



# **SYSTEM FAILURE IDENTIFICATION**

Jimmy Bell



# System Failure Identification

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SIGNS OF A  
FAILING SYSTEM



CAUSES OF  
FAILURE



SYSTEM  
INVESTIGATION



**WHY CARE?**

# Why Care?

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Encourages proper design of the replacement system(s)

Educates the industry professionals on the system's capabilities

Provides knowledge on how the point of discharge operates

- Business
- Seasonal Homes
- Residential Homes
- Campgrounds



# Why Care?

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## PROTECTS THE ENVIRONMENT



# Why Care?

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## What is a failure?



# Why Care?

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"Failure" means: (a) Effluent has been discharged on the surface of the ground prior to approved treatment; or (b) effluent has percolated to the surface of the ground; or (c) effluent has contaminated or threatens to contaminate a groundwater supply.

- WA Rules and Regulations



# Signs of a Failing System

# Signs of a Failing Systems

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- Spongy Soil Over the Drain Field



# Spongy Soil

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# Spongy Soil

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# Signs of a Failing Systems

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- Spongy Soil Over the Drain Field
- Liquid Breakout Over the Drain Field or Septic Tank

# Surface Liquid Breakout

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# Septic System Toe Breakout

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# Liquid Breakout Over the Septic Tank

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# Signs of a Failing Systems

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- Spongy Soil Over the Drain Field
- Liquid Breakout Over the Drain Field or Septic Tank
- Foul Smelling Septic Odor



# Foul Smelling Septic Odor

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What's that  
smell?!

# Signs of a Failing Systems

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- Spongy Soil Over the Drain Field
- Liquid Breakout Over the Drain Field or Septic Tank
- Foul Smelling Septic Odor
- Gurgling Drains

# Gurgling / Slow Moving Drains

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## Clues

- Do you hear gurgling in your drainage pipes?
- Do you have to flush multiple times?
- Do you smell septic odor above your drains?

## Cause

- Clog in line?
- Bad Vent Stack?
- Drainage Field Issue?

# Signs of a Failing Systems

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- Spongy Soil Over the Drain Field
- Liquid Breakout Over the Drain Field or Septic Tank
- Foul Smelling Septic Odor
- Gurgling Drains
- Frequent Pumping

# Frequent Pumping

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# Signs of a Failing Systems

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- Spongy Soil Over the Drain Field
- Liquid Breakout Over the Drain Field or Septic Tank
- Foul Smelling Septic Odor
- Gurgling Drains
- Frequent Pumping
- Back-up into the structure



# Backing into the Home

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# Signs of a Failing Systems

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- Spongy Soil Over the Drain Field
- Liquid Breakout Over the Drain Field or Septic Tank
- Foul Smelling Septic Odor
- Gurgling Drains
- Frequent Pumping
- Back-up into the structure
- System Alarm is Sounding

# Signs of a Failing Systems

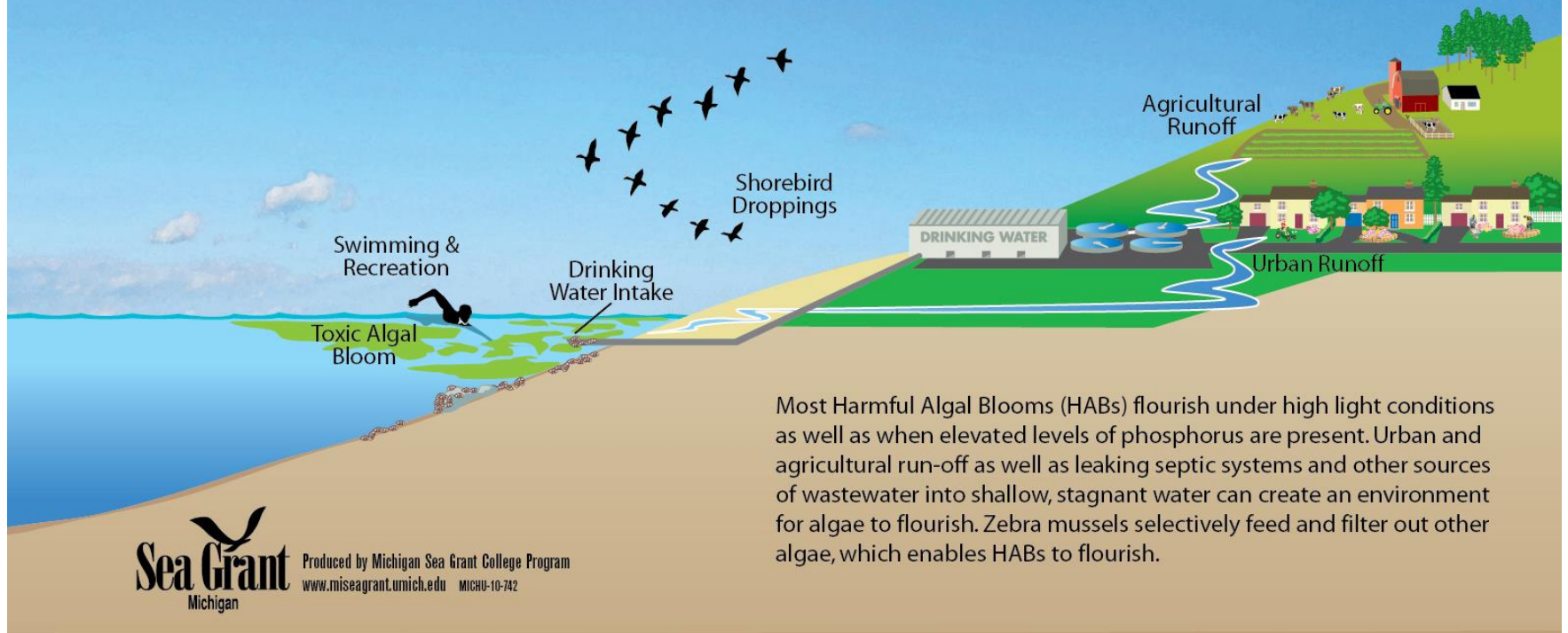
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- Spongy Soil Over the Drain Field
- Liquid Breakout Over the Drain Field or Septic Tank
- Foul Smelling Septic Odor
- Gurgling Drains
- Frequent Pumping
- Back-up into the structure
- System Alarm is Sounding
- Algae Blooms in nearby lakes and ponds

