2024 Certified Installer Training

Division of Water Engineering Support and Plan Review Section

April 16-19, 2024

Introduction

- Course Instructor: Ryan Peterson, Environmental Program Specialist, DEC-ESPR
- Course Instructor 2: Tonya Bear, PE, Environmental Program Manager and Engineer, DEC-ESPR

- Training is for the 2024 Certified Installer course for the installation of conventional onsite wastewater disposal systems in accordance with 18 AAC 72.500 and the Onsite Wastewater System Installation Manual (OWSIM)
- Introduction to Online Learning Platform and Microsoft Teams

Agenda

- Total of 4 sessions via Microsoft Teams Webinar

- Session 1 – April 16th
  - Overview of Key Concepts, OWSIM, Pre-planning and Site Evaluation including Soils
- Session 2 – April 17th
  - Soils Part 2, Sizing Wastewater Systems, Programs and Scenario's, Open Discussion and Questions
- Session 3 – April 18th
  - Environmental Data Management System (EDMS) or Ed, Technology and Other Resources
- Session 4 – April 19th
  - Regulation changes overview, Open Discussion and Questions

Staff Contacts

- Ryan Peterson
  - Lead for onsite wastewater system registrations
  - Grades Exams, issues certifications
  - Specializes in areas covered by the Soldotna and Juneau offices
- Tony Sonoda
  - Manages class registration
  - Specializes in areas covered by the Fairbanks office
- Martha Harrison
  - Specializes in areas covered by the Wasilla office
- Tonya Bear, PE
  - ESPR Section Manager
  - Specializes in all areas in the State of Alaska

- Engineers in the Engineering Support and Plan Review section may also be contacted with questions and will provide any approvals needed for installations that do not meet the prescriptive requirements
  - https://dec.alaska.gov/water/wastewater/engineering/area-offices

Course Objectives

- How to install a conventional onsite wastewater disposal systems with **domestic wastewater only** under the Authorization by rule “ABR” or Documentation of Construction “DOC” process as required in 18 AAC 72 and the OWSIM
- To obtain the required training for licensed contractors to become a Certified Installer in the State of Alaska
- How a conventional onsite wastewater disposal system works and the impacts of these systems on human health, the environmental, and water quality
- How to troubleshoot a conventional onsite wastewater disposal system
- How to operate and maintain a conventional onsite wastewater disposal system

Course Objectives Continued

- The course **does not** teach all of the required skills and abilities required to install, maintain, modify, troubleshoot, etc. these systems. There is simply not enough time to provide that amount of detail.

To become a Certified Installer

- You must complete the training program
  - Attend the next available summer field session in your area. Summer field courses are tentatively scheduled in July this year.
- You must pay the certification fee
- You must have a valid license as a general contractor, an excavation contractor, or a sewer and water contractor
- You must agree to follow the rules and requirements for installing onsite wastewater systems

Completing the Training Program (Course Syllabus)

https://dec.alaska.gov/water/wastewater/engineering/course-training-material

- Attend Live Sessions (total of 4)

- Complete online learning modules
  - 4 lessons available now! (you should have already completed them)

- Written Exam
  - Will be available after live sessions on Friday
  - Must be submitted no later than 5 pm on April 30

- Summer Field Session (first available 2024)
  - 1-day in depth soils and sites field course
  - 1 each located in Kenai, Fairbanks, and Wasilla/Palmer

Summer 2024 Field Session

- Will cover soils in depth with samples
  - Finally, we will get our hands dirty again!

- Will be a hands-on experience!
  - How to perform a percolation test
  - Other field methods for better soil classifications

You can help us make the first field sessions the best by sending us soil samples with a picture of your test hole profile and location.

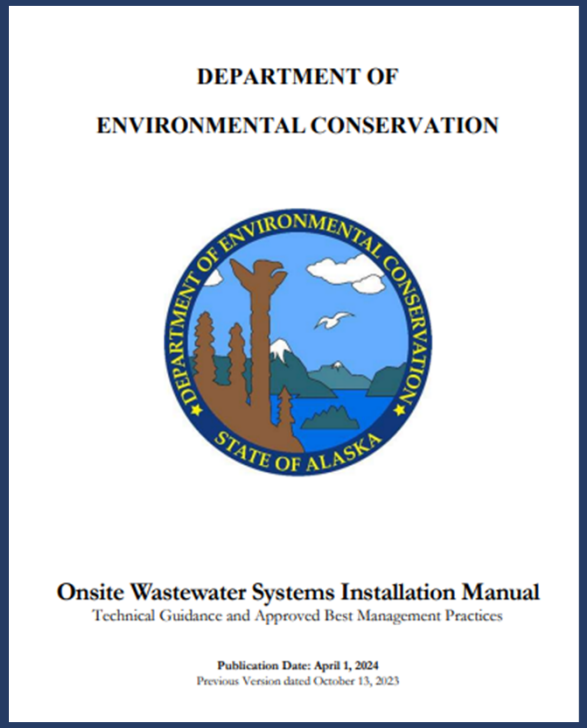
To Stay Certified…

- You must maintain a valid license as a general contractor, an excavation contractor, or a sewer and water contractor
- **You must attend the refresher class every two years**
- You must pass the exam if you are not exempt from taking the exam
- You must pay the certification fee
- **You must submit 24-hour notifications and complete documentation within the 90-days**
- Installations must comply with the regulations

Overview of Key Concepts

A brief summary

Onsite Wastewater System Installation Manual (OWSIM)



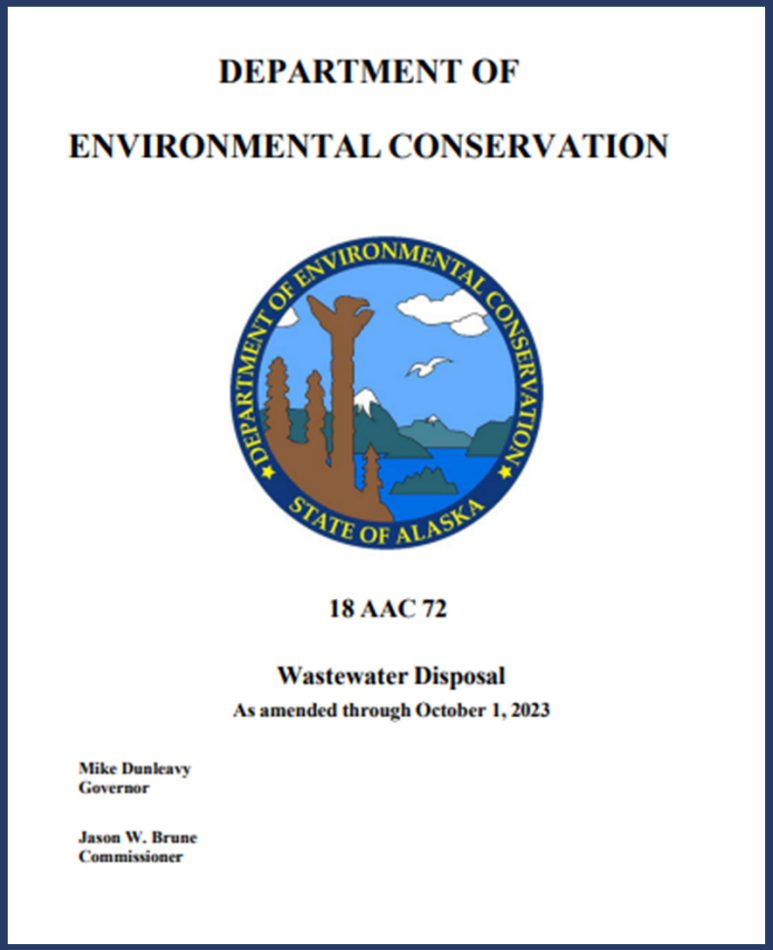
Contains all of the information required to install a conventional onsite system by the “authorization by rule” process. If the system you install does not follow the OWSIM, it cannot be installed under your certification and requires prior plan approval prior to construction

***Note the version! The OWSIM is periodically updated, make sure you always have a copy of the most recent manual! Copies can be picked up at the local DEC office.**

Onsite Wastewater System Installation Manual (OWSIM)

- Everything needed to install an onsite system in the OWSIM. DEC staff are here to assist; however, sometimes responses may not be timely. Email is very efficient.
- <u>If something discussed isn't in the OWSIM,</u> please let DEC know as soon as possible to be covered in a future OWSIM.
- Contrary to above, ask questions! If you are not clear on a requirement, please contact DEC staff ASAP for assistance.

Wastewater Disposal Regulations 18 AAC 72



DEPARTMENT OF

ENVIRONMENTAL CONSERVATION

18 AAC 72

Wastewater Disposal

As amended through October 1, 2023

Mike Dunleavy
Governor

Jason W. Brune
Commissioner

Is the legal backend of the OWSIM. Conventional systems are covered in Article 5. Certified Installer requirements in Article 4. Definitions are at 18 AAC 72.990.

OWSIM Technical Review Committee

- The OWSIM Technical Review Committee provides suggestions and helps the Department develop guidance manuals for the construction, operation, maintenance, and inspection of onsite wastewater disposal systems.
- When you start installing systems and would like to assist on making the OWSIM better, you are strongly encouraged to request to join the OWSIM. Please contact the ESPR section manager for information on joining!

OWSIM Key Terms

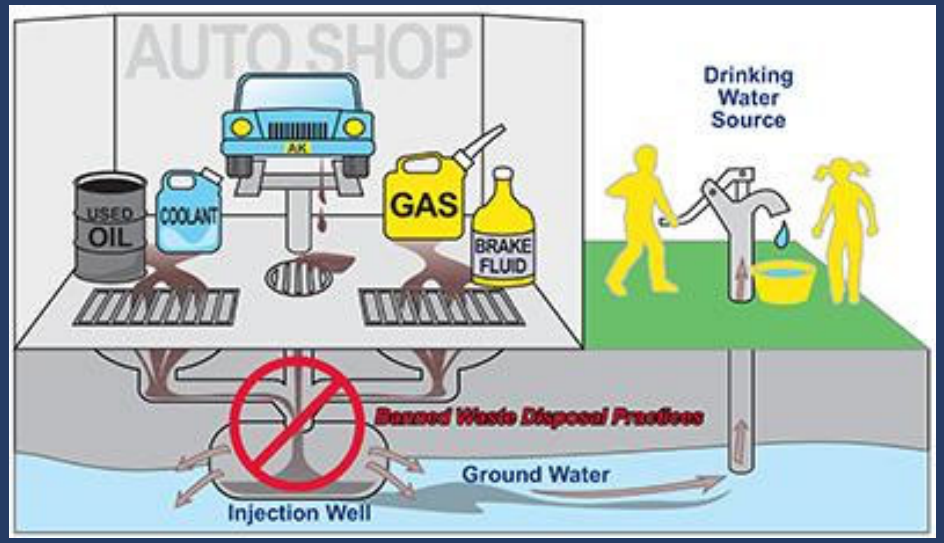
- **Alternative Onsite System:** method of onsite treatment and disposal other than a conventional onsite system
- **Conventional Onsite System:** means a system that treats domestic wastewater only and consists of a septic tank and a soil absorption system that is located below original grade, may also include a lift station
- **Private Residence:** a single lot developed to house no more than two families with a total on lot daily flow of less than 1500 gpd. A private residence can include multiple support buildings for the residents.
- **Small Commercial Facility:** single commercial building with a daily flow of 500 gpd or less
- **Multifamily Dwelling**: a single building that houses more than two families (ex. 4-plex)
- **Private Sewer Line**: serves one private residence, a single commercial building, or a single multifamily dwelling structure
- **Community Sewer Line:** serves two or more private residences, or otherwise two or more commercial buildings, multifamily dwellings, etc.

Key Concepts

- Wastewater and Domestic Wastewater
  - Waterborne **human wastes** or graywater derived from residences, commercial buildings, or similar structures.
  - Note: Graywater contains many of the same disease causing organisms as “black water” and must be tied into the septic system
- Conventional Wastewater Disposal System
  - Simplest terms, a septic tank to a subsurface soil absorption system. It may include a pump (lift station)
- Why does it matter?
  - Typical residential or commercial waste streams from human sources have a studied and known input parameters and therefore can be treated in a standardized matter (e.g., a conventional onsite system). If the input changes (such as institutional sources such), then it must be determined whether a septic system is the most appropriate treatment option. Likewise, if the system parameters change, above ground treatment, similarly, the treatment options must be determined if they are appropriate. Those systems are engineered for that reason

Floor Drains and Nondomestic Wastewater

- Connecting a floor drain to a septic system may result in a Motor Vehicle Waste Disposal well



http://www.newsminer.com/business/epa-orders-fairbanks-business-to-close-illegal-motor-vehicle-waste/article_f78c4f90-7ecf-11e7-91ce-17bd1a2a9c27.html

EPA orders Fairbanks business to close illegal motor vehicle waste disposal well

Staff Report Aug 11, 2017

FAIRBANKS - Stepping Stone Builders, Inc. has agreed with the Environmental Protection Agency to close an illegal motor vehicle waste disposal well, according to an EPA news release.

Motor vehicle waste disposal wells are often found in maintenance bays and catch fluids from vehicles such as oil, transmission fluid, and antifreeze, and dispose of them into septic systems. These wells pose a high risk to drinking water.

In 2016, an inspection found that Stepping Stone Builders had three floor drains illegally connected to a septic system. The Cushman Street business is located within the groundwater protection area for the public drinking water system, and close to other water systems.

The business also also paid a $36,500 penalty for alleged violations of the Safe Drinking Water Act. In 2000, the EPA banned new motor vehicle waste disposal wells nationwide. In 2005, all existing wells in Alaska were ordered closed due to the high risk they pose to drinking water. About 80 percent of Alaskans depend on groundwater for drinking water.

"Motor vehicle waste disposal wells have the potential to allow oil, antifreeze, brake fluid and other hazardous chemicals to contaminate drinking water sources and put people's health at risk," said Edward Kowalski, director of the Office of Compliance and ... illegal

Soldotna company settles with EPA for $130,000

The company was accused of violating the Safe Drinking Water Act

By Ashlyn O'Hara
Saturday, March 20, 2021 10:54pm | NEWS

The U.S. Environmental Protection Agency has reached a settlement agreement with Soldotna-based company North Star Paving & Construction, Inc. following allegations that the company violated the Safe Drinking Water Act when it was found to have an unauthorized underground injection well on the property.

Also as part of the settlement, the company has to close the well, including removing all contaminated materials in and around the well and permanently disconnecting the floor drain to the leachfield, among other things.

