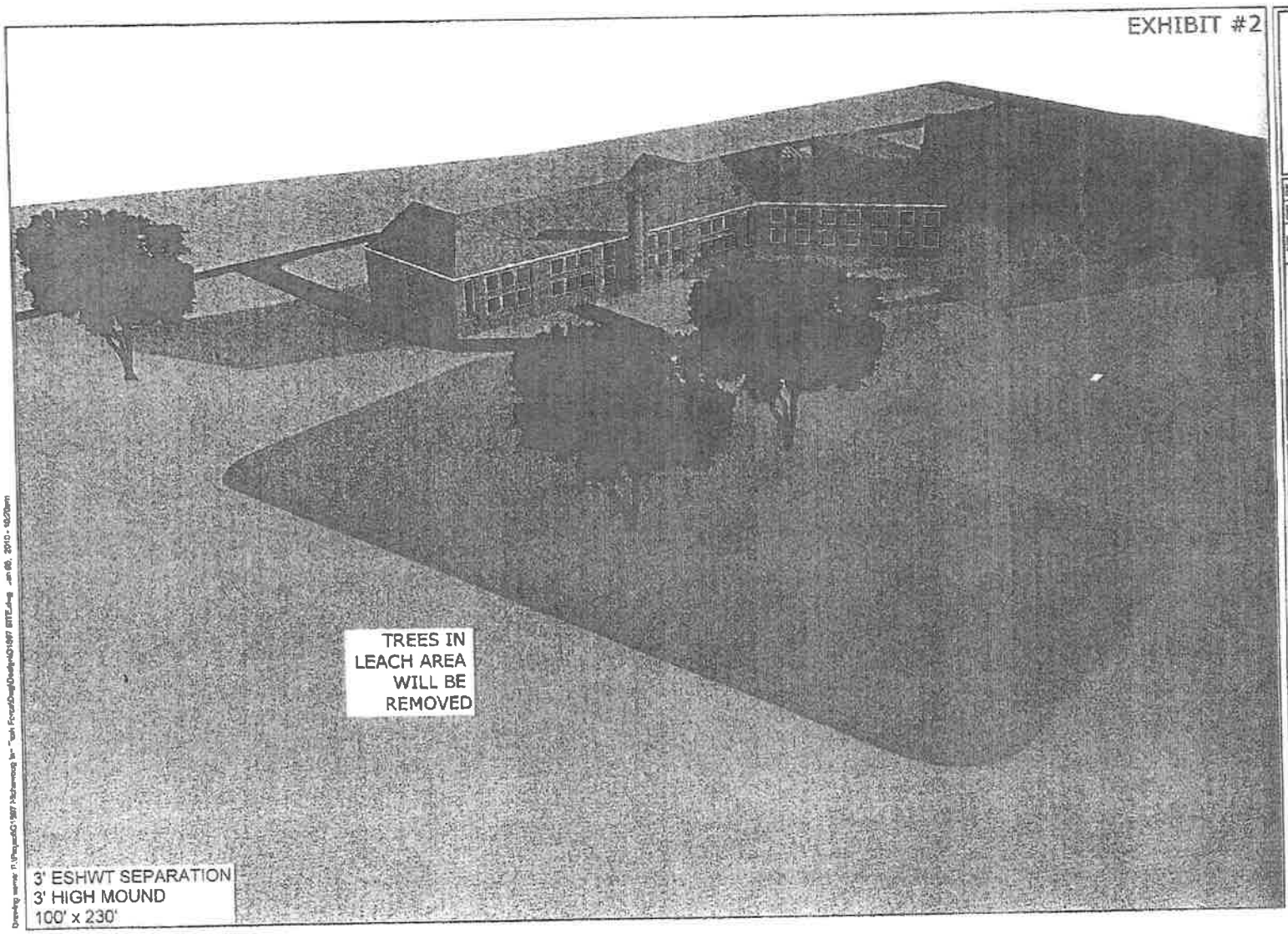
SKETCHUP EXHIBIT

EXHIBIT #2



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