# Algal Blooms



## Factors Influencing the Growth of **HARMFUL ALGAL BLOOMS**





# Causes of Failure

# Why Do Septic Systems Fail?

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- Inaccurate soil and site evaluation
- Improper design
- Improper construction
- Not using specified materials
- Homeowner abuse
- Leaky fixtures
- High Strength Waste (Kennels vs. Dentist Office)



# Signs of distress?

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# Is this normal?

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# Dirty sand

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# Why Do Septic Systems Fail?

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- Lack of Maintenance
- Excessive water usage
- Biomat Formation - Old Age
- Cracked tanks
- Pumps not calibrated or not operating
- Clogged or collapsed distribution pipes
- Water softener backwash discharged to the septic tank



# Water Softener

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# Waldoboro school leach field to be replaced after heating oil snafu



# Why Do Septic Systems Fail?

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- Garbage grinders
- Power off to the System
- Chemicals – household, medical, industrial
- Lack of septic tank filters
- Lawn irrigation system
- Stormwater grading and runoff / downspouts



# Something went wrong here

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# Why Do Septic Systems Fail?

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- Driving over the system
- Excessive system depth
- Improper venting or no venting
- Bending to homeowners will
- Development on adjacent property
- Look for the not obvious

# The not obvious

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# Don't drive over the system

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# System Investigation

# Problem System Investigation

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- Gather information on the site
  - Do your homework
    - Plans
    - Permits
    - As-built
  - Available Pictures
- Contact homeowner, health department, contractor and/or tenant
- Investigate the site

# Problem System Investigation

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- Install Inspection Report from Health Department
- Water Usage (if available)
- Talk to homeowner, contractor and health inspector
- Nosey Neighbor

# Documents



Environmental Laboratories, Inc.  
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045  
Tel. (860) 645-1102 Fax (860) 645-0823

## Analysis Report

July 24, 2014

FOR: Attn: Mr Jim King  
Eljen Corp  
125 Mckee Street  
East Hartford CT 06108

### Sample Information

Matrix: LIQUID  
Location Code: SPECIAL2  
Rush Request: Standard  
P.O.#:

### Custody Information

Collected by:  
Received by: SW  
Analyzed by: see "By" below

### Date

07/17/14  
07/17/14

### Time

14:30  
15:35

### Laboratory Data

SDG ID: GBG76949  
Phoenix ID: BG76949

Project ID: 298 LONG HILL RD S WINDSOR  
Client ID:

| Parameter                  | Result | RL/<br>PQL | Units | Date/Time      | By    | Reference |
|----------------------------|--------|------------|-------|----------------|-------|-----------|
| B.O.D./5 day               | 120    | 64         | mg/L  | 07/17/14 20:08 | CB/RM | SM5210B   |
| Oil and Grease by EPA 1664 | 13     | 1.4        | mg/L  | 07/18/14       | MA    | EPA 1664A |
| Total Suspended Solids     | 28     | 5.0        | mg/L  | 07/18/14       | RP/KG | SM2540D   |