DEPARTMENT OF ENVIRONMENTAL CONSERVATION
STATE OF ALASKA

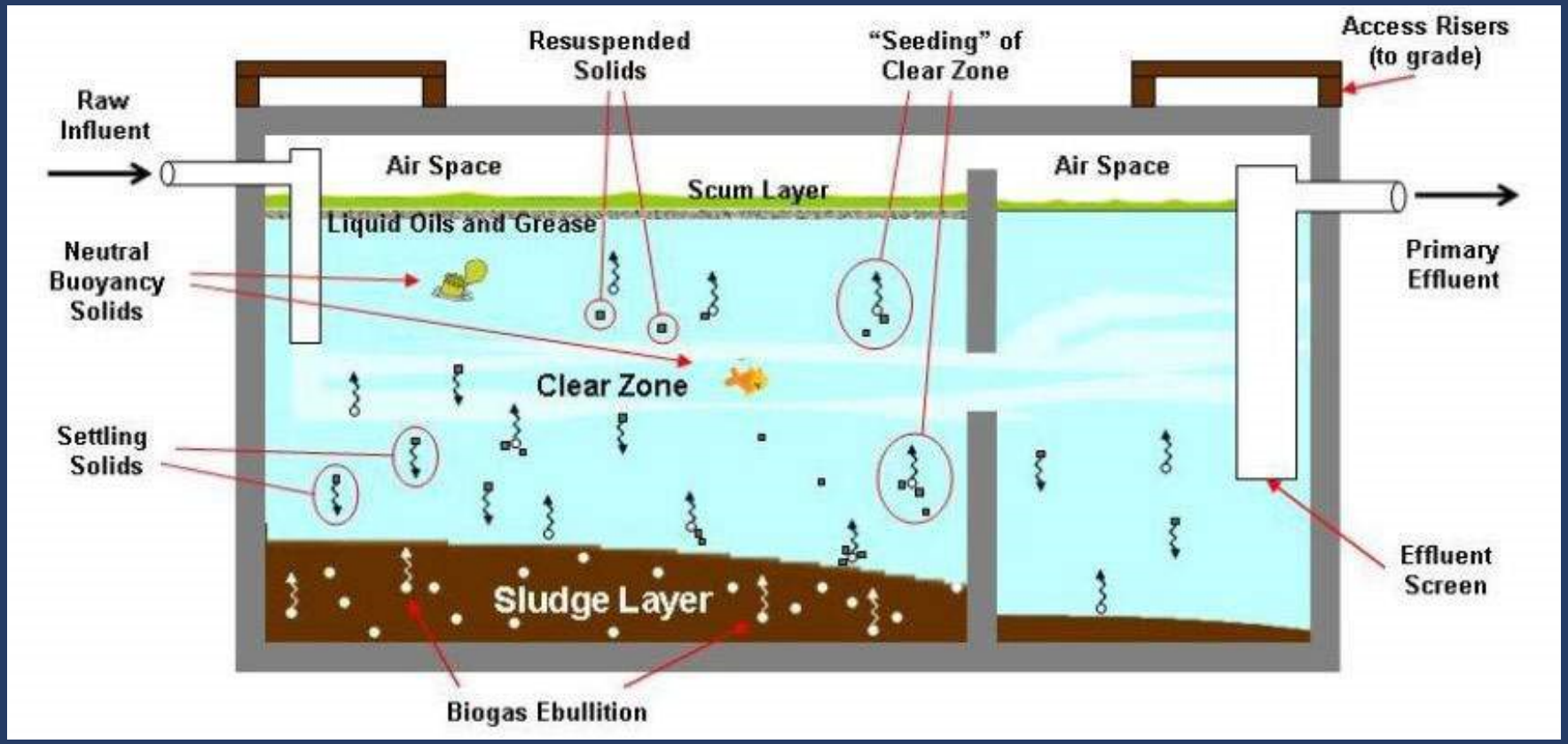
How a Septic Works

- Septic tank provides primary treatment by separating solids, grease and oils from waterborne wastewater by providing retention time. Heavy materials (toilet paper and solids) settle to the bottom of the tank and form a sludge layer. Lighter materials float to the top forming a scum layer.
- These layers may be reduced by anaerobic digestion; however, in cold climates very little to no digestion occurs. Alaska's subsurface soil temperature is cold! For that reason, a 2-year pumping schedule is recommended for most homeowners.
- Beware of suspended solids. Flushable wipes and RV toilet paper may be common example. Do a jar test!

Jar Test

- Simple science experiment. Far left is a flushable wipe

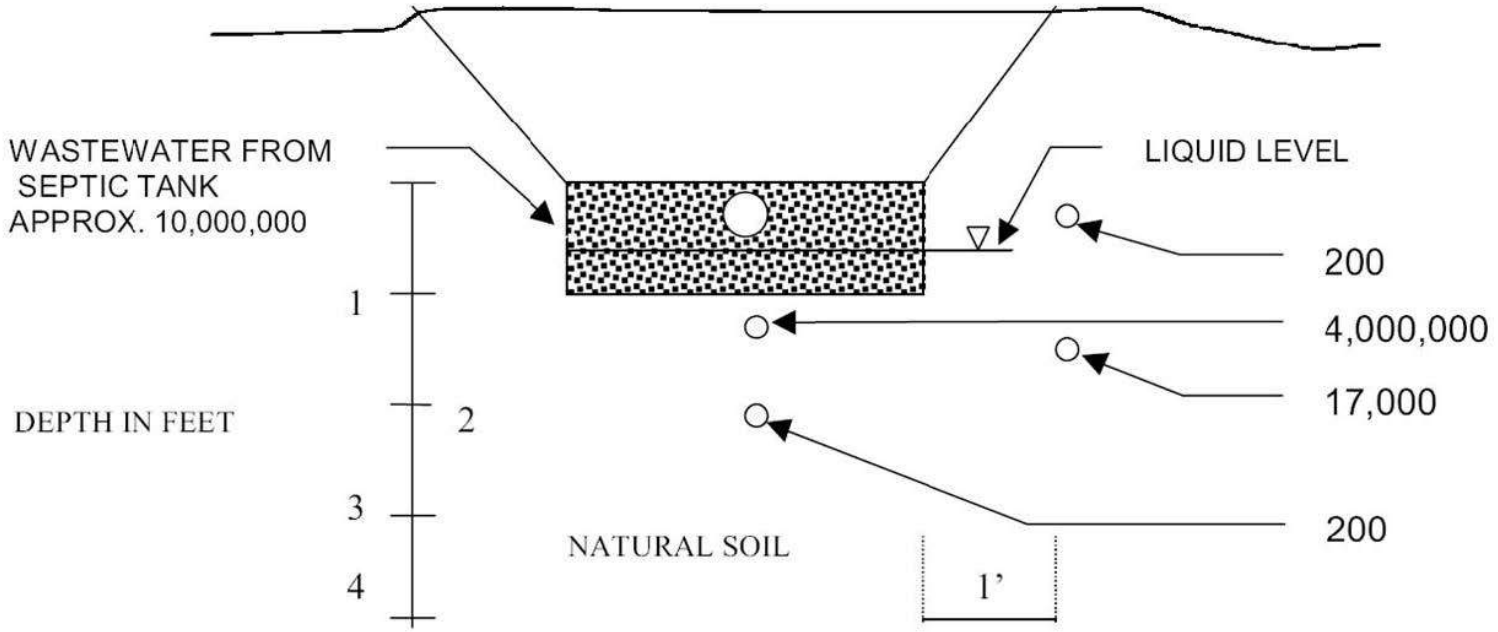
Illustration of a Septic Tank



How a Soil Absorption System Works

- The physical, chemical, and biological processes occurring with the soil will reduce the organic and microbial constituents of the wastewater.

Figure 4. Absorption Field Cross Section



Above numbers in organisms per 100 ml

Soil Absorption Systems

- Effective for the removal of harmful bacteria and viruses, soil does not remove all potential harmful impacts of wastewater into the environment. For example, nitrogen is only removed with a percent removal rate of 10-40 percent*.
  - EPA Onsite Wastewater Treatment Manual

Breaking the Installation Process Down

1. Pre-planning & site evaluation
    a. Initial site investigation and Property Owner Questions
        i. Facility/Property Served. Can you do this system as a CI?
        ii. Type of system to be installed. Initial evaluation. Can you do this system as a CI?
        iii. Research, historic information
        iv. Equipment Available
        v. Material Availability
    b. Site Evaluation
        i. “Best” location for system on property
        ii. Dig test holes
        iii. Appropriate leach field type based on above research
        iv. Determine the daily maximum wastewater flow based on the facility served
        v. Calculate the minimum size of the septic system
            A. Septic Tank based on the facility served
            B. Leach Field based on the facility served and soil conditions and loading rates
2. Construction
    a. Submit 24-hr notification through EDMS
    b. Install the wastewater system. Remember to take lots of pictures!
3. Record Documentation
    a. Complete EDMS Documentation of Construction (DOC) and submit within 90 days
        a. In some cases, owners, lenders, etc. require a copy of the submittal receipt ASAP
        b. Timely submissions allow Department staff to provide constructive feedback

Initial Site & Property Owner Questions

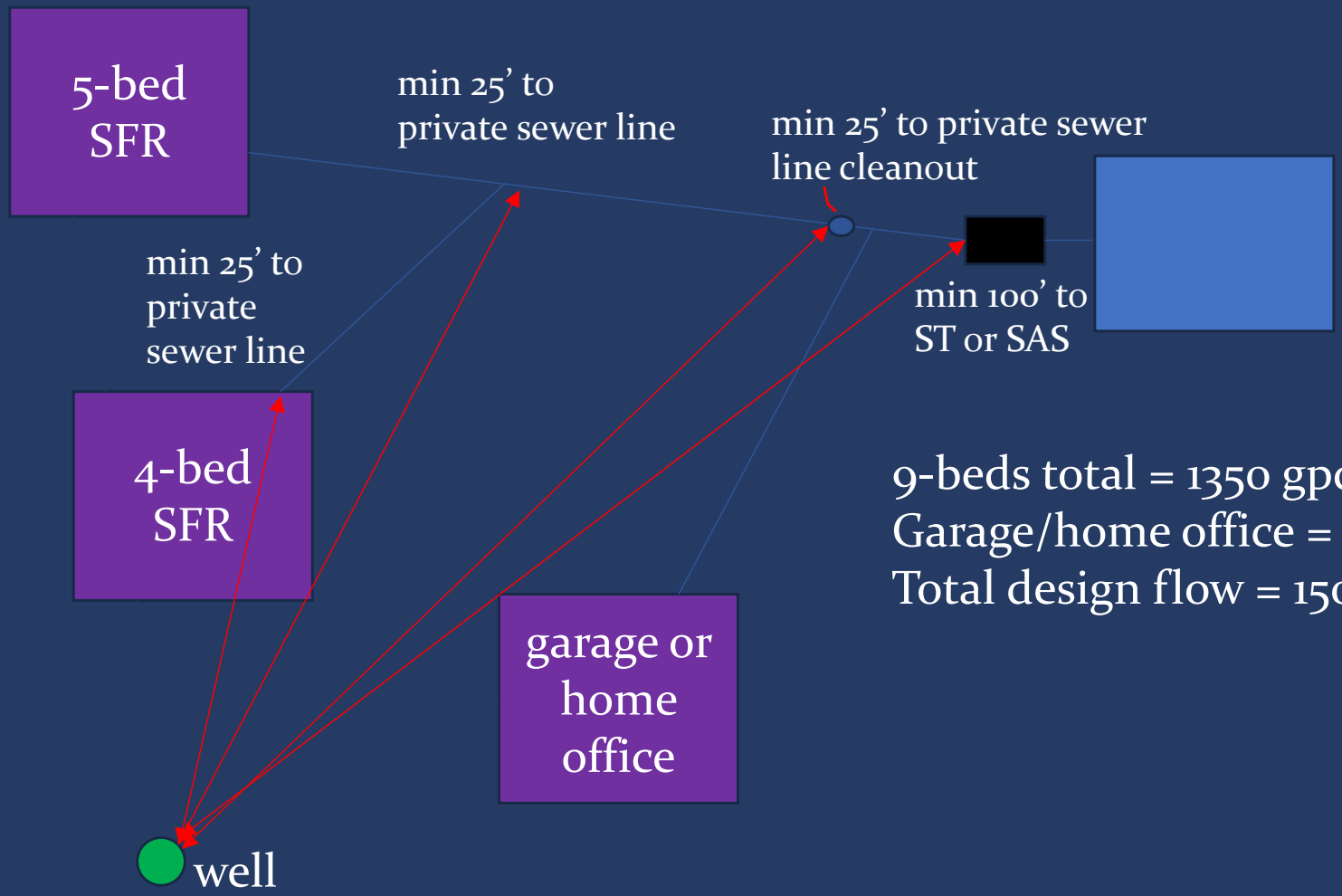
i. Facility/Property Served. Can you do this system as a CI?
ii. Type of system to be installed. Initial evaluation. Can you do this system as a CI?
iii. Research, historic information
iv. Equipment Available
v. Material Availability

Initial Site & Property Owner Questions

OWSIM Section 2.2.2 Certified Installer

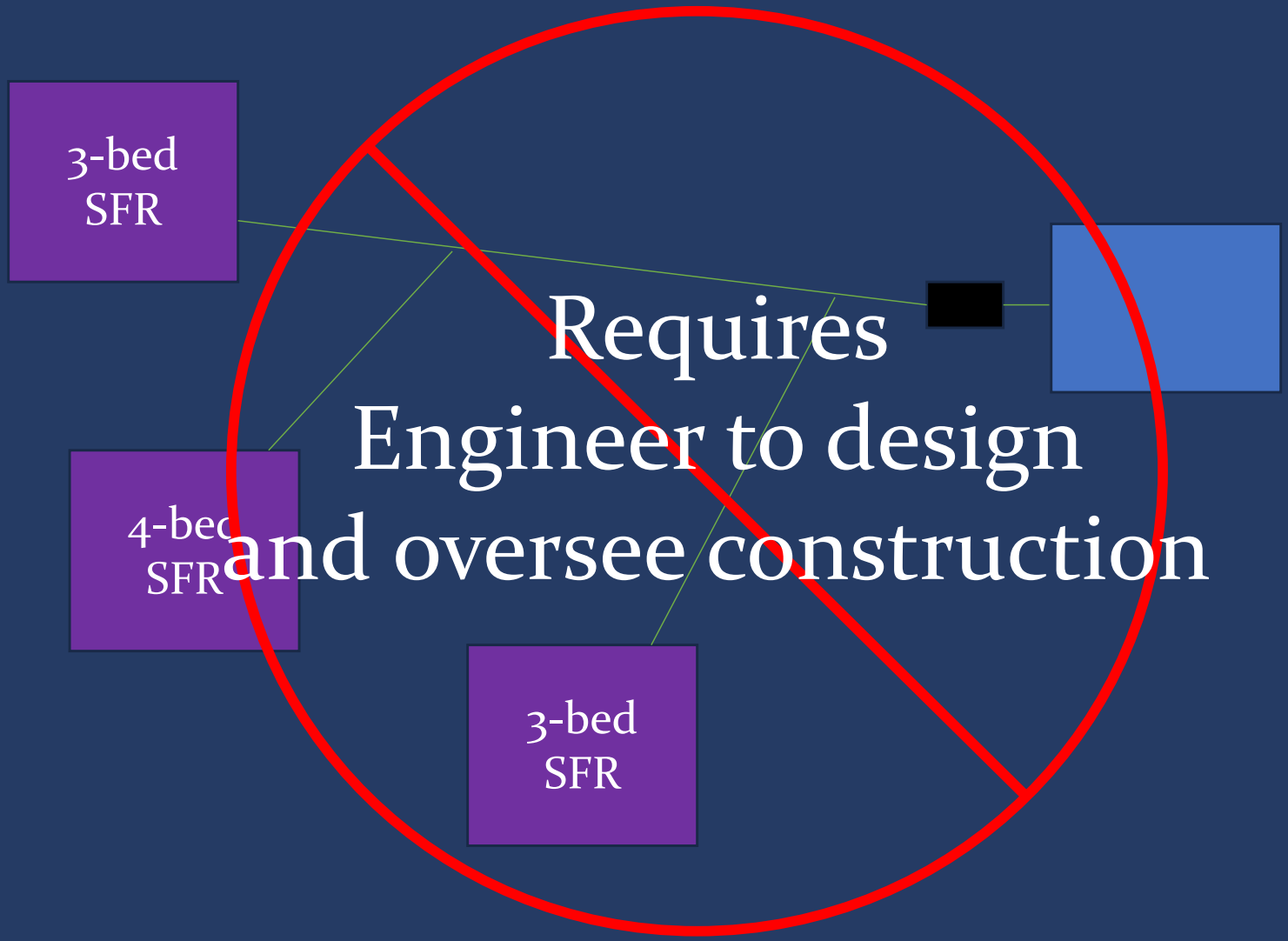
- Facility/Property Served. Can you do this system as a CI? (Brief overview refer to OWSIM)
  - Systems that serve a
    - private residence single lot with no more than 2 dwelling units, on lot flow less than 1500 gpd
    - a single building small commercial facility <500 gpd, on lot daily flow less than 1500 gpd
    - a single multi-family dwelling with no more than four units and 10 bedrooms or less, on lot daily flow less than 1500 gpd