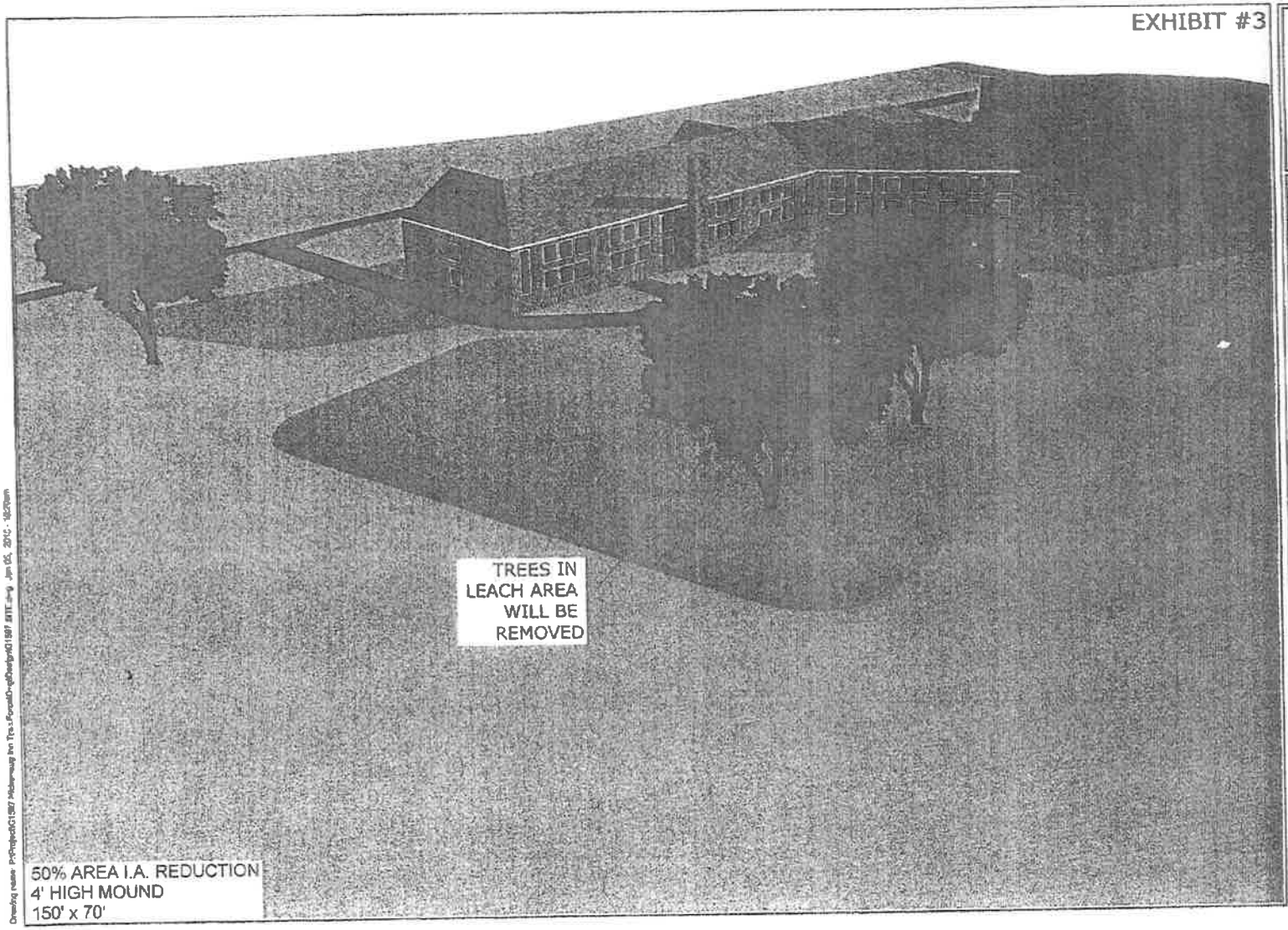
SKETCHUP EXHIBIT

TOWN OF PETERSHAM

EXHIBIT #3



50% AREA I.A. REDUCTION
4' HIGH MOUND
150' x 70'

