



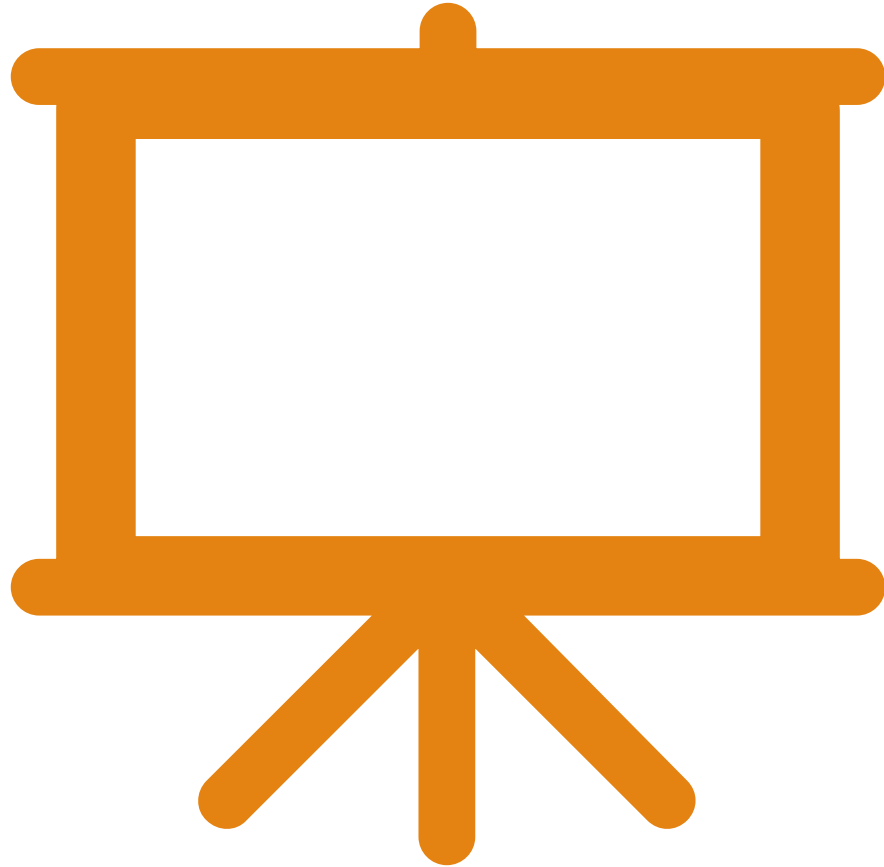
# Onsite Systems vs Stream Discharges in Virginia

*MARCIA J. DEGEN, PH.D., P.E.*

*VIRGINIA DEPARTMENT OF HEALTH*

*OCTOBER 24, 2023*





---

The materials being presented represent the speaker's opinion, and do NOT reflect the opinions of NOWRA.