Private Residence Scenario

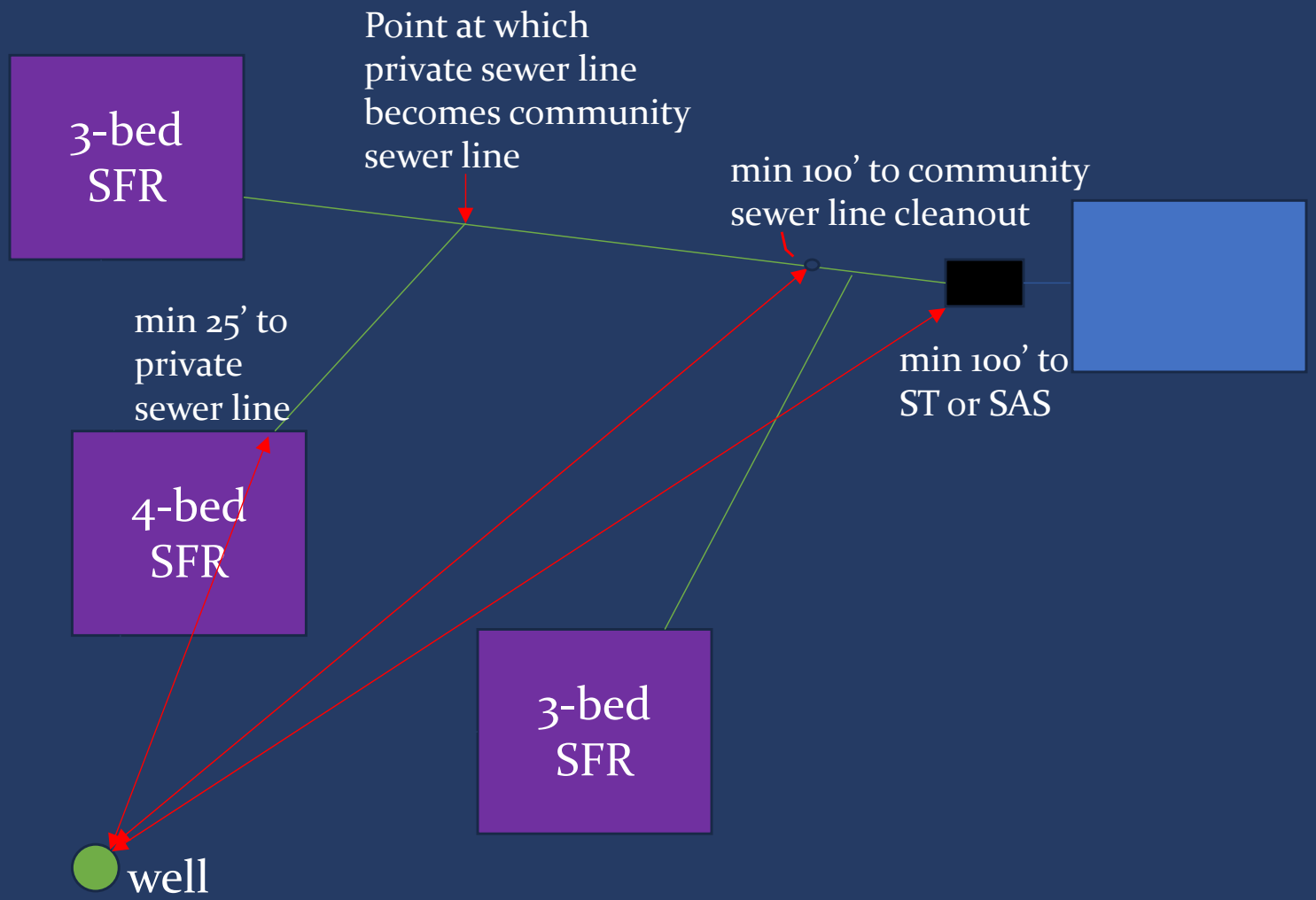


9-beds total = 1350 gpd
Garage/home office = 150 gpd
Total design flow = 1500 gpd

10-beds total = 1500 gpd
more than two families so is NOT a private residence nor a single service multi-family dwelling

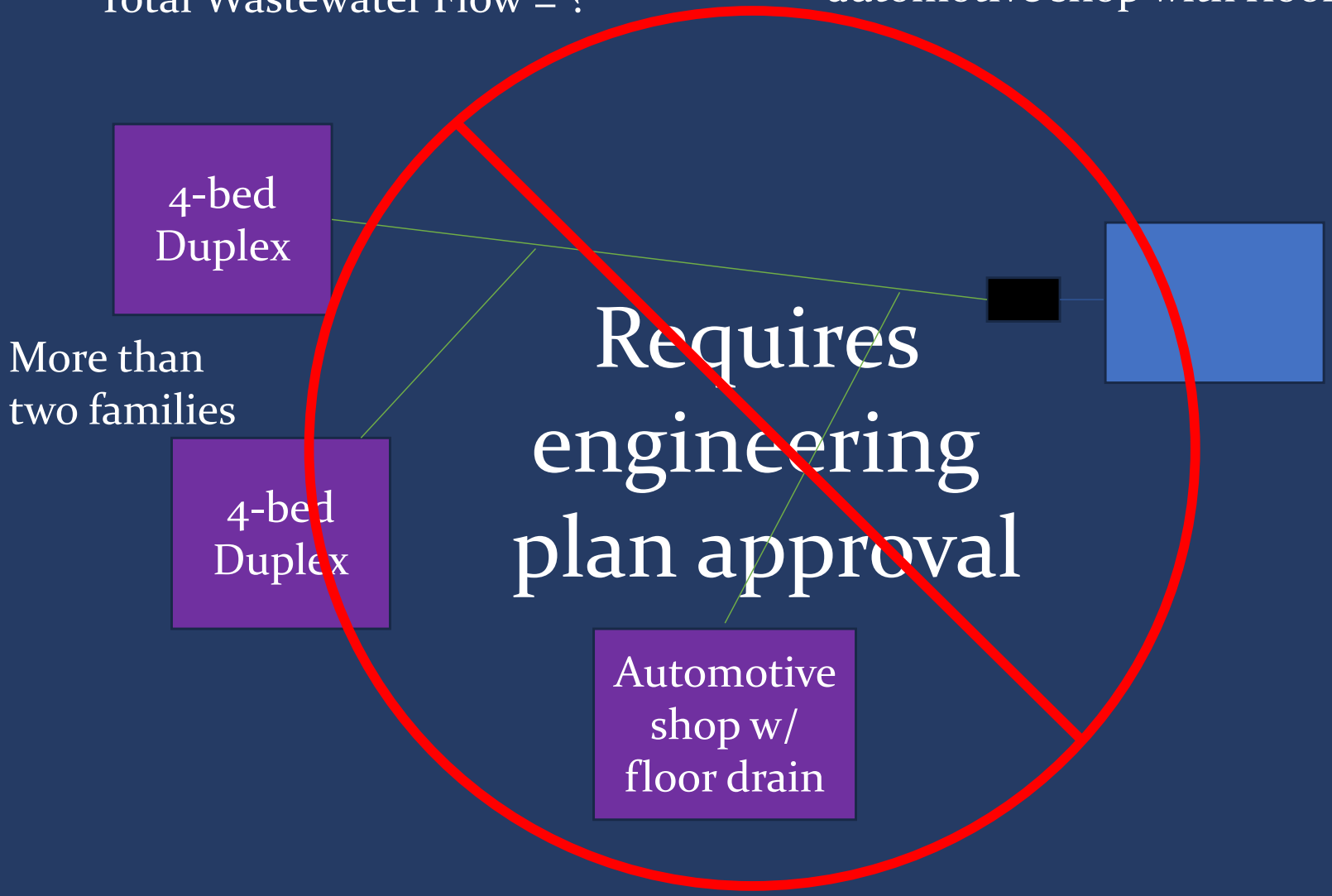


10-beds total = 1500 gpd
But more than two families
so is not a private residence

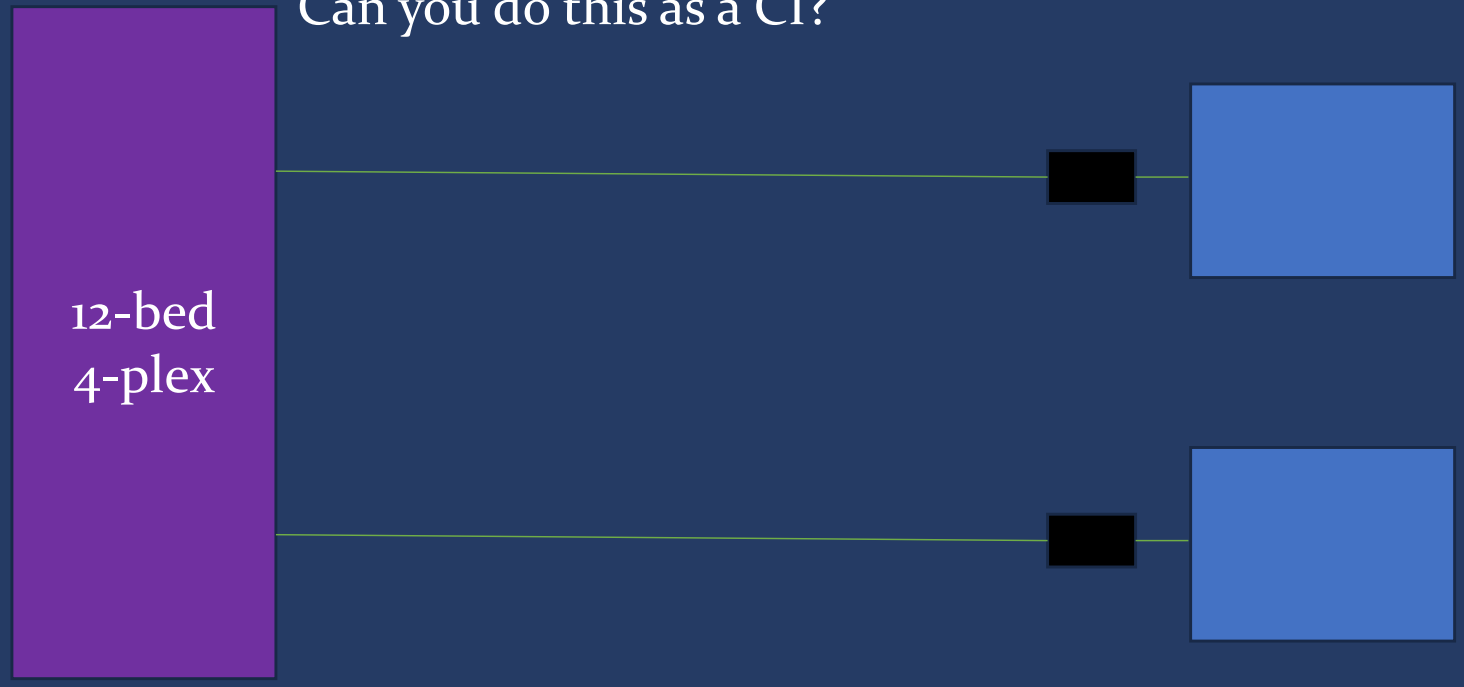


8-beds total = 1200 gpd
Auto Shop = ?
Total Wastewater Flow = ?

Engineer and plan approval required for systems with non-domestic wastewater source. In this case, the automotive shop with floor drains.



Each system serves half of the building:
Each system serves 6 beds = 900 gpd each
Total wastewater flow = 1800 gpd
Can you do this as a CI?

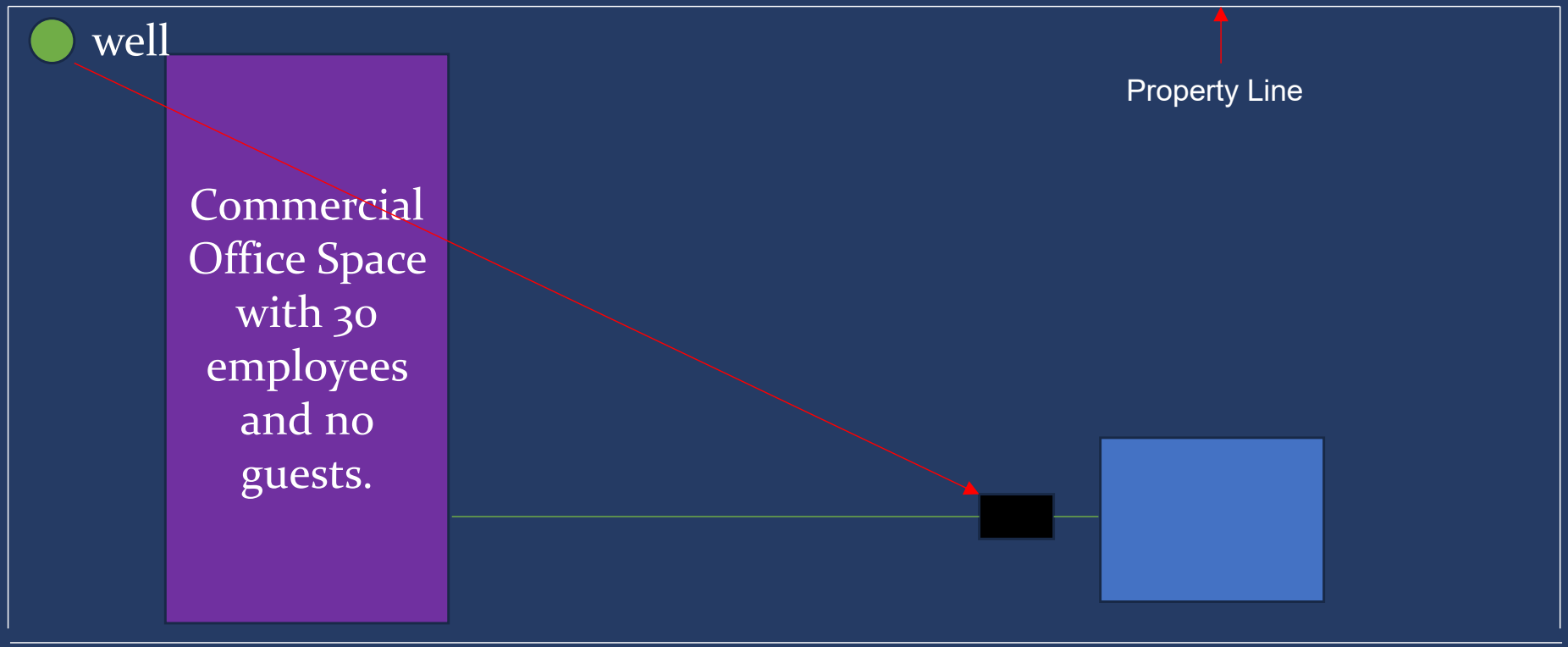


No! Even though a single multi-family dwelling with no more than
4 units, the total wastewater flow for the lot exceeds 1500 gpd

Each system serves half of the building:
Each system serves 4 beds = 600 gpd each
Total wastewater flow = 1200 gpd
Can you do this as a CI?