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

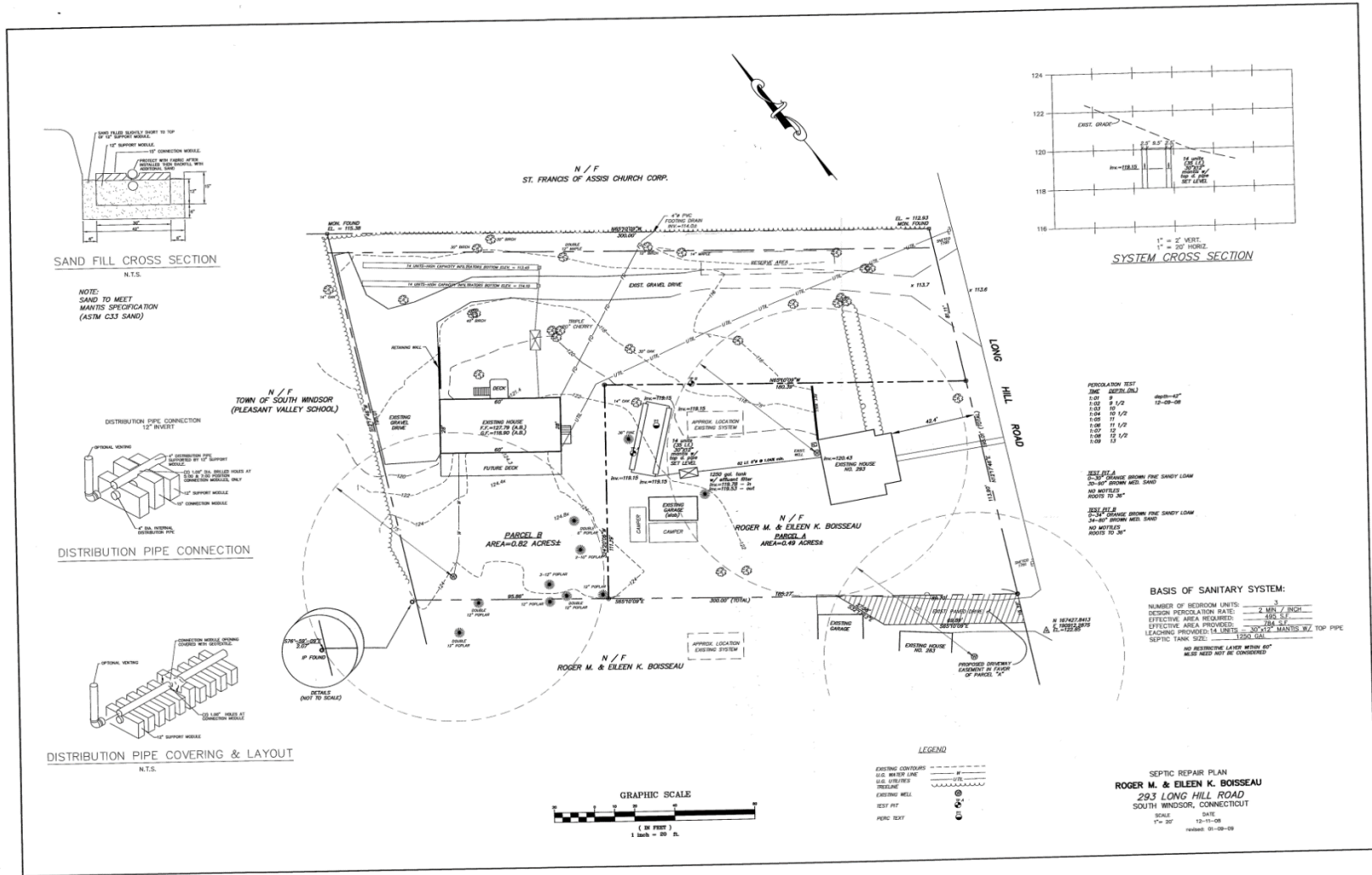
### Comments:

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.  
This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director  
July 24, 2014



# Documents



# Documents



## MATERIALS TESTING, INC.

55 LAURA STREET • NEW HAVEN, CONNECTICUT 06512 • (203) 468-5216  
42 BOSTON POST ROAD • WILLIMANTIC, CONNECTICUT 06226 • (860) 423-1972

DATE: 07-22-14

REPORT: M-1001

CLIENT: Eljen Corporation  
125 McKee Street  
East Hartford, CT 06108  
Attn: Mr. Jim King

PROJECT: Client's Information

SUBJECT: WASHED SIEVE ANALYSIS (ASTM C-136, D-1140)

Material: Concrete Sand

Source: 298 Longhill Road South Windsor, CT

Sampled by: and delivered to MTI by client 7/18/14.



| Sieve Size       | Percent Passing | ASTM C-33 |
|------------------|-----------------|-----------|
| ½" (12.5mm)      | 100             | 100       |
| ¾" (9.5mm)       | 99*             | 100       |
| #4 (4.75mm)      | 97              | 95-100    |
| #8 (2.36mm)      | 90              | 80-100    |
| #16 (1.18mm)     | 82              | 50-85     |
| #30 (600µm)      | 70*             | 25-60     |
| #50 (300µm)      | 45*             | 10-30     |
| #100 (150µm)     | 15*             | 2-10      |
| #200 (75µm)      | 6.0*            | 0-3       |
| Fineness Modulus | 2.0             | 2.3-3.1   |

\* Indicates out of specification limits.