# Agenda

---

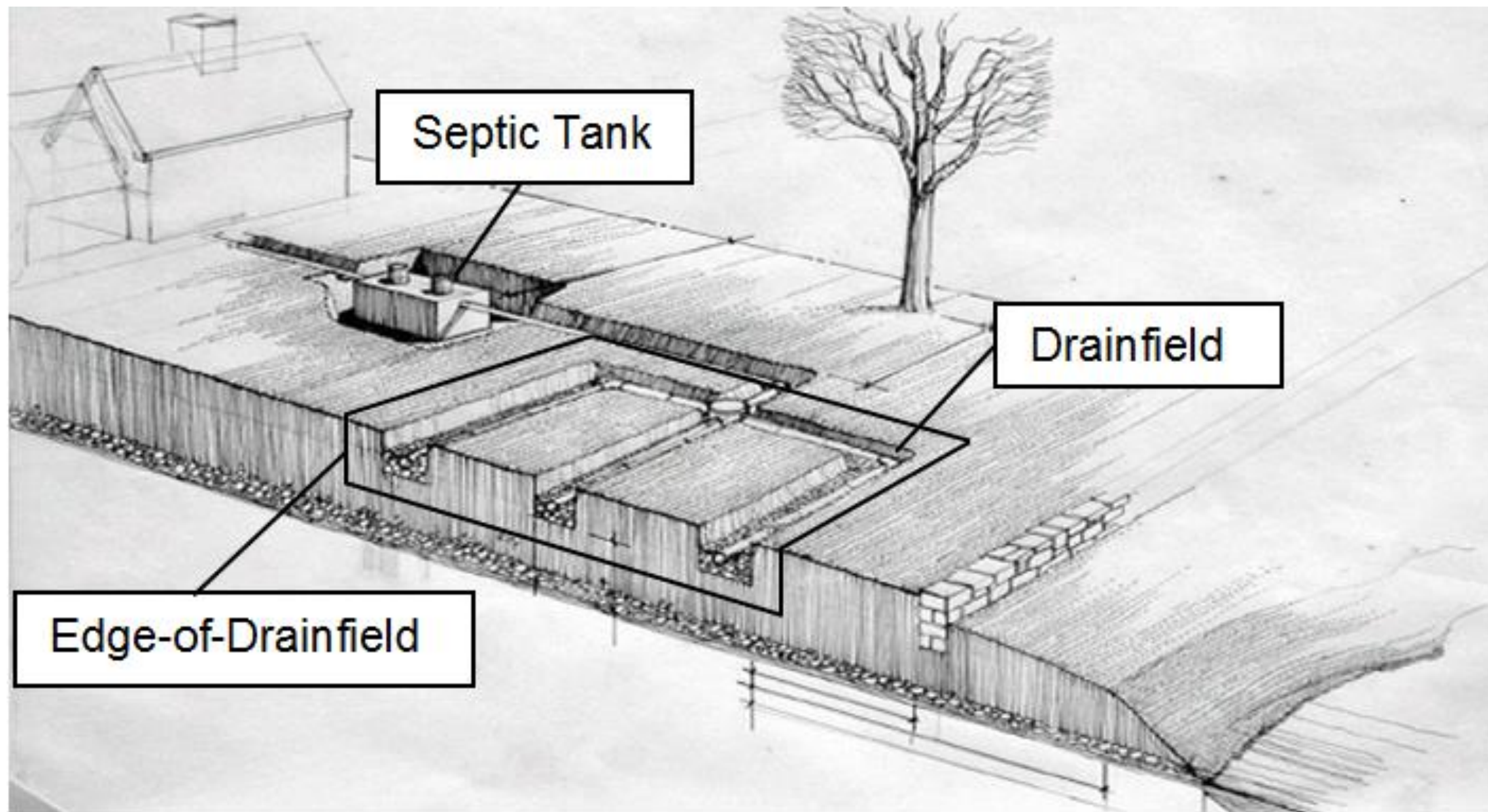
Onsite Options in VA

When can a stream discharge be considered?

The basic process to obtain a stream discharge permit

Compare Onsite vs Discharge

*≤ 1000 gpd, single family homes*



Source: Joubert et al. (2005)