Yes, because it meets description of a single multi-family dwelling with no more than four residential units with total calculated daily flow less than 1500 gpd

30 employees @ 15 gpd/employee OWSIM 2.4.2
Total wastewater flow = 30 x 15 = 450 gpd
Can you do this as a CI?



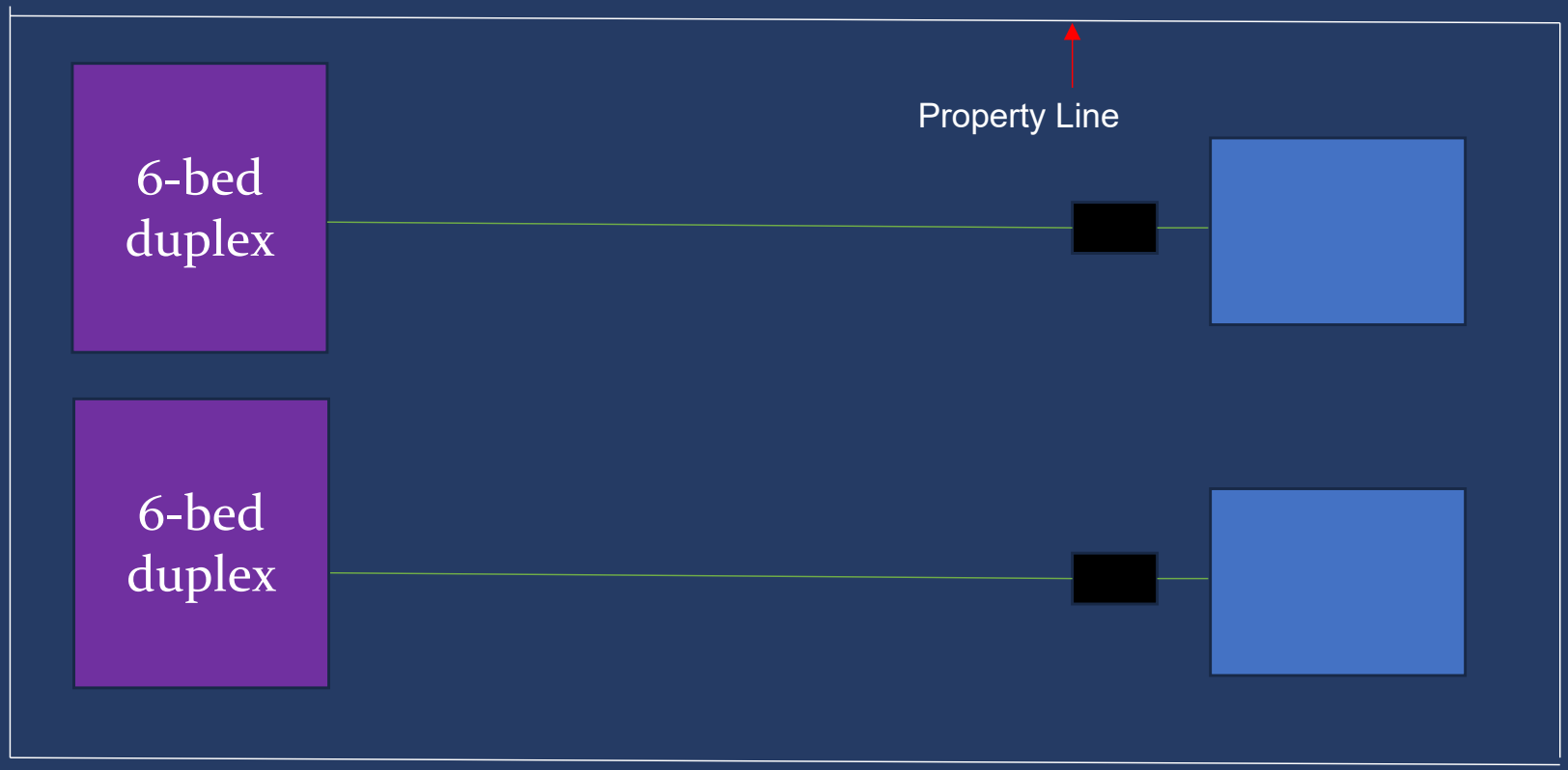
Yes, because it meets the definition of a small commercial facility

Can you give any examples of a commercial building with this type of flows?

Note 30 employees, the well serving this property may be a public water well! Obtain a current drinking water system classification!

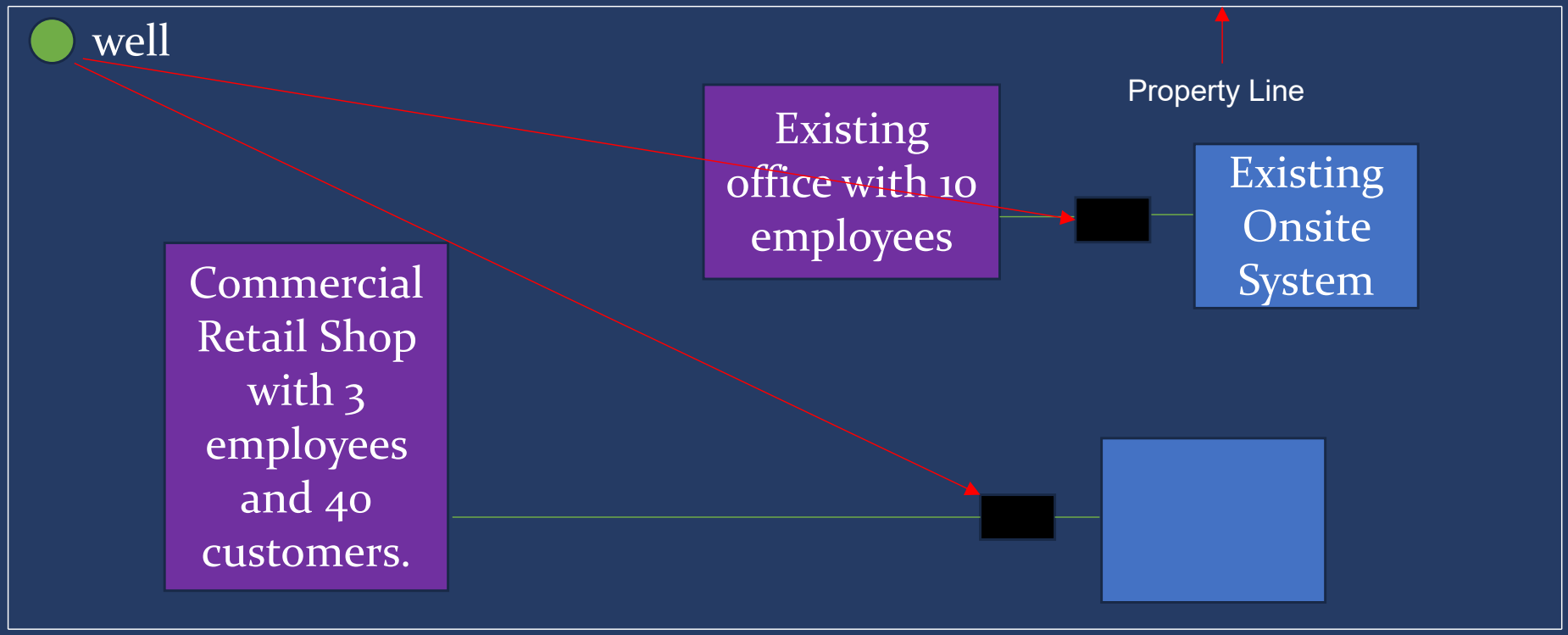
For such facilities, you may also assume a public system and provide appropriate setbacks, a water system classification is still required though!

Both buildings are on the same lot
Each system serves a 6-bed duplex = 900 gpd each
Total wastewater flow = 1800 gpd
Can you do this as a CI?



No, the total wastewater flow for the lot exceeds 1500 gpd. The fact That there are two systems which individually could be installed Without an engineer does not mean an engineer is not required.

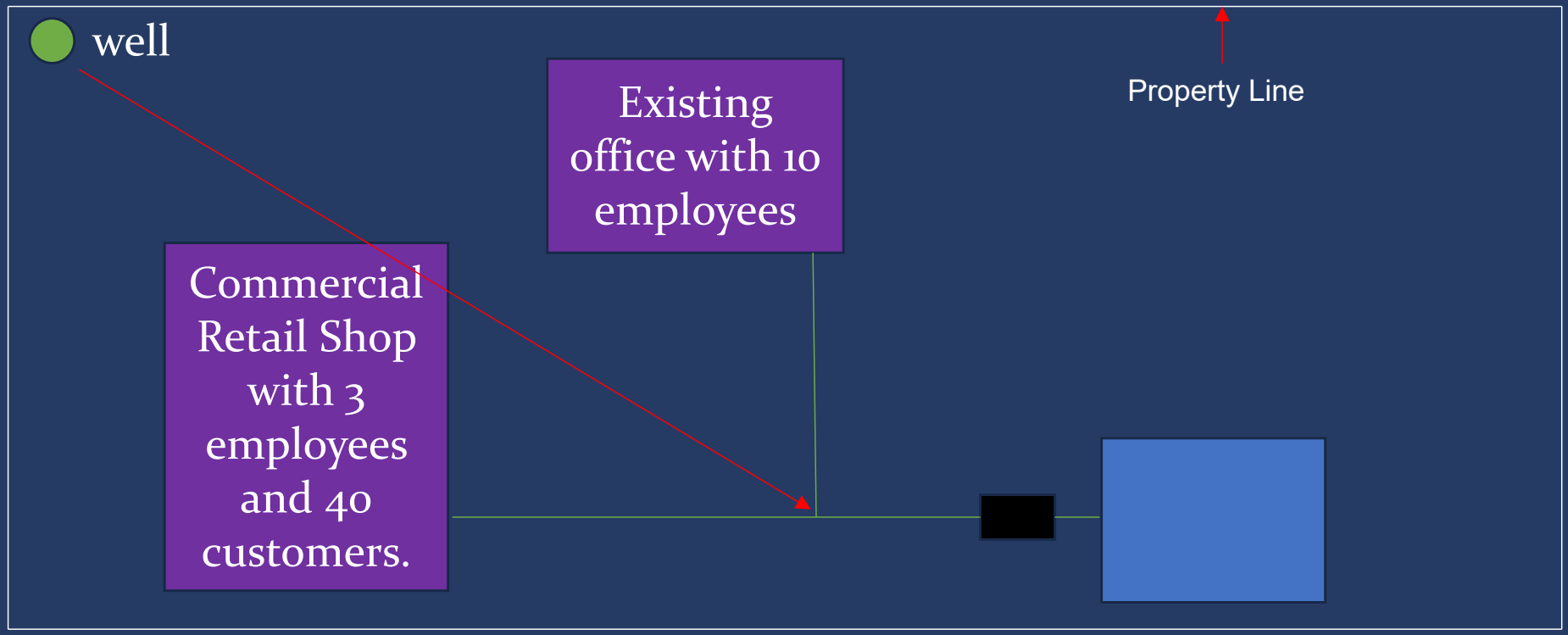
3 employees @ 10 gpd/employee OWSIM 2.4.2
40 customers @ 3 gpd/customer
Total wastewater flow = 150 gpd
Can you do this as a CI?



Yes, because it meets the definition of a small commercial facility with on lot wastewater flows less than 1,500 gpd

Note the number of people, the well serving this property may be a public water well! Obtain a current drinking water system classification!

3 employees @ 10 gpd/employee OWSIM 2.4.2
40 customers @ 3 gpd/customer
Total wastewater flow = 150 gpd
Can you do this as a CI?



No, because it includes multiple service connections.

Note the number of people, the well serving this property may be a public water well! Obtain a current drinking water system classification!

Site & Property Owner Questions

Type of system to be installed. Initial evaluation. Can you do this system as a CI?

- Conventional Onsite Systems meeting the requirements of the OWSIM

Research, historic information

- What systems are installed nearby?
- Pull up a map from the borough or another online mapping program!
- How much useable area is there for wastewater disposal? Small acreage lots are possible; however, may run into separation distance issues
- If there is an existing system, if so what system type was installed?
- **Important!** Never assume site conditions in an area nor previously recorded site conditions.

Site Evaluation

SITE CHARACTERISTICS			
	SITE RATINGS GOOD	SITE RATINGS MODERATE	SITE RATINGS POOR
Texture	----	----	Permafrost and compacted silts
Flooding	None (protected)	Rare	Common
*Depth to Bedrock	>11 ft.	7-11 ft.	<7 ft.
*Depth to Cemented Soil (Clay-Silt)	>11 ft.	7-11 ft.	<7 ft.
*Depth to Seasonal High Water Table	>9 ft.	7-9 ft.	<7 ft.
Permeability (Percolation Rate)	3-10 min/in	1-3 or 10-45 min/in	<1 min/in or >45 min/in
Slope	0-10%	10-20%	>20%
Soil Classification	**GW, ** GP, SW SP	GM & SM	ML & CL
* Depth from ground level. ** These soils require a sand liner, unless waived by the department.			

Site Evaluation

OWSIM 2.6, 2.7, 2.8, 2.9

- Where will system be located?
  - Is there an existing system?
  - Where are nearby drinking water wells (including neighboring wells)?
  - Any nearby surface water?
  - Are there other features best to be avoided?

- What are the subsurface conditions?
  - Soil classification?
  - Is a percolation test needed?
  - Depth to groundwater, bedrock, or other limiting condition?

Is there an existing system?

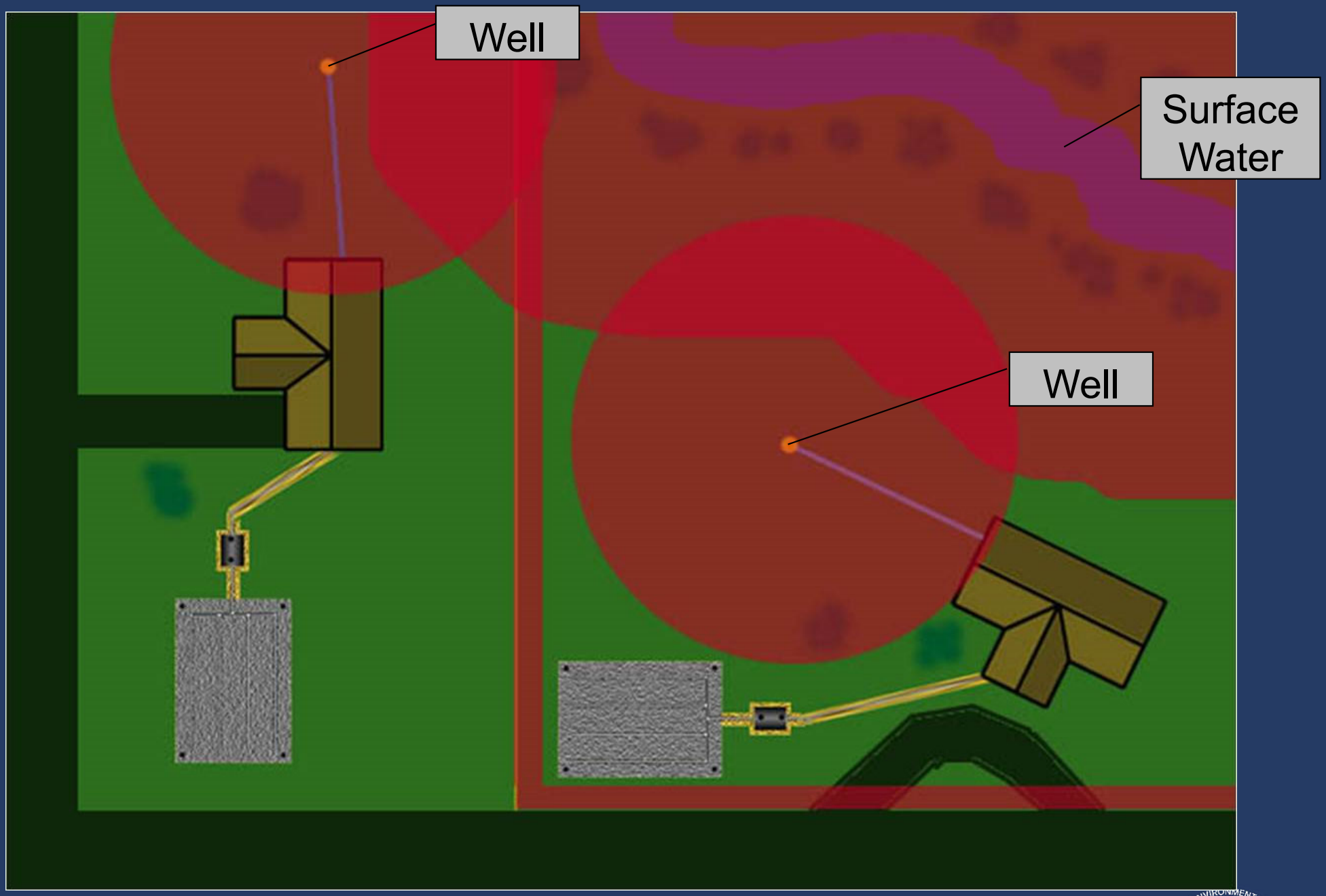
OWSIM 1.5

- Existing septic tank **must** be inspected
  - Internal baffles intact?
  - Tank corroded or compromised?
  - Correct size?