# Photo Evidence?

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# Questions to ask

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- When does the problem occur?  
Seasonal... Weekends... Always...
- How long have they noticed the problem?
- How long have they been in the home
- How many occupants
- Any changes in water usage habits



# Problem System Investigation

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- Verify soil and site evaluation
- Verify system sizing
- Ensure system is level
- Check dosing cycle if a pumped system
- Is the system compliant, “Legal System”
- Verify the material components
  - Does the sand meet the designer’s specifications
  - Are the proper components installed
- Ensure effluent is going where it should
- Look for the not obvious

# Invite Everyone...almost everyone

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- Local Regulator
- Contractor
- Engineer
- Builder
  
- Homeowner usually is not a help

# Tools of the Investigation

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- Probe
- Auger
- Tape Measure
- Gloves
- Camera
- Dye Packs
- Shovel
- Marking Paint
- Flashlight
- Laser Level





# Septic Tank



# Septic Tank Condition

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# Probe

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- Excellent for finding/confirming tank locations
- Find/Confirm drainfield lines
- Are they Saturated
- Are the Lines Dry
- Are some lines getting effluent while others are not

# Septic Tank Condition

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# Effluent Filter

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# Concrete Condition

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# Watertight Risers

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# Field Conditions

# Auger

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- Are the lines full
- Is there a biomat present
- Are there signs of greying
- Is it saturated or dry
- How far away from the system is saturated



# Auger – Dry Drainfield

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# Auger – Saturated Drainfield

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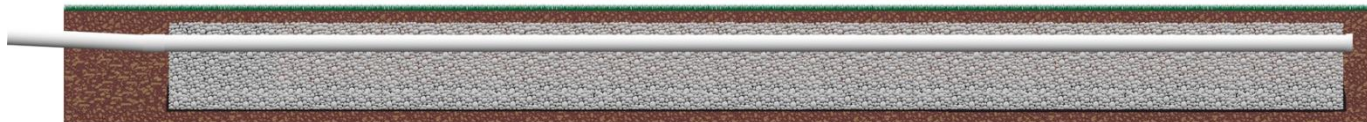
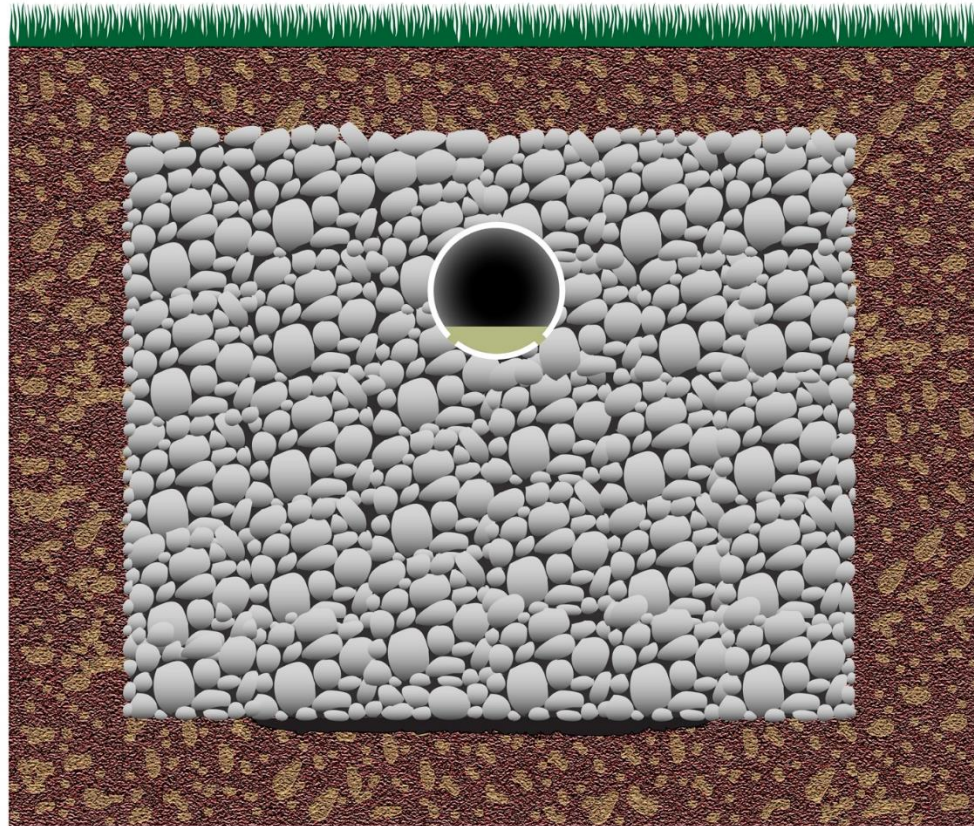