# Alternative Onsite Sewage Systems

---

Pressure distributed dispersal field

Treatment beyond a septic tank

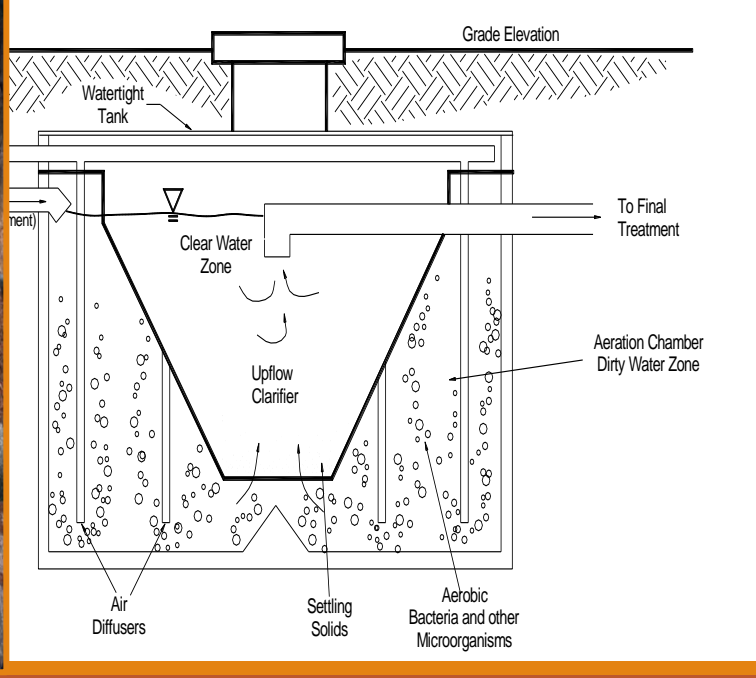
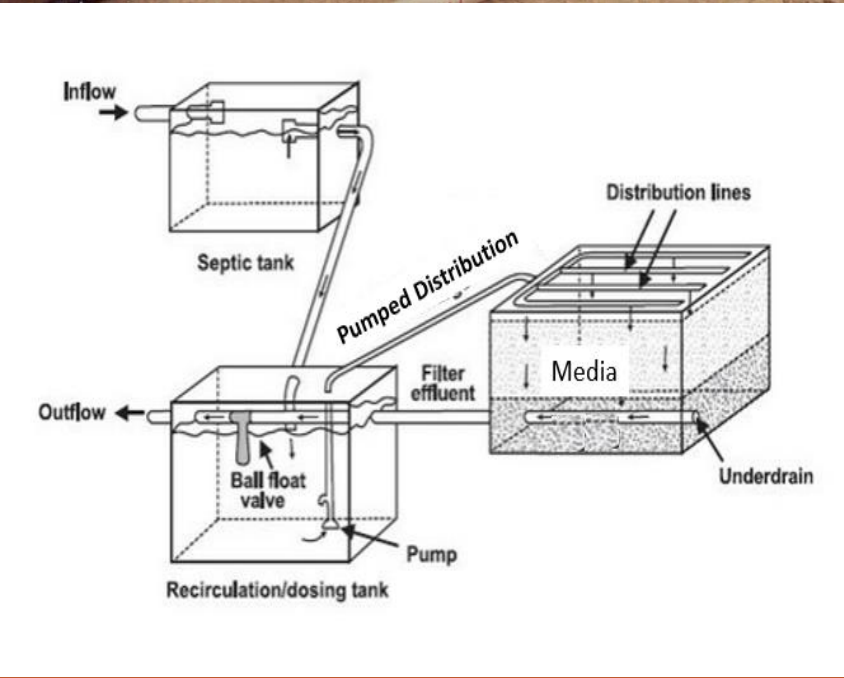
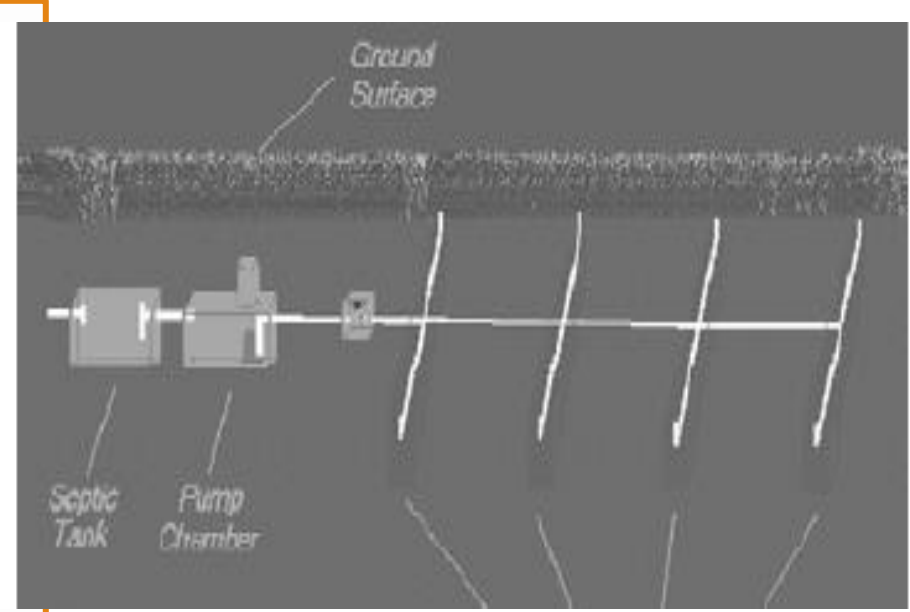
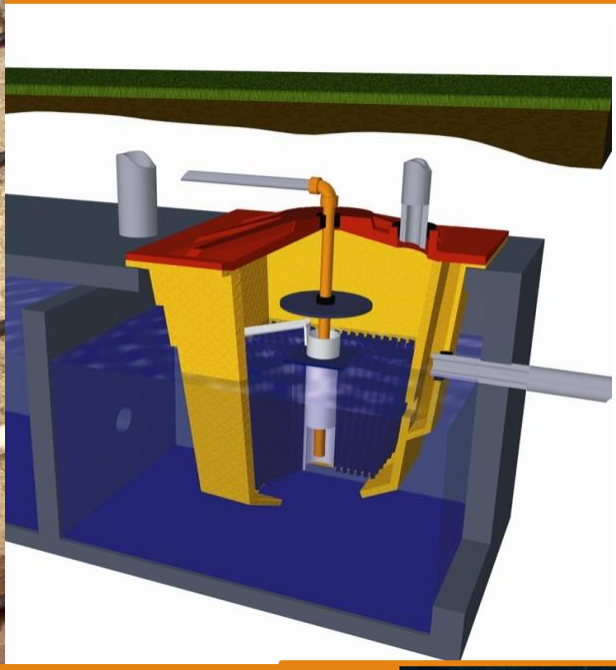
(or Both)