- If there is an existing lift station, it must also be inspected
  - If no high water alarm, one must be installed!

- Wood stave sewer lines must be replaced
- Install foundation cleanout if there is not one

- Verify ALL separation distances!



Separation Distance from Surface Water, Onsite Wells, Neighboring Wells and Property Lines

Is there an existing system?

OWSIM 1.5

- Any existing separation distance issues?
  - Relocate components
  - Obtain a separation distance waiver (must be requested by an engineer)

When an existing system is modified, the entire system must be brought into compliance with current regulations!

- Any existing waiver is almost always voided (unless specifically stated otherwise in the letter)

Is there an existing system?

OWSIM 1.5.2

- Decommissioning
  - Existing systems must be properly decommissioned. Must know what type of system it is. Older systems (early 80s and before) are more likely to be seepage pits, log crib systems, etc. Those void spaces must be properly decommissioned

2024 Certified Installer Training Session 2

Division of Water Engineering Support and Plan Review Section

April 16-19, 2024

Session 2 Agenda

- Summary of Day 1 How Systems Work
  - OWSIM – Your Guide to Installing an Onsite System
  - Summary of Site Evaluation
- Separation Distance Requirements Continued
- Soils Part 1 & 2
- Construction of System Requirements
- Piping and Collection System Installation
- Septic Tank Sizing
- Soil Absorption System Sizing
- Standard Drawings for Systems
- Installation Scenarios

Local Borough/City Requirements

- MOA/Valdez has their own requirements. MOA requires their own training program which is administered by them
- Valdez installations must go through the City of Valdez; however, the City uses the Certified Installer program to meet the installer requirements

- Check with the local borough/city for any additional requirements.

- System in a Floodplain? Check to see if there is a local floodplain control program. **OWSIM 2.7** Flooding sites.

Initial Site Investigation

Photo from a site inspection. Can you spot the possible issues needed with this system?

Siting the System - Separation Distance Requirements

OWSIM 2.9

- One of the most important things to do constructing an onsite system is to ensure you meet all of the prescriptive separation distances listed
- Pay attention to separation distance recommendations versus requirements. Recommendations are **strongly** recommended!
- Separation distances are from **nearest edge to nearest edge**
- Separation distances are **minimum** distances required. Depending on the accuracy or confidence in your measurements, you may want to adjust or contact a surveyor

Siting the System - Separation Distance Requirements

OWSIM 2.9

- Often the only visible item seen post construction.

Separation Distance Requirements to Water Systems

OWSIM 2.9

- **Public wells**
  - Serves 25 or more people for at least 60 days (churches, restaurants, office buildings, RV Parks, large apartment buildings, etc.)
  - https://dec.alaska.gov/das/gis/apps/ (or turn on layer in EDMS!)
- **Private well**
  - If it is not a public well, then it is a private well
  - Minimum 100 ft to septic tank, lift station, and SAS
  - Minimum 100 ft to community sewer lines
  - Minimum 25 ft to private sewer lines

Separation Distances to Heating Oil Tanks & Abandoned Wells

OWSIM 2.9 Table

- **Fuel Tanks:** Private Water Systems and Public Water Systems have separation distance requirements to Fuel Storage Tanks (Home Heating Oil Tanks). This is often an overlooked as it isn't involved in the septic system installation; however, as an installer you have the equipment and expertise to aid the property owner to move the tank to a more appropriate location. Regardless of the size exemption noted in the table, **it is always recommended to be at minimum 25 feet away**

- **Abandoned Water Wells/Decommissioned Wells:** If you encounter an abandoned water well this may impact the installation of your onsite system. Often considered an "Other source of contamination", more information is needed to determine whether that well is a potential conduit of wastewater into the aquifer. E.g., a dry well. The Drinking Water program has a **well decommissioning BMP** which can be incorporated into the installation of the onsite system. More information on this is available at their website: https://dec.alaska.gov/eh/dw
    - Decommissioning requirements. If a well is being moved and needs to be decommissioned to ensure separation distances, documentation that the well was properly decommissioned in accordance with the procedures is required. ADNR and DEC have a form for this.

MINIMUM HORIZONTAL SEPARATION DISTANCES TO DRINKING WATER SYSTEMS

all horizontal separation distances must be measured from nearest edge to nearest edge

	Private Sewer Line[a] and Cleanouts, Basement Sump	Sewer Line[b] and Cleanouts, Manholes, Lift Station	Septic Tank, Wastewater Holding Tank, Lift Station, Manholes	Pit Privy, Soil Absorption System	Fuel Tank[c] and Lines	Drinking Water Treatment Waste disposal system	Other Sources of Contamination[d]
Public Water System	100 feet	200 feet	200 feet	200 feet	100 feet	100 feet	200 feet
Private Water System	25 feet	100 feet	100 feet	100 feet	25 feet	25 feet	100 feet
Water line	10 feet	10 feet	10 feet	10 feet	10 feet	10 feet	Contact DWP
Private Water Line	1 foot	5 feet	5 feet	5 feet	10 feet	5 feet	--

Additional separation distance requirements may apply for public water systems; 18 AAC 80 must be referenced for all public water system requirements.
a. A drain pipe buried in the ground below a building is required to meet the same separation distance as a private sewer line to a public water system.
b. Sewer line includes sewer main, community sewer line, and stormwater sewer lines.
c. The separation distance to fuel tanks applies to below-ground fuel tanks and fuel lines, and to above-ground tanks greater than 500 gallons.
d. Other sources of contamination include, but are not limited to, animal byproducts, manure, and agricultural waste. The separation distance to landfills is covered under 18 AAC 60. DWP = Drinking Water Program.

MINIMUM VERTICAL SEPARATION DISTANCES TO DRINKING WATER COMPONENTS

	Private Sewer Line, Building Sewer	Community Sewer Line or Cleanout, Sewer Main	Septic Tank, Wastewater Holding Tank	Soil Absorption System	Fuel Tank** and Lines	Drinking Water Treatment Waste disposal system	Other Sources of Contamination*
Water line	18 inches recommended	18 inches	cannot cross	cannot cross	no crossing recommended	10 feet	Contact DWP
Private Water Line	12-inches	12-inches	cannot cross	cannot cross	no crossing recommended	5 feet	--

Well Classification and Select Abbreviated Definitions (See 18 AAC 80.1990 or 18 AAC 72.990 for complete definitions)

Public Water System: a potable water system serving 25 or more people at least 60 days per year or a system that has at least 15 service connections.

Water Line: is a pipe or conduit used to carry water as part of a public water system but does not include a water service line or private water line.

Private Water System: a potable water system that is not a public water system

Private Water Line: is a line, pipe, or conduit used to carry water as part of a private water system. The department interprets regulations to not include a water service line that is connected to a public water system in the definition of private water line.

Disclaimer: This separation distance table was developed for convenience but may not contain all separation distances required to be met.

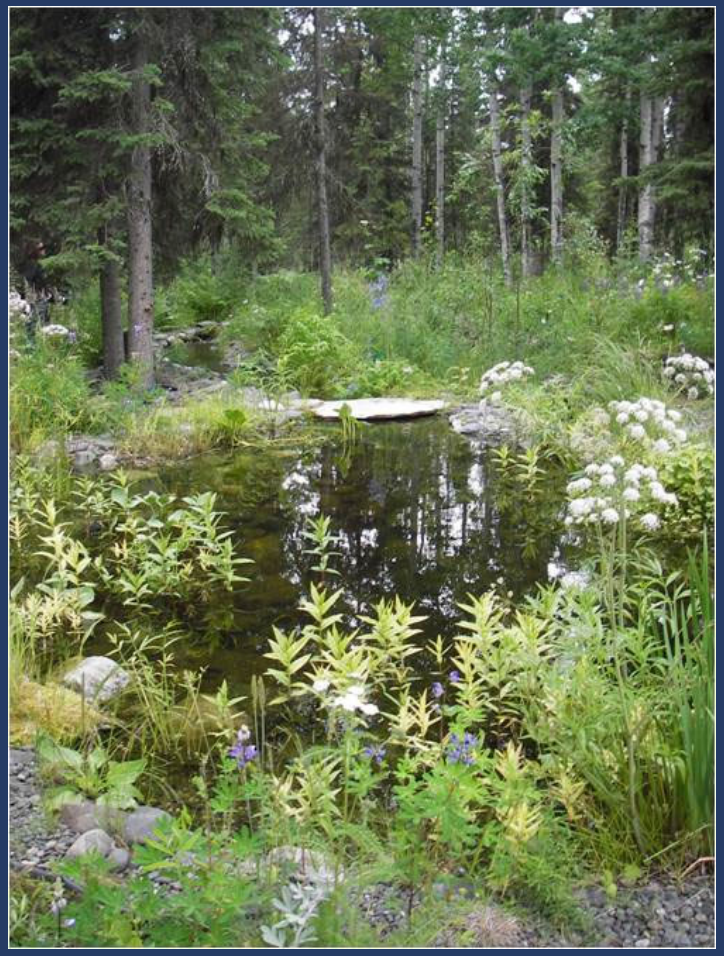
MINIMUM HORIZONTAL SEPARATION DISTANCES FROM SEWER COMPONENTS					
	River, Lake, Stream, Spring, Slough[c]	**Slopes >25%**	**Soil Absorption System**	**Lot Line[a]**	**Foundation[a]**
Septic Tank, Holding Tank, Lift Station	100 feet	need to be stable	5 feet	10 feet	10 feet
Soil Absorption System	100 feet	50 feet[d]	see b. below	10 feet	10 feet
Pit Privy	100 feet	50 feet recommended	see b. below	10 feet	10 feet

a. Recommended minimum horizontal separation distance. All parts, including ground cover for freeze protection must be wholly located on the property with the facility being served. Locating a septic tank or soil absorption system too close to a building foundation may have negative impacts. The septic tank cleanouts or manhole riser must be accessible for maintenance purposes.
b. 6 feet or 2 times the distribution media depth, whichever is greater.
c. Setbacks is from the mean annual high water level of surface water or the mean higher high water level of tidally influenced water.
d. Separation distance applies to the downhill slope; does not apply to mound type soil absorption systems

MINIMUM VERTICAL SEPARATION DISTANCES FROM SEWER COMPONENTS		
	Seasonal High Water Table	**Impermeable Soil, Permafrost, Bedrock**
Septic Tank, Wastewater Holding Tank	need buoyancy protection	--
Subsurface Soil Absorption System	4 feet	6 feet
Pit Privy	4 feet	--

Disclaimer: This separation distance table was developed for convenience but may not contain all separation distances required to be met.

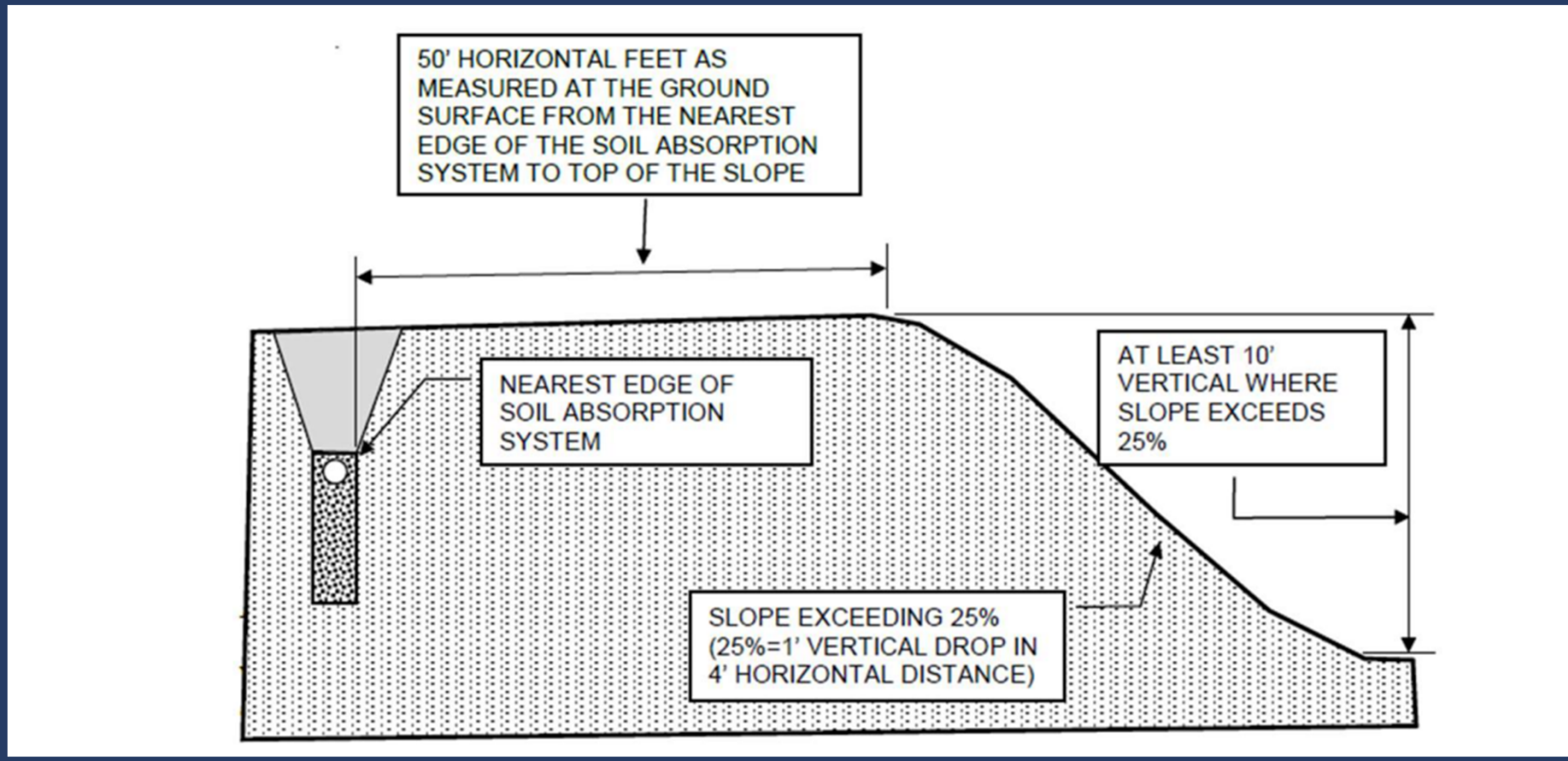
Surface Water



Surface Water within 100 feet – Anything that holds or transports water relatively permanently including, but not limited to, rivers, sloughs, lakes, swamps, bogs, marshes