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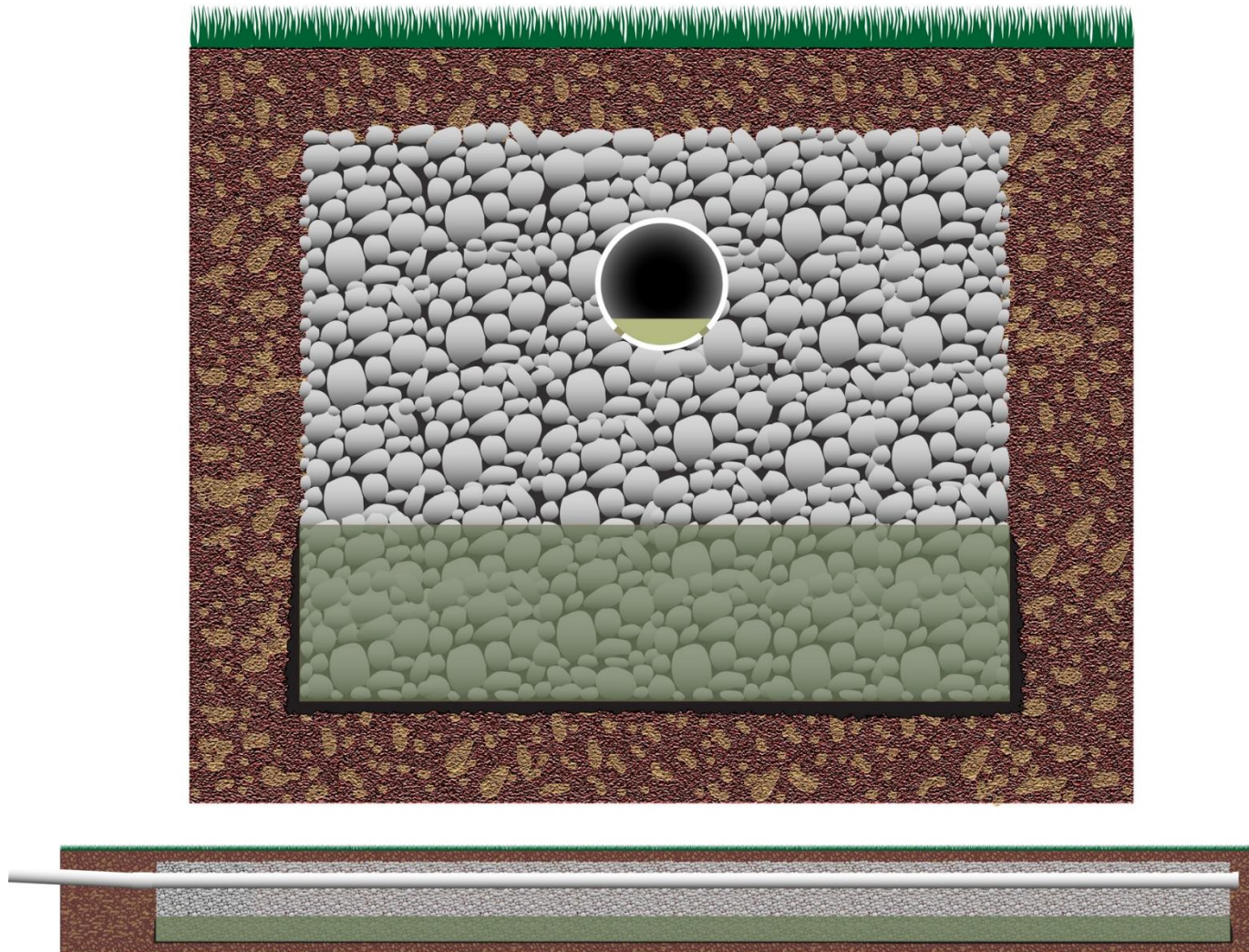
# What Stage is the System in?

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# What Stage is the System in?