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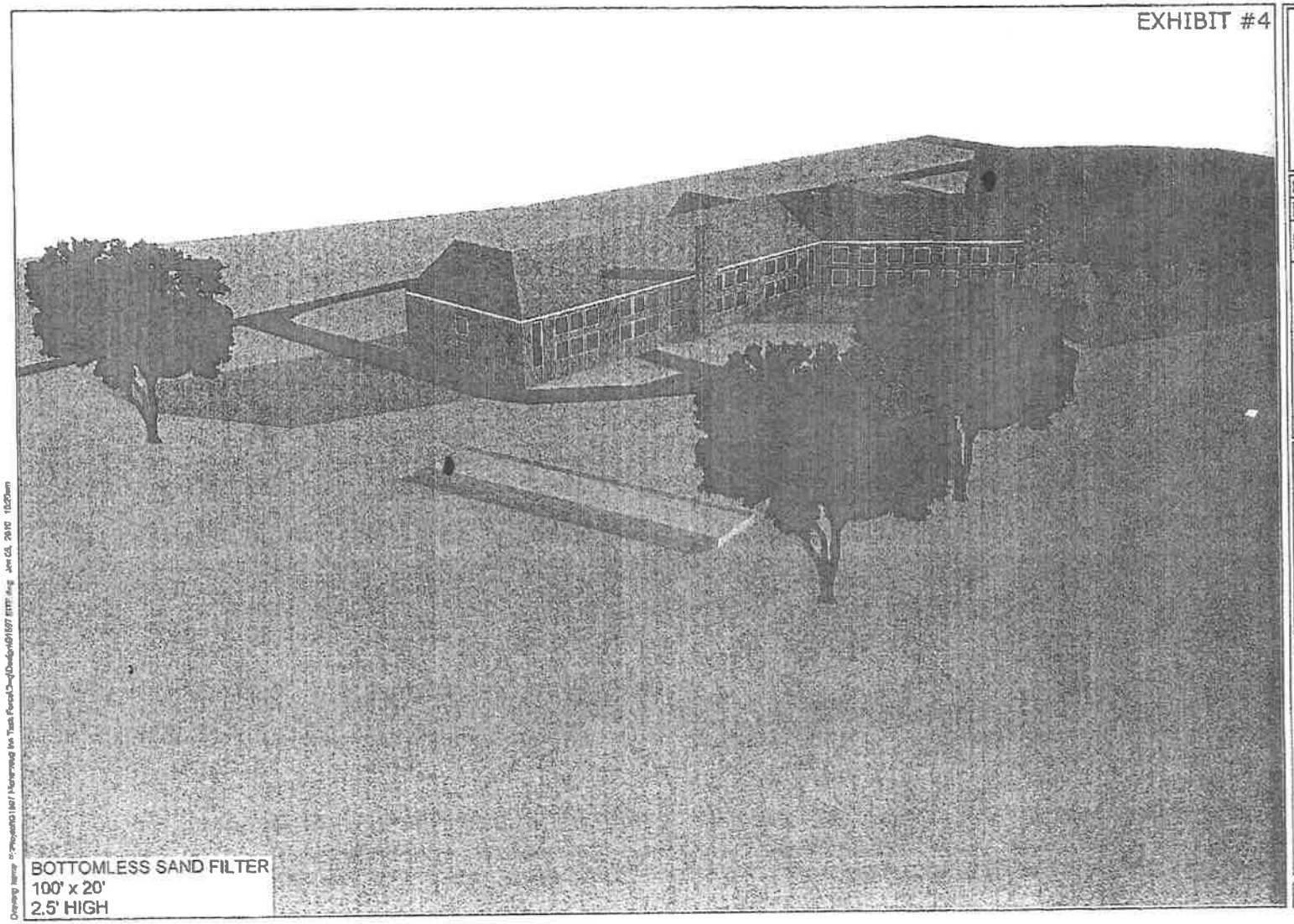
SKETCHUP
EXHIBIT

1/1

EXHIBIT #4



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SKETCHUP EXHIBIT

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