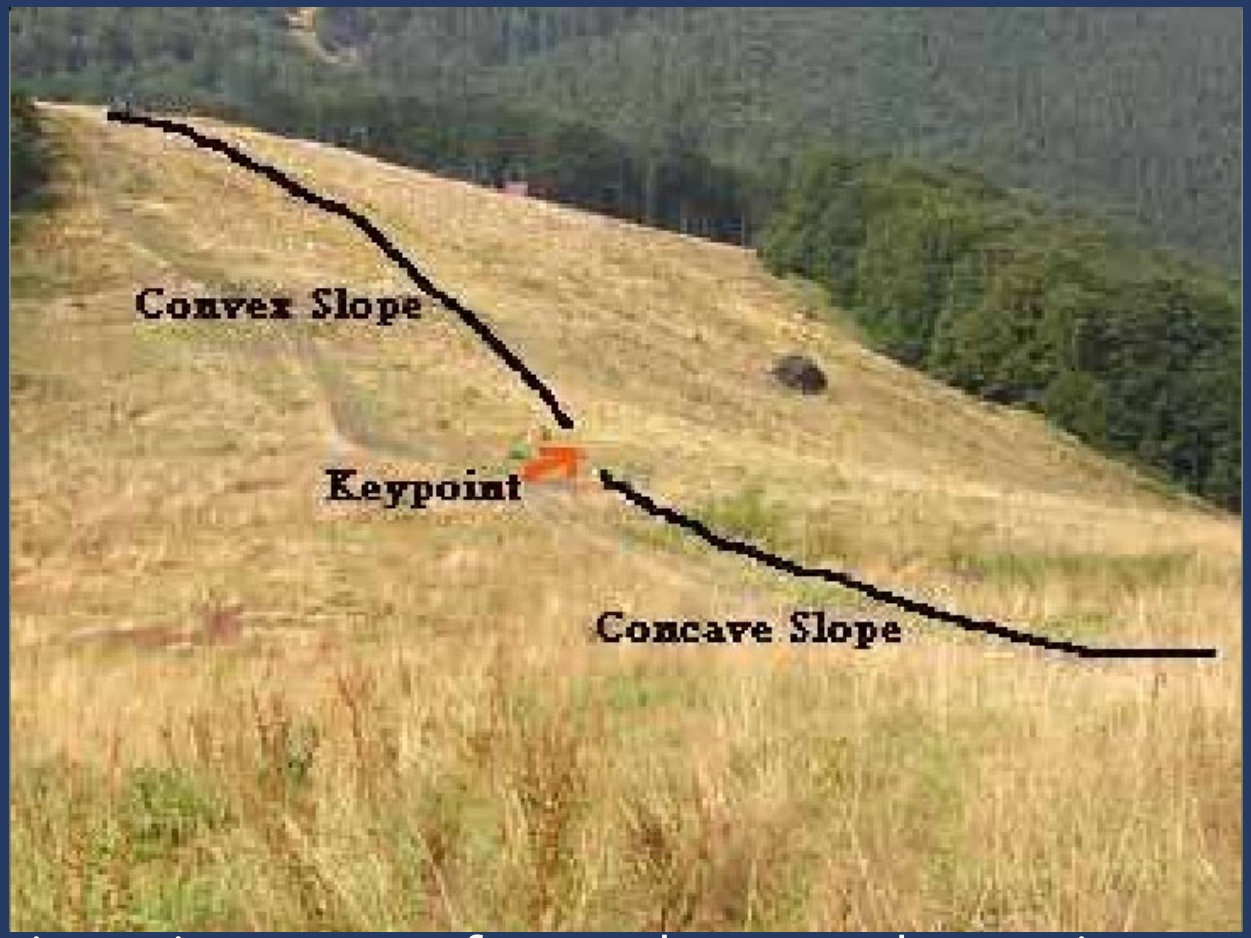
Not intended to include drainage ditches or puddles that are the direct result of precipitation

Slopes



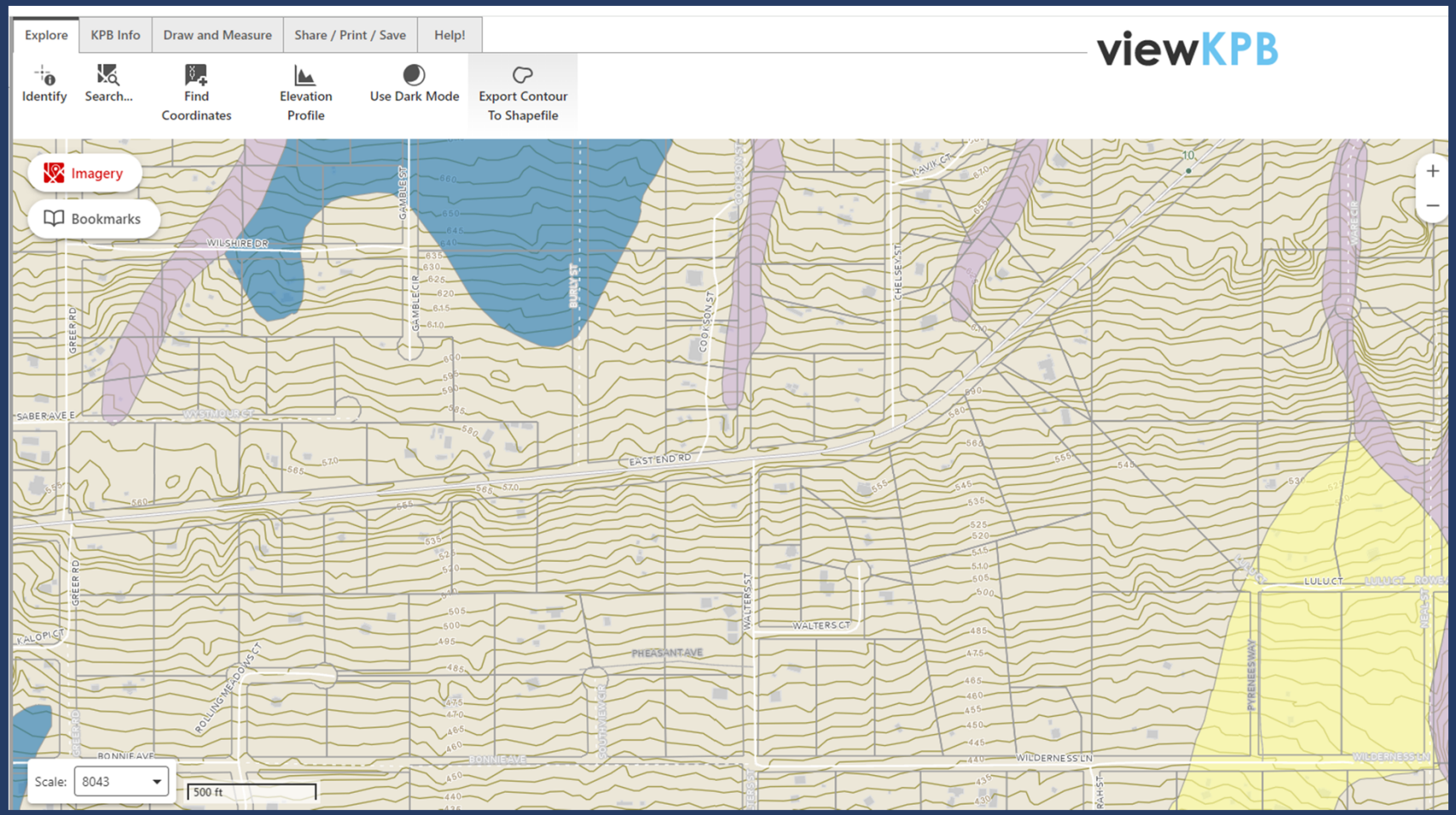
Slope and cut banks require a 50 foot set back between the nearest edge of a soil absorption system and a slope exceeding 25% that has more than a 10 foot change in elevation

Landscape



Landscape is an important factor that can determine surface and subsurface flow of water and is important in determining surface and subsurface drainage patterns.

Landscape



Local borough contour maps may be available and can show drainage patterns or potential drainage patterns! Note the site conditions on how a road can change the drainage pattern.

Test holes

OWSIM 2.8.1

- Evaluate Subsurface Conditions with a Test Hole
  - Test hole should be deep enough to determine types and layers of soils, groundwater presence and/or impermeable soils, minimum 6 feet below bottom of field
  - Dig test hole within 25 feet of the perimeter of the proposed leach field (but not within the footprint)
  - Document test hole and soil with pictures
    - send us your test hole profiles, logs, and location for contribute to better soil maps for Alaska

A well log is NOT a substitution for a test hole

Test holes

Keep a sample!

Soils Part 1

The evaluation of site specific soil conditions is one of the most important aspects of septic system construction

- **Gravel** – Best draining, may be too fast and may require a sand liner. Usually only suitable for bed or shallow trench systems.
- **Sand** – Best for treatment and general drainage. Commonly requires a bed, 5-wide, or shallow trench system.
- **Silt** – Common in hills and along river and stream channels in upper layers – slower draining but usually still acceptable. Suitable for 5-wide, leach pits, and deep trench systems
- **Clay** – Very slow draining, likely requires an engineered system.

Soils are not always homogenous. Get to know the local soils well, ask an engineer or a soils lab if you are unsure.

Soils Part 1

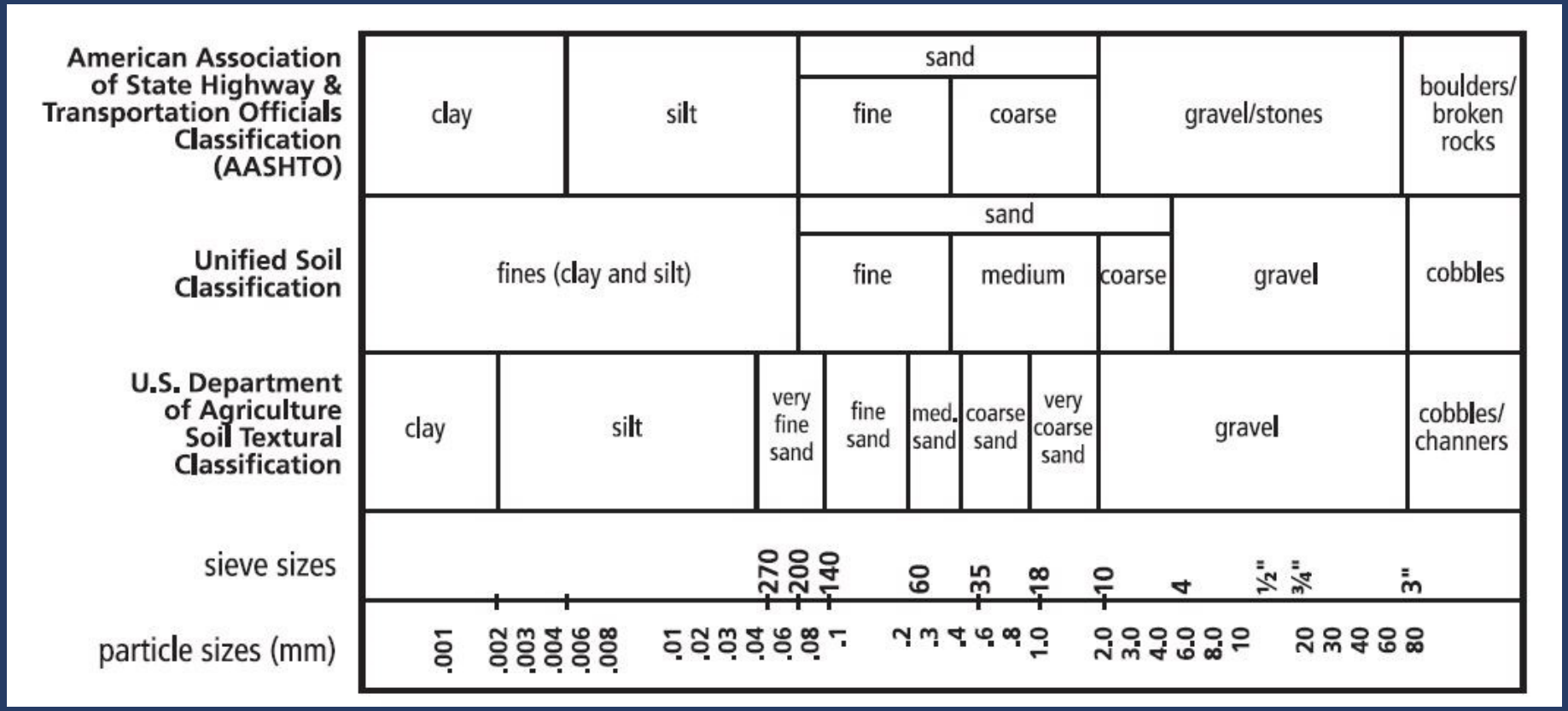
But why classify?

- Soils can be broken down into classifications; however, why?

- All of the classification systems are made to provide a method to describe soils in a way that they are predictable. Sandy soils behave in this matter. Gravel in that matter. And so on and so forth.