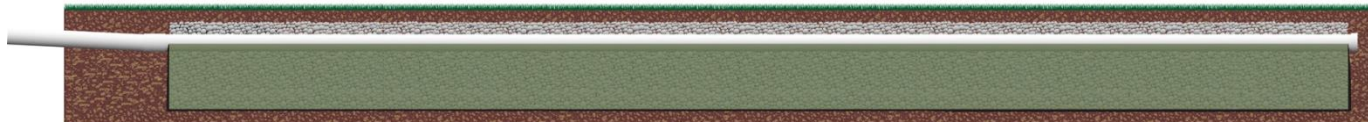
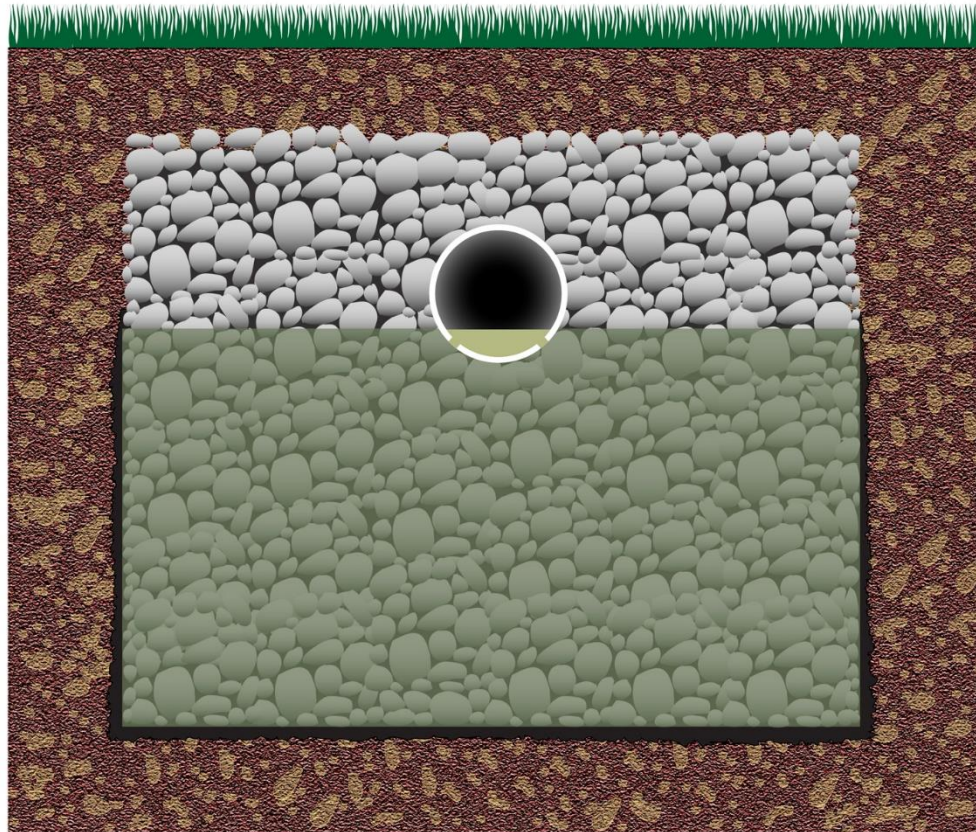
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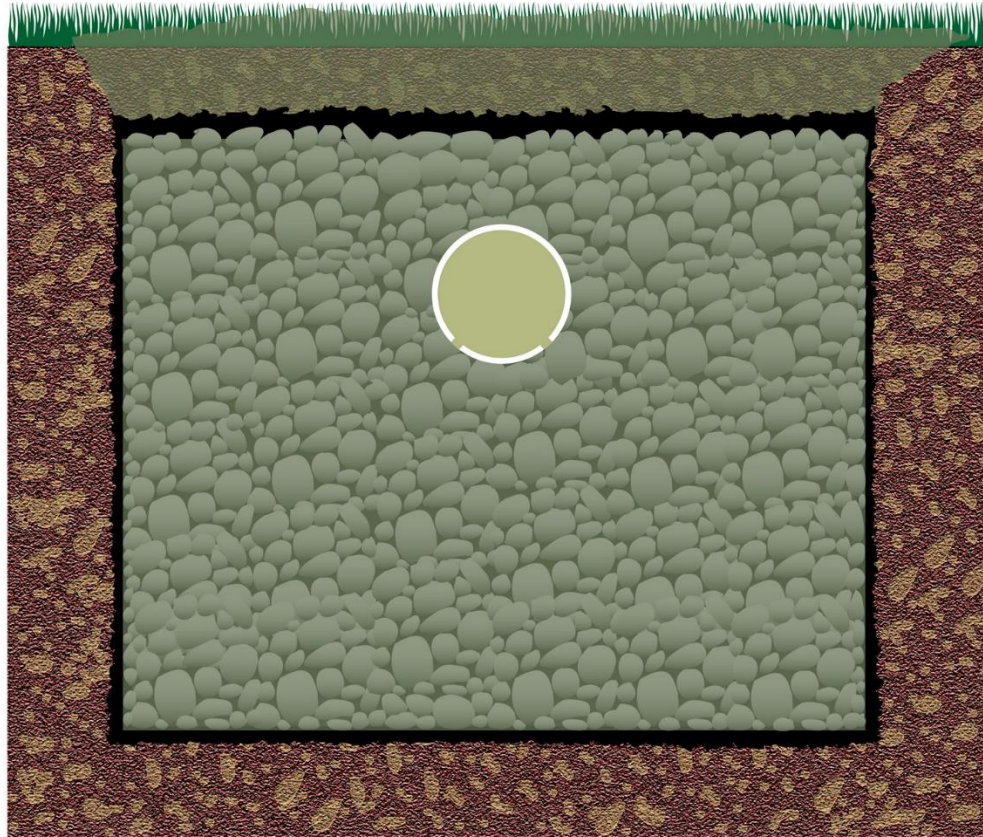
# What Stage is the System in?