Site conditions – minimum 6 inches of soil without limitations; can add fill to create vertical separation w disinfection

Treatment Levels - 30/30 or 10/10 (BOD/TSS)

Disinfection – 200 col/100 ml fecal coliforms

N reduction in Chesapeake Bay Watershed (50% TN residential, 20 mg/l TN commercial)





What if onsite just won't work





## Discharge to a Surface Water

### Only allowed

- if no onsite solution available as defined by regulation
- Can be used for new construction
- In some areas, only allowed in case of a failing onsite system
- In some areas, prohibition to any discharge

# Department of Environmental Quality (DEQ) General VPDES Permit – 9VAC25-110

---

Limited to  $\leq 1,000$  gpd

Domestic sewage only

3 Sets of discharge limits

- $< 0.2$  MGD
- $\geq 0.2$  MGD
- Potomac Embayment

Some prohibitions to discharges

Shellfish is a special concern

Discharge Permit is issued by  
DEQ

5 year term

All GPs have the same expiration  
Date

DEQ will reissue the GP with no  
objection from VDH

For SFH, requires coordination with VDH through the *Alternative Discharging Sewage Treatment Regulations for Single Family Home Dwellings* 12VAC5-640

Virginia  
Department of  
Health's  
*Alternative  
Discharging  
Sewage  
Treatment  
Regulations for  
Single Family  
Home Dwellings*  
12VAC5-640

Purpose: regulate construction, location and operation of SFH systems permitted under DEQ's General Permit

Applicability:  $\leq 1,000$  gpd individual **single family dwellings** ONLY when an appropriate onsite solution does not exist