- Wastewater application wise:
- Gravel does not provide adequate treatment of effluent however disposes of wastewater effectively
- Sand provides adequate treatment and disposes of wastewater effectively
- Silty soils provides treatment however requires knowledge of the soil whether it is an appropriately receiving soil
- Clay soils often are not suitable for wastewater disposal

Soil Classification Methods



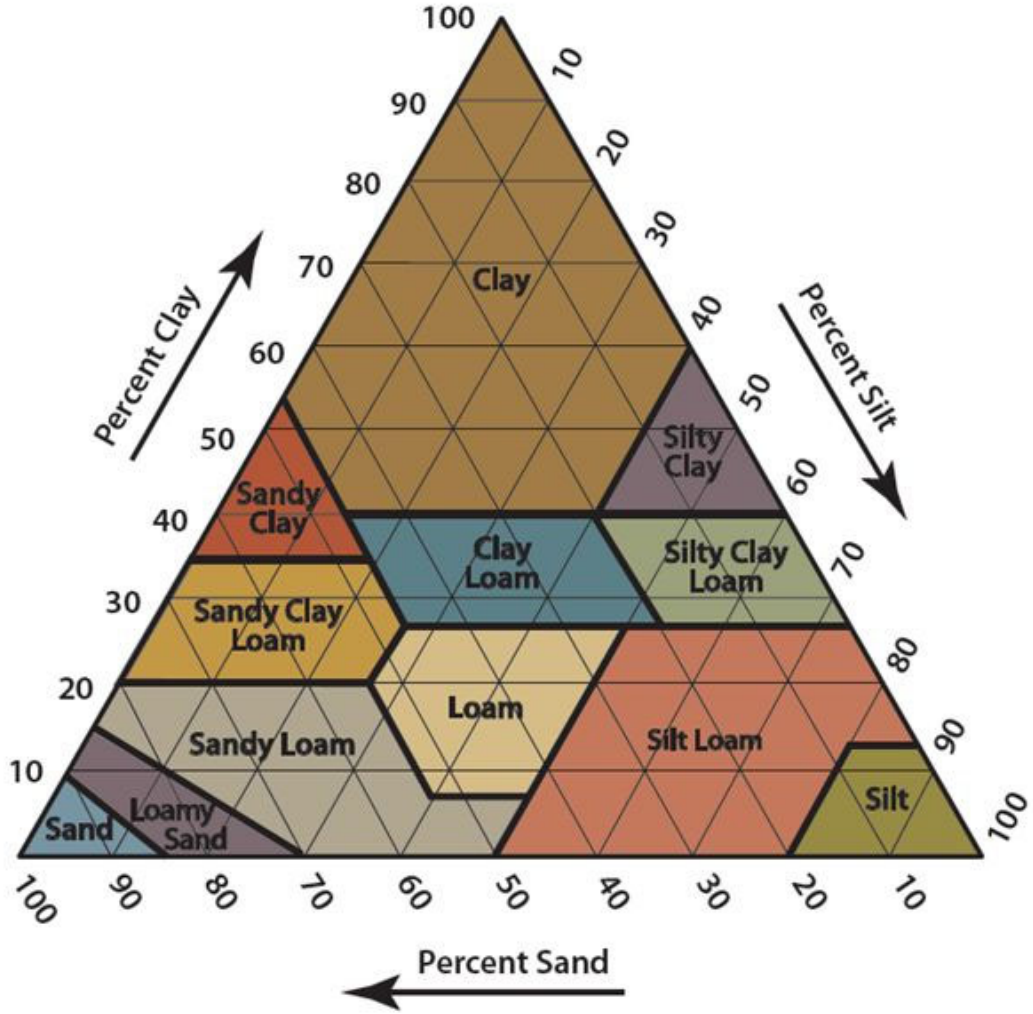
USCS describes soils with a 2-letter symbol based on the gradation of a soil.

- % retained or % passing
- #4 sieve – gravel/sand
- #200 – sand/silt

Primary Divisions			Group Symbol	Descriptions
COARSE GRAINED SOILS Sands/Gravels Over 50% retained on #200 sieve	GRAVELS Over 50% of coarse material retained on #4 sieve	CLEAN GRAVEL Less than 5% passing #200 sieve	GW	Well graded gravel, many different particle sized, little or no fines
			GP	Poorly graded, few different particle sizes, little or no fines
		GRAVEL WITH FINES	GM	Silty gravels, gravel-sand-silt mixtures, fractured schist
			GC	Clay-like gravels, gravel-sand-clay mixtures
	SAND Over 50% of coarse material passed #4 sieve	CLEAN SANDS Less than 5% passing #200 sieve	SW	Well graded sands, many different particle sizes, little or no fines
			SP	Poorly graded, few different particle sizes, little or no fines
		SAND WITH FINES	SM	Silty sands, sand-silt-gravel mixtures, Fairbanks Silt Loam
			SC	Clay-like gravels, gravel-sand-clay mixtures
FINE GRAINED SOILS Silts/Clays Over 50% passing the #200 sieve	SILTS AND CLAYS Liquid limit is less than 50%		ML	Inorganic silts, slight to no plasticity
			CL	Inorganic clays, low to moderate plasticity
			OL	Organic silts and clays of low plasticity
	SILTS AND CLAYS Liquid limit is more than 50%		MH	Inorganic silts, moderate to high plasticity
			CH	Inorganic clays, high plasticity, fat clays
			OH	Organic silts and clays of high plasticity

DEPARTMENT OF ENVIRONMENTAL CONSERVATION
STATE OF ALASKA

SOIL TEXTURE TRIANGLE



USDA classification system describes soil texture as the relative amount of sand, clay, silt and combinations thereof

Soil Texture

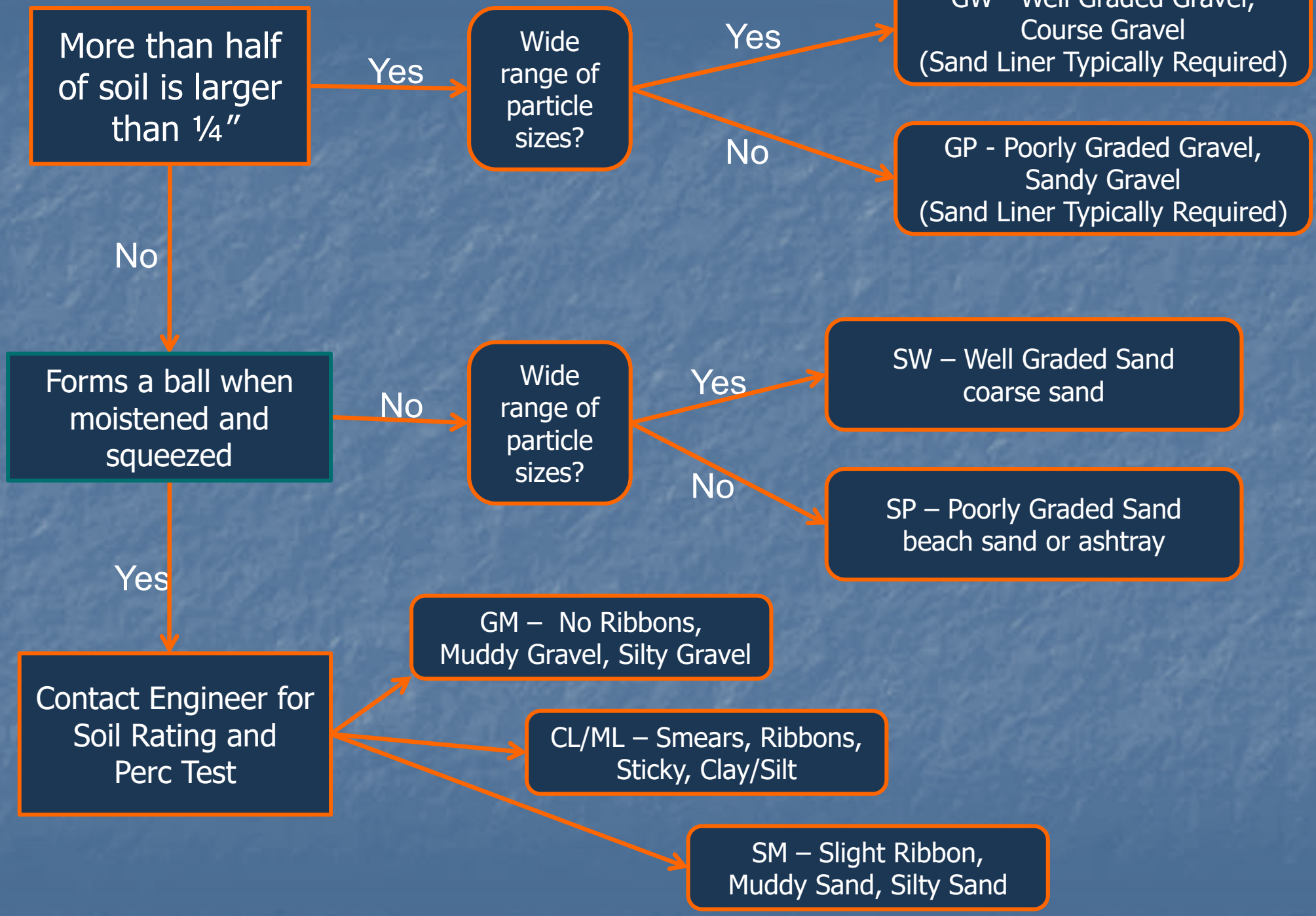
The “feel” of the soil, when moist how it may be manipulated.

- Sands are gritty like salt or sugar
- Soil with a lot of silt will feel silky, similar to flour
- Clay tends to be greasy and sticky, easily forms a ball

Most soils have a varying amount of these particles and will have a combination of properties

Picture from Quick Reference Guide: Assessing soil texture | VRO | Agriculture Victoria

Soils Rating Method



Percolation Tests

OWSIM 2.8.2

- *NEW: percolation tests may be performed by a CI for systems that may be installed under your certification (previously required by DEC regulations to be performed by a registered professional engineer)
- The in-person soils course will teach certified installers how to perform a percolation tests
- Regional exceptions – OWSIM 2.8.2
- The only soil types that do not require a percolation test are SP/SW, unless there is a specific exception provided for an area
  - Nikiski Sands
- OR, you do not need a percolation test in GP/GW soils *IF* you install a 2 foot thick sand liner
  - Tok (area-wide sand liner waiver for GP/GW)

Sand Liners

OWSIM 2.11

- REQUIRED if GP/GW soils percolate faster than 1 minute/inch
- Application rate of 150 sf/bedroom must be used
- RECOMMEND increasing size of field at least 50%
- Limited to a bed or shallow trench type leach field
- Minimum 2 feet thick below leach rock
- Bottom of leach rock (not bottom of sand) still required to be 4-feet above seasonal high water table
- Material specifications at OWSIM at 2.11

Summarization of Site Eval

- Yes — Facility served meets one of the requirements in the OWSIM 2.2.2
- Yes — System receives domestic wastewater only (commercial facility question)
- Yes — Proposed wastewater system is a conventional onsite system
- Yes — All separation distances can be met
- Yes — Proposed system is installed in accordance with the OWSIM and 18 AAC 72

Conventional Wastewater System Overview

- Piping, Collection, and Pumping – OWSIM 3
  - Getting the wastewater from point A to point B
- Wastewater Flows
- Septic Tank – OWSIM 4.2
- Conventional Soil Absorption System – OWSIM 4.3

Piping, Collection, and Pumping

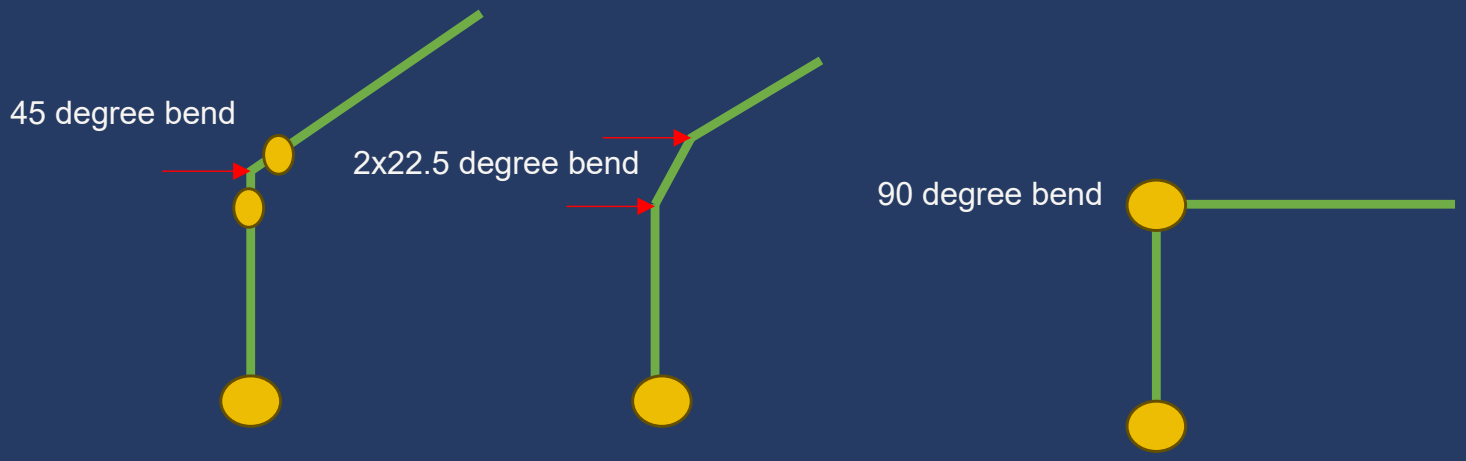
OWSIM 3, 3.1, 3.2, 3.4, 3.5, 3.6, 3.7

- General Requirements
- Approved Sewer Line Pipe Materials
- Pipe Joints
- Pipe Bedding & Installation
- Sewer Line Slopes
  - Drop Connections
  - Remember gravity!
- Cleanouts
- Community Sewer Lines
- Pump Stations and Lift Stations

Piping, Collection, and Pumping

OWSIM 3.3

- Cleanouts
  - Foundation cleanout within five (5) feet of the outside wall
  - Additional cleanouts for each aggregate horizontal change in direction of 45 degrees or more prior to the septic tank or pre-treatment tank



Calculate Wastewater Flows

OWSIM 2.4.1 and 2.4.2

System is sized based on the potential maximum daily flow and facility type:

Residential Dwellings - Daily Wastewater Flow - # of bedrooms

- •150 gpd/bedroom standard: assumes full occupancy with 2 people per bedroom at 75 gpd/person.
- •Updated OWSIM allows for 100 gpd/bedroom IF the dwelling is served by a hauled water system.
- •How many bedrooms? Are they planning on expanding soon?
- •Is there an office that is actually a bedroom?

Commercial facility – Daily Wastewater - # units

- •Average gpd/unit are typical flows by facility type
  - •Type of facility – restaurant, office building?
  - •Number of customers, employees, meals, etc.?
  - •Use tables in the OWSIM, EPA Design Manual, or UPC
  - •Get assistance from ADEC staff or an engineer

Residential Wastewater Flows from Other Sources

- Drinking water treatment wastewater such as water softener discharge, reverse osmosis, etc.
- Residential nondomestic wastewater*
- Cottage food permit facilities**
- On-lot Dry Cabins or “storage sheds”***
- Structures with existing “unknown” systems****
  - Like above, more information must be known about the units

Calculate Wastewater Flows

- **Seasonal wastewater flows OWSIM 2.4.3**
  - No reduction or changes are given for seasonal use facilities. Peak wastewater flow is peak. In addition to, winter use, late fall, and spring usage often deal with similar challenges based on weather
  - Standard wastewater flow calculations include factors of safety that should account for most guest activity at the house

Quiz

- What's the daily flow for a 3-bedroom home?
- What's the daily flow for a 5-bedroom house with a 1-bedroom apartment above a detached garage?
- What's the daily flow for a 50-person office building (hint: typical flow is 15 gpd/person)
  - Can you install this system under your certification?
  - Additionally, is it reasonable that a 50-person office building would not allow guests/visitors?

Freeze/Frost Protection

OWSIM 2.10

- Make sure to read and understand freeze protection requirements. Add a note to your OWSIM for your area.
- Frost protection is over **the entire system, piping, tank, drainfield**
- Insulation may substitute for some of the required soil cover

Calculate Size of Septic Tank

OWSIM 4.2.1

Depends on:

- Facility type:
  - Number of Bedrooms for Residential Dwellings or
  - Daily Peak Wastewater Flow for Commercial Facilities

- Residential Dwellings:
  - Minimum 1,000 gallons for up to 3 bedrooms
  - Increase 250 gallons for each bedroom over three

- Commercial Facilities
  - For systems installed by a CI, the septic tank size is always 1,000 gallons
  - CI's may consider increasing size depending on type of facility

- Other Considerations
  - Garbage grinder? Recommend increase 250 gallons
  - Lift station before septic tank? Must increase tank size by 250 gallons *Corrected after class presentation*
  - Small commercial restaurant? Ensure a grease trap has been installed!

Add notes to your manual for a complete tank size chart!

Septic Tank

OWSIM 4.2

One-bedroom house requires what size of septic tank?

Five-bedroom house requires what size of septic tank?

Seven-bedroom house requires what size of septic tank?

Ten-bedroom house requires what size of septic tank?

Commercial Office Building with 5 employees?