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# What Stage is the System in?

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# Soil Information



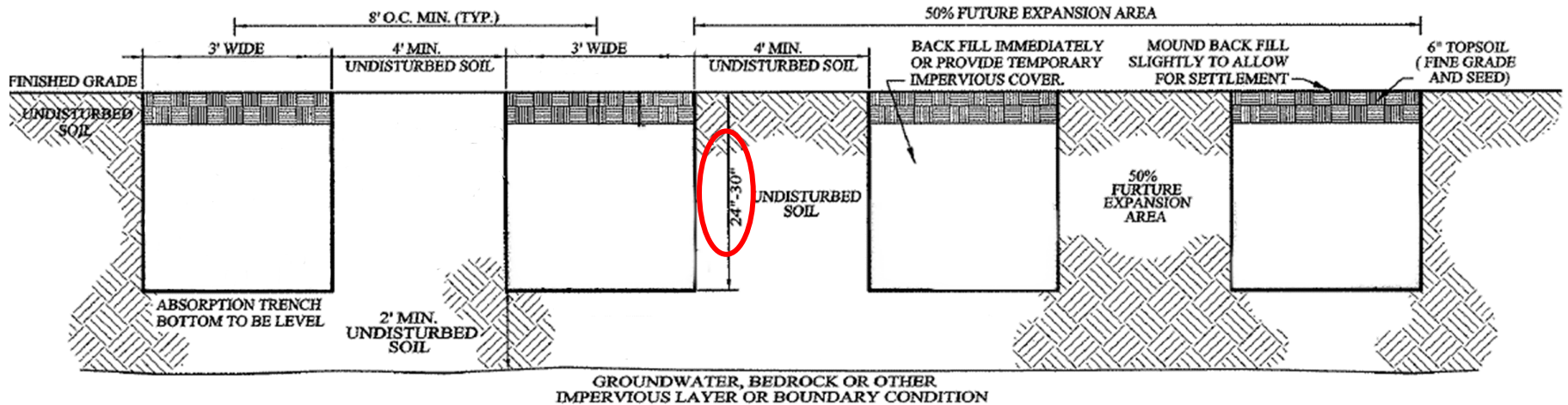
# Problem System Investigation

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- Verify soil and site evaluation

# Plan

|            |  |  |  |   |   |
|------------|--|--|--|---|---|
| CLUSTER 15 | 00" - 08" TOPSOIL<br>08" - 87" CLAY LOAM W/SAND AND GRAVEL<br>COBBLES<br>NO SEEPAGE<br>NO BEDROCK<br>MOTTLING @ 16"  | 00" - 08" TOPSOIL<br>08" - 90" CLAY LOAM W/SAND AND GRAVEL<br>NO SEEPAGE<br>NO BEDROCK<br>MOTTLING @ 14"   |  | PT1: 8 MIN.<br>DEPTH: 24"<br><br>PT2: 7 MIN.<br>DEPTH: 24"<br><br>(JSI) PT3: 8 MIN.<br>DEPTH: 24"<br><br>PT4: 8 MIN.<br>DEPTH: 24"<br><br>PT5: 7 MIN.<br>DEPTH: 24" | SDS DESIGNED FOR<br>4 BEDROOM MAX.<br>4 ROWS OF 9 UNITS<br>36 L.F. PER ROW<br>REQUIRED 96 L.F. TOTAL<br>PROVIDED 144 L.F. TOTAL<br>CURTAIN DRAIN REQ. |
|            | DEEP TEST PIT #3<br>RESULTS<br><br>00" - 08" TOPSOIL<br>08" - 15" SILT LOAM W/ CLAY & COBBLES<br>15" - 84" CLAY LOAM<br>NO SEEPAGE<br>NO BEDROCK<br>MOTTLING @ 24" | DEEP TEST PIT #4<br>RESULTS<br><br>00" - 08" TOPSOIL<br>08" - 15" SILT LOAM W/ CLAY & COBBLES<br>15" - 84" CLAY LOAM<br>NO SEEPAGE<br>NO BEDROCK<br>MOTTLING @ 24" |  |   |   |



# Groundwater

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# Percolation Test and Soil Identification

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# Poor Soils

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# Problem System Investigation

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- Verify soil and site evaluation
- Verify system sizing

# Measure the System

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# Problem System Investigation

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- Verify soil and site evaluation
- Verify system sizing
- Ensure system is level