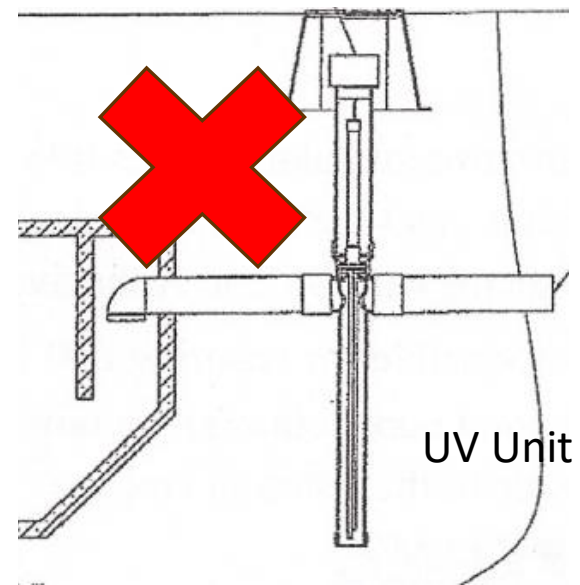
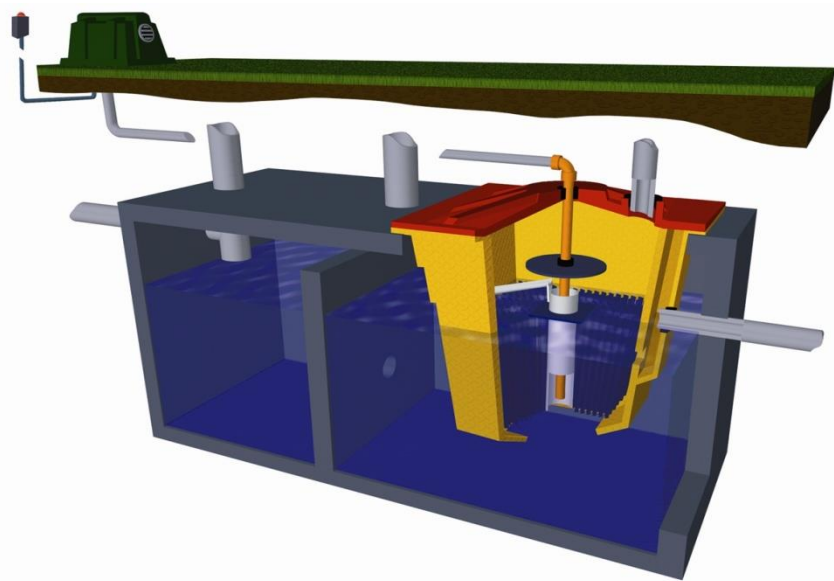
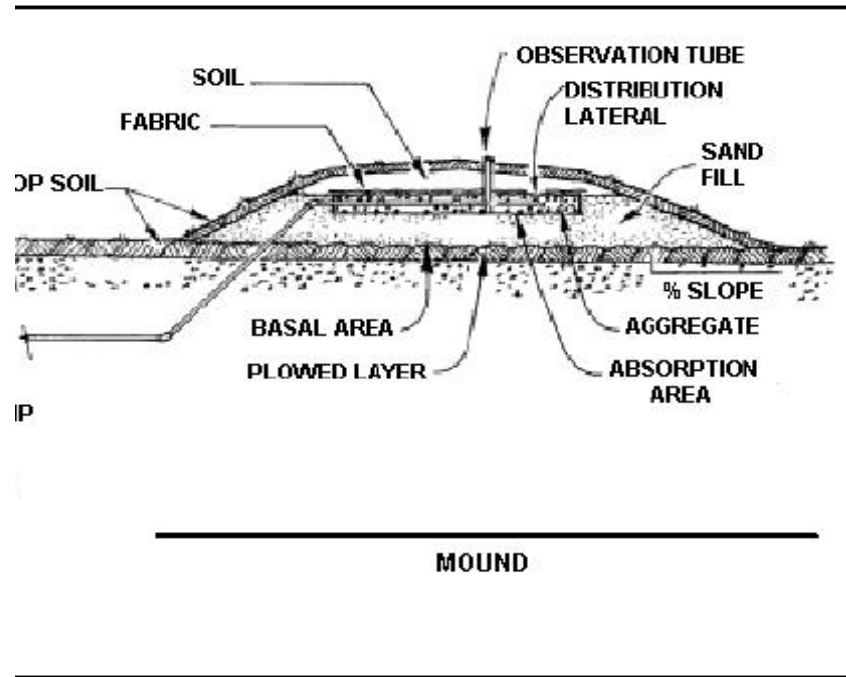
- 
- Issues coverage under the VPDES General Permit
  - Maintains and updates the General Permit every 5 years
  - Reissues the General Permit to permittees in good standing every 5 years
  - Can enforce
- Confirm no onsite solution
  - Confirm proposed discharge point meets all setbacks and other VDH requirements
  - Relay onsite denial to DEQ with combined application
  - Issue construction permit that is compliant with design requirements
  - Issue operation permit
  - Track O&M and compliance reporting
  - Conduct annual inspections
  - Can enforce