Calculate Size of Leach Field and Soils Part 2

OWSIM 4.3.1

Depends on:

- Minimum area calculated by soil classification and wastewater flow
  - Reference OWSIM

- Calculation for total absorption area depends on system type
  - Bed: Length x Width (bottom area only)
  - Shallow Trench: Length x Width (bottom area only)
  - Deep Trench: Length x Depth x 2 (sidewalls only)
  - 5-Wide: Uses reduction factor depending on depth (bottom full credit and partial credit for sidewalls)
  - Leach Pit: total perimeter length x Depth (sidewalls only)

WASTEWATER APPLICATION RATES				
Percolation Rate[a] (minutes/inch)	Soil Texture (Unified Soil Classification)	Application Rate in sf/bedroom	Application Rate in gpd/sf for design flows ≤ 2,500 gpd	Application Rate in gpd/sf for design flows >2,500 gpd
Faster than 1	Gravel (GW/GP)	Not Suitable[b]	Not Suitable[b]	Not Suitable[b]
1 – 5	Gravel (GW/GP)	125	1.2	0.79 – 0.98
1 – 15	Medium to coarse sand (SW/SP)	150	1.0	0.67 – 0.89
6 – 15	Fine sand or loamy sand	190	0.8	0.61 – 0.74
16 - 30	Sandy loam, silty gravel (GM), silty sand (SM)	250	0.6	0.52 – 0.61
31 – 60[c]	Loam, silt loam, silt (ML)	335	0.45	0.25 – 0.52
61 – 120[d]	Silty clay loam, clay loam[e]	Not Suitable[d]	Not Suitable[d]	Not Suitable[d]

a. Percolation tests must be performed by a registered engineer in accordance with EPA method. May be done now by a Certified Installer after the in-person soils course.

b. GW/GP soils with percolation rates faster than one minute/inch may have a shallow trench or bed type system installed with a 2-foot thick sand liner. Application rate must be 150 sf/bedroom or 1.0 gpd/sf.

c. Soils with percolation rates slower than 30 minutes/inch are unsuitable for seepage pits.

d. Soils with percolation rates slower than 60 minutes/inch require an engineer design and plan approval. Soils with percolation rates slower than 120 minutes/inch are considered impermeable.

e. Soils without expandable clays.

Calculate Size of Leach Field

OWSIM 4.3.2 and 4.3.3
Bed and Shallow Trench Type Systems

- Credit for bottom area only (L x W)
- Minimum depth of leach rock = 12-inches
- Perforated pipe/laterals no more than 100-feet long

- **Bed:** minimum 6 feet wide, recommend no more than 24 feet wide

- **Shallow Trench:** maximum 5 feet wide

Calculate Size of Leach Field

OWSIM 4.3.5 and 4.3.6

Deep Trench Type System

- Credit for Side Wall area only: Length x Depth x 2
- Minimum 4-feet to maximum 10-feet of rock depth
- Width varies, typically 18-inches to 24-inches
- No more than 100-feet long

Leach Pit

- Credit for side walls only
- Depth is typically taken to be height of leach tank, 5 – 6 feet
- Total perimeter length x depth
  - square: length of side wall x 4 x depth
  - rectangle: (length on long side wall x 2 + length of short side wall x 2) * depth

Calculate Size of Leach Field

OWSIM 4.3.4

5-Wide

- Credit for side walls and bottom area
- Width is 5 feet
- Minimum 18 inches to maximum 4 feet of rock depth
- Uses a reduction factor, depending on depth, to calculate minimum length

5-WIDE DRAINFIELD LENGTH REDUCTION FACTOR (RF)

DEPTH OF GRAVEL BELOW PIPE (INCHES)	LENGTH REDUCTION FACTOR
18	0.78
24	0.70
30	0.64
36	0.58
42	0.54
48	0.50

LENGTH = AREA REQUIRED/5' (WIDTH) x RF (TABLE ABOVE)

EXAMPLE: FOR 450 SQ FT ABSORPTION AREA USING 36" OF ROCK:
LENGTH = 450 FT^2 ÷ 5' x 0.58 = 53' (ALWAYS ROUND UP TO NEAREST FOOT)

Leach Field Standard Configuration

OWSIM Appendix C

OWSIM Appendix A – Formula's and Examples

Leach Field Media (Distribution Medium)

OWSIM 2.13

- Sewer Rock
  - Coarse grade used for 5-wide, deep trench, and leach pit
  - Fine grade used for beds and shallow trench

- Manmade media
  - Chambers – bed or shallow trench only
  - EZFlow – any except potentially a leach pit
  - No reduction in the minimum absorption area given!

Equipment

- An excavator, backhoe can do most of the job site requirements.
- A mini-excavator can be the right piece for the job, but it may not be the best equipment for a deep trench.
- A skid steer/dozer can be useful moving materials and grading

Chambers

QUICK4 PLUS STANDARD CHAMBER

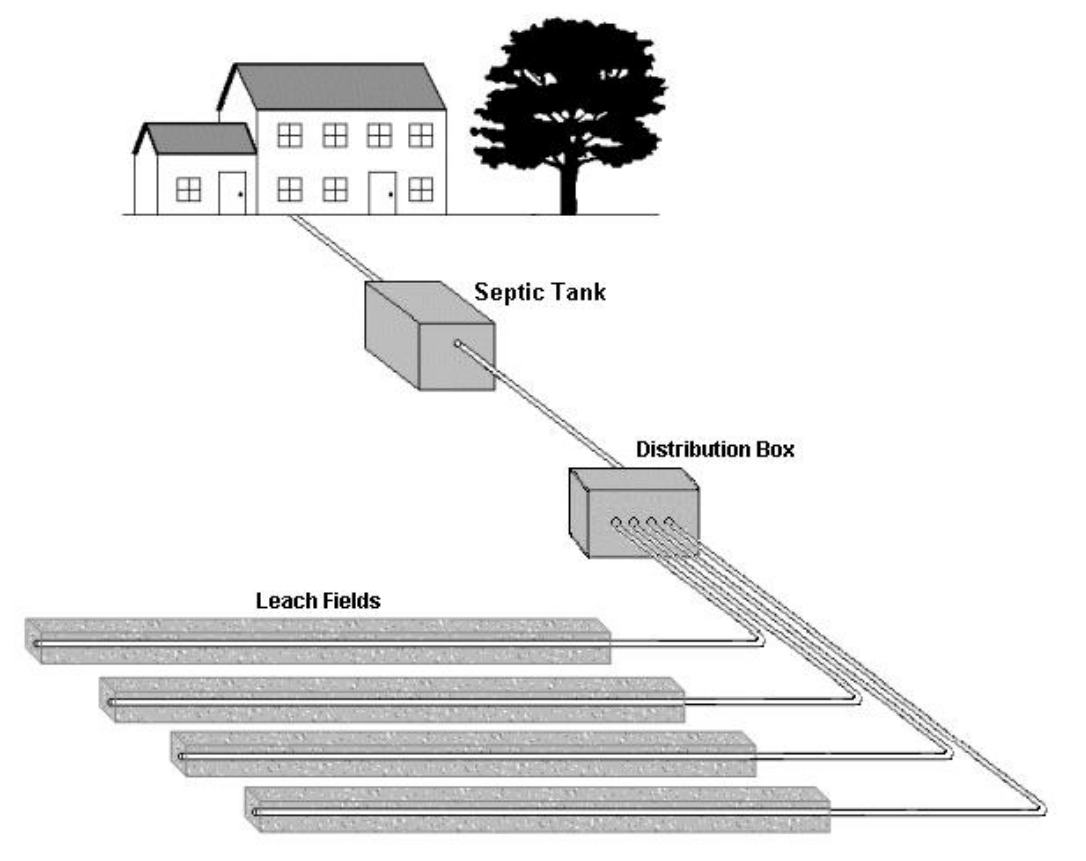
The Quick4 Plus™ Standard chamber offers maximum strength through its two center structural columns. This chamber can be installed in a 36" wide trench. Like the original line of Quick4® chambers, it offers advanced contouring capability with its Contour Swivel Connection™ which permits turns up to 10°, right or left. It is also available in 4' lengths to provide optimal installation flexibility.

The Quick4 Plus All-in-One 12 Endcap and the Quick4 Periscope are available with this chamber, providing flexibility in system configurations.

EZFLOW® SEPTIC SYSTEM

The Infiltrator EZflow septic system is an environmentally friendly replacement to traditional stone and pipe drainfields using an engineered geosynthetic aggregate modular design. The gravelless EZflow system is designed to improve drainfield performance by eliminating the fines and reducing compaction and embedment associated with stone. Preassembled units include a 3" or 4" perforated drain pipe surrounded by aggregate and held in place with durable, high-strength netting.

Distribution Box



May be used instead of a solid header. In some cases, it may be a preferred option. Not currently called out explicitly in the OWSIM, these units may be installed. For sloping lots where multiple trenches are used in parallel, a distribution box may provide the best option for evenly distributing waste.

In Class Problems

Scenario 1

3-bedroom single-family home

design flow = 450 gpd

Test hole to 11 ft, no groundwater or bedrock

SP application rate = 150 sf/bedroom

(no perc test required)

minimum absorption area = 450 sf

Potential leach field sizes:

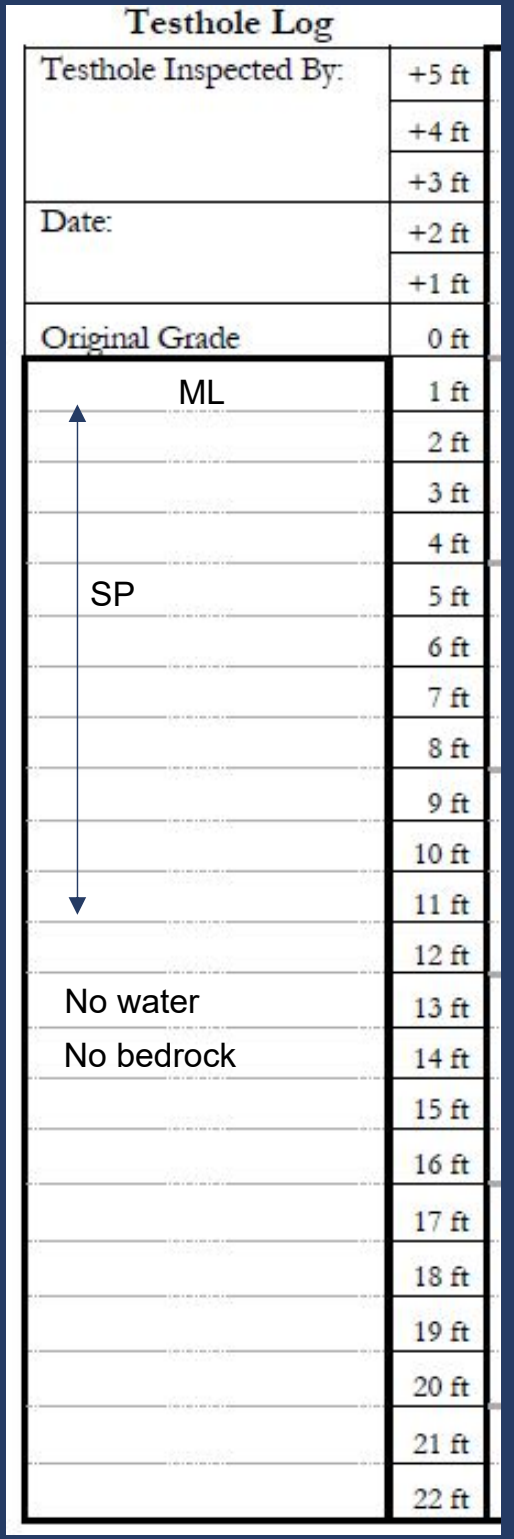
bed = 18’ x 25’

shallow trench = 5’ x 90’

5-wide, 24” rock depth = 63’ long

450 sf/5’ wide = 90
Note: this is length if installing a 5’ wide shallow trench

24” reduction factor = 0.70
90 x 0.70 = 63’ long



Scenario 2

3-bedroom single-family home and 1-bedroom cabin

design flow = 4 x 150 = 600 gpd

Minimum septic tank volume = 1000 + 250 = 1250 gallons

Test hole to 11 ft, no groundwater or bedrock

SM application rate = Perc Test?

55 min/inch => 335 sf/bedroom

minimum absorption area = 4 x 335 = 1340 sf

Potential leach field sizes:

deep trench =

leach pit = 10’ x 67’ x 2 = 1340 sf

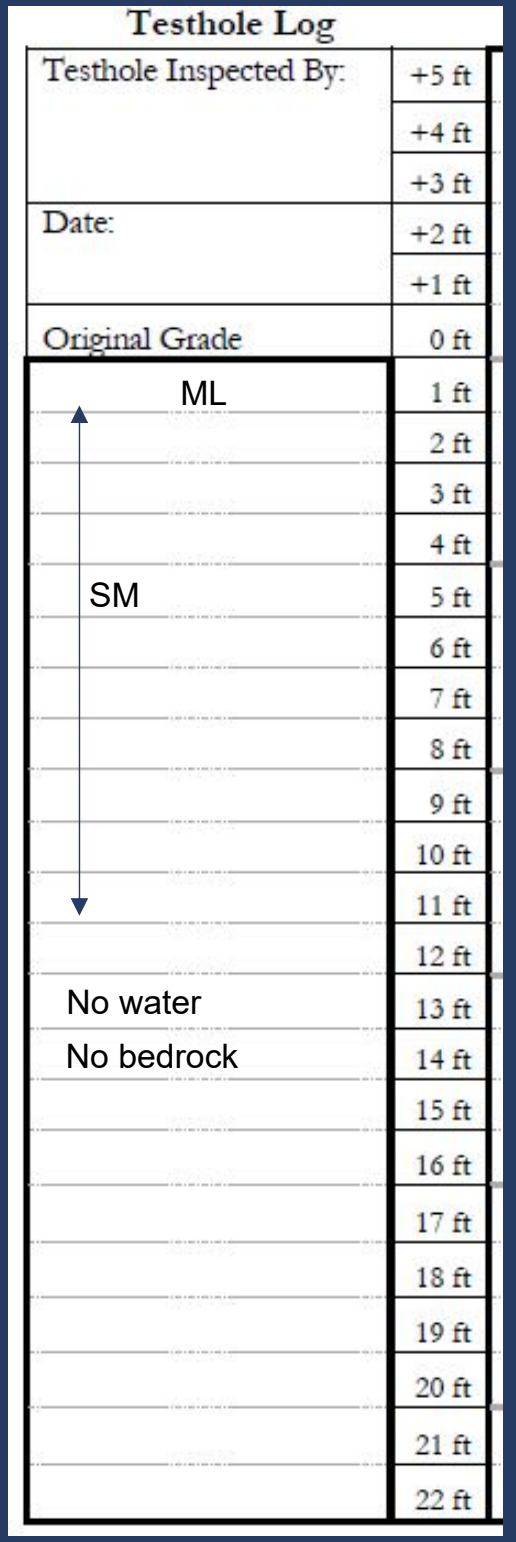
Not suitable – percolation slower than 30 min/inch

5-wide =

48” depth 134’ long

1340 sf / 5’ wide = 268
Note: this is length if installing a 5’ wide shallow trench

48” reduction factor = 0.50
268 x 0.50 = 134’ long



Big “no-no’s”

- “this might work for a couple years but then you will need an engineer to design a system”
- “I won’t install a lift station this time but next time you will need one”
- “Do you want to pay for the documented system or undocumented system?”
- “Put a fish head in your septic tank”

Don’t be afraid to walk away from a job, it may save you more in the future than you will lose today

Questions/Open Discussion