# Ensure System is Level

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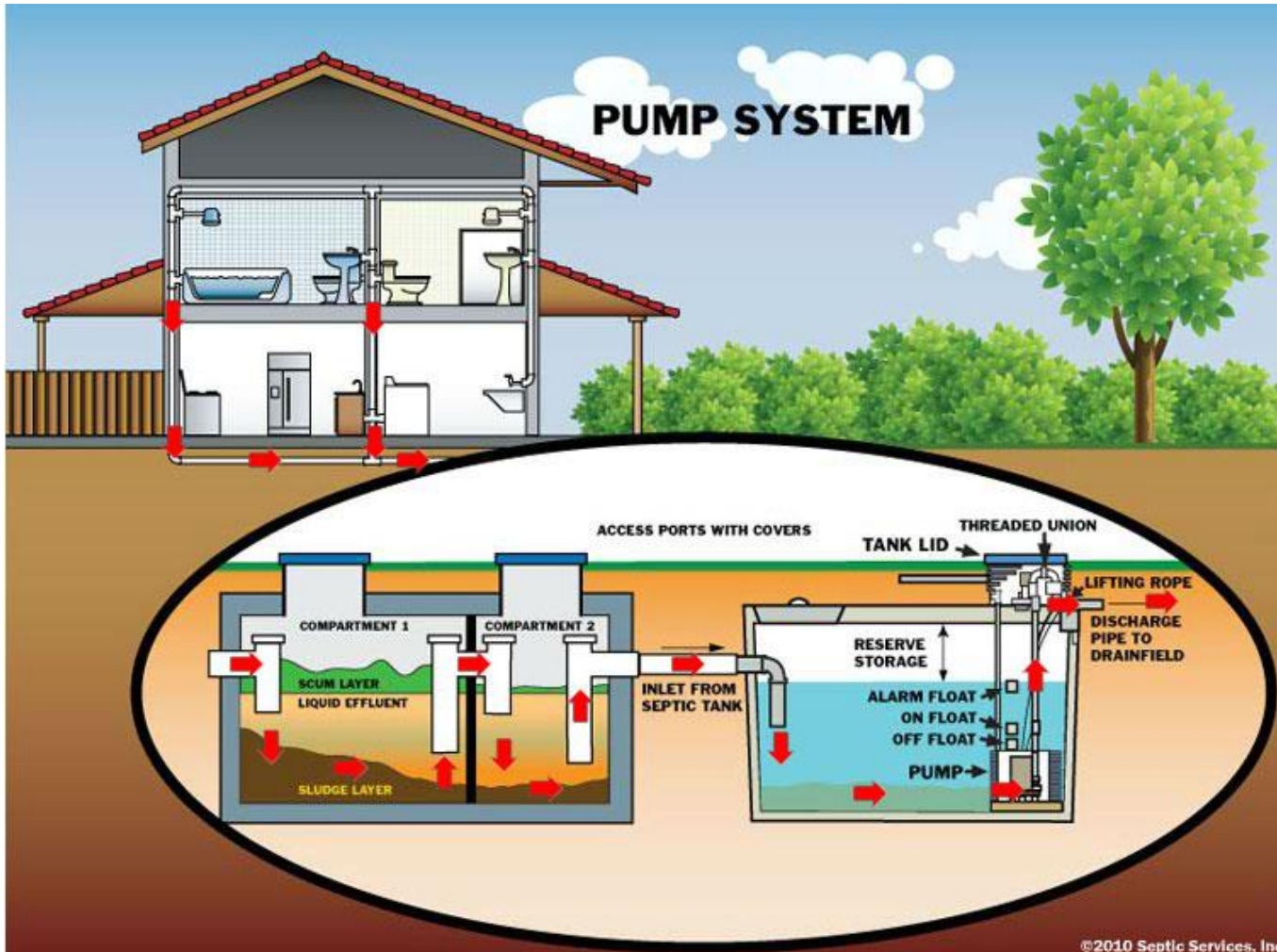
# Problem System Investigation

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- Verify soil and site evaluation
- Verify system sizing
- Ensure system is level
- Check dosing cycle if a pumped system



# Check dosing cycle if a pumped system



# Check dosing cycle if a pumped system

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# Check dosing cycle if a pumped system

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# Problem System Investigation

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- Verify soil and site evaluation
- Verify system sizing
- Ensure system is level
- Check dosing cycle if a pumped system
- Is the system compliant, “Legal System”

# Problem System Investigation

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- Verify soil and site evaluation
- Verify system sizing
- Ensure system is level
- Check dosing cycle if a pumped system
- Is the system compliant, “Legal System”
- Verify the material components
  - Do the aggregate materials meet the designer’s specifications
  - Are the proper components installed

# Correct Aggregate

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# Correct Components

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# Problem System Investigation

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- Verify soil and site evaluation
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- Ensure effluent is going where it should

# Ensure effluent is going where it should

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# Ensure effluent is going where it should

---



# Problem System Investigation

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- Verify soil and site evaluation
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# Environmental Issues

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# Flushable Wipes

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# Discussion