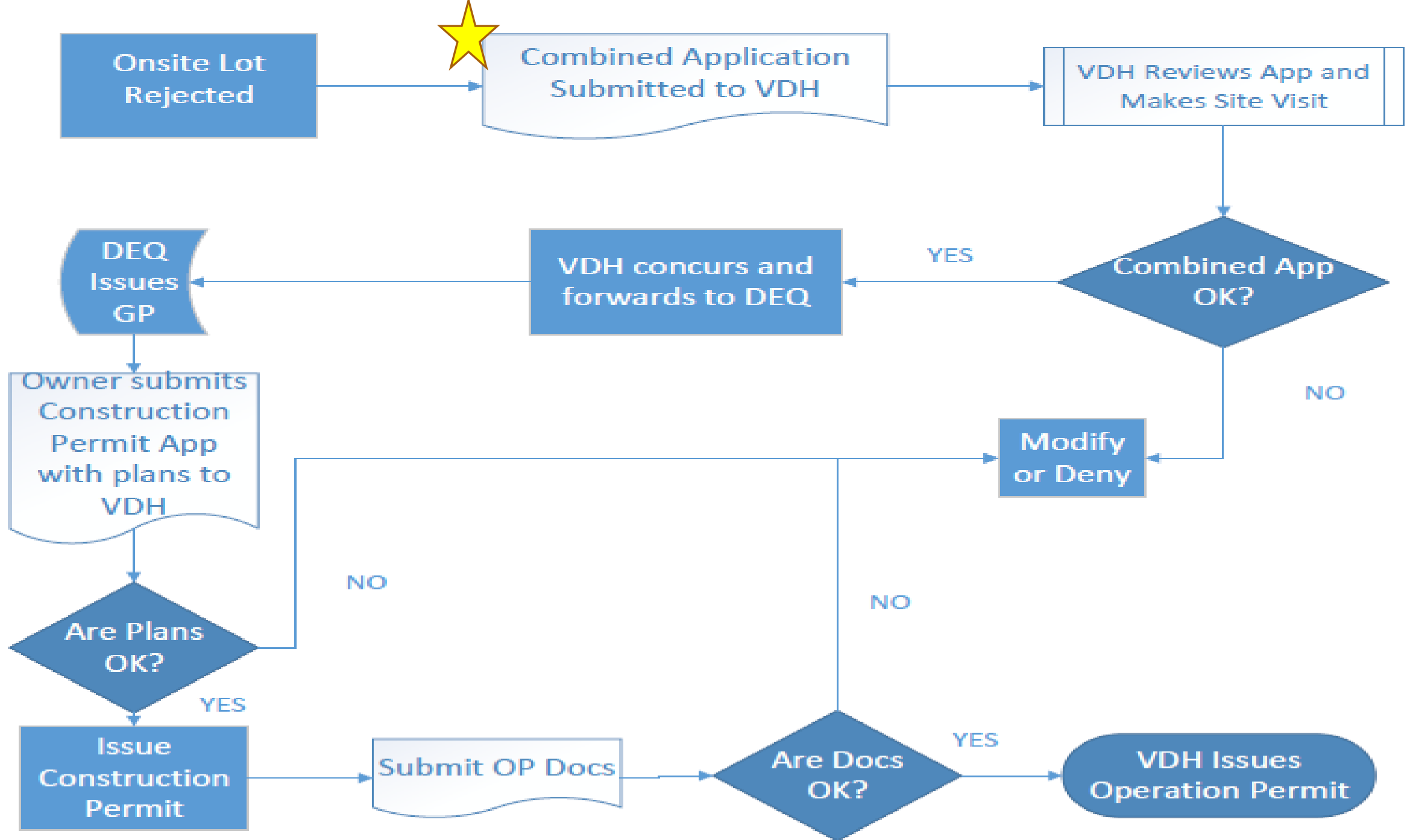
## No Onsite Solution

Defined in VDH's *Alternative Discharging Sewage Treatment Regulations for Single Family Home Dwellings* 12VAC5-640

Must consider treatment (30/30 or 10/10) and/or pressure dispersal but not disinfection

- ✓ Need at least 6 inches of good soil with no limitations
- ✓ Licensed onsite soil evaluator completes site evaluation and justifies no onsite solution to VDH
- ✓ VDH must concur





# Combined Application

## Three Purposes:

- Confirm no onsite solution
- Walks through the process of evaluating a discharge point
- Functions as the General Permit Application

**COMBINED APPLICATION**  
Virginia Department of Health Discharging System Application  
For Single Family Dwellings Discharging Sewage Less Than or Equal To 1,000 Gallons per Day  
and  
State Water Control Board Virginia Pollutant Discharge Elimination System  
General Permit Registration Statement For  
Domestic Sewage Discharges Less Than or Equal to 1,000 Gallons Per Day

**PART A. General Information**  
Types of Application: \_\_\_\_\_ New, \_\_\_\_\_ Repair, \_\_\_\_\_ Modification, \_\_\_\_\_ Expansion  
\_\_\_\_\_ County or City Health Department Date: \_\_\_\_\_, 20\_\_\_\_

Name of Facility/Residence: _____	Owner(s) of Facility/Residence: _____
Street Address _____	Street Address _____
City, State, Zip _____	City, State, Zip _____
Day Phone: _____ Cell: _____	Day Phone: _____ Cell: _____
	Email Address: _____

Agent (if applicable): \_\_\_\_\_  
Street Address \_\_\_\_\_  
City, State, Zip \_\_\_\_\_  
Day Phone: \_\_\_\_\_ Cell: \_\_\_\_\_

Tax Map#: \_\_\_\_\_ Subdivision: \_\_\_\_\_ Sect/Block: \_\_\_\_\_ Lot #: \_\_\_\_\_  
Size of Parcel: \_\_\_\_\_ Acres. Proposed Use (# of bedrooms): \_\_\_\_\_  
Proposed volume of discharge (gallons per day): \_\_\_\_\_ gpd

If the discharge is to a wetland, attach the statement from the Army Corps of Engineers confirming the wetland delineation.

	YES NO
1. Are central sewage facilities available to this site/facility? If yes, explain: _____	_____
2. Does the residence/facility (existing or proposed) currently have an existing VPDES permit? If yes, please provide the VPDES permit number: _____	_____
3. Will any pollutants other than domestic sewage be treated or discharged? If yes, please indicate what: _____	_____
4. Is this application for a system to replace a failing septic system? _____	_____
5. Discharge permits can only be issued to sites with no onsite solution in accordance with 12VAC5-640 Attach a copy of the onsite sewage permit denial. OSE/PE: _____ Date of Denial: _____ PE/OSE License #: _____	_____

I hereby give permission to the Health Department to enter onto the above referenced property for the purpose of processing this application. I certify that the property lines and the proposed location of the treatment system, discharge point, proposed structures, water supplies, utilities, easements, are clearly marked and the property is sufficiently clear to see the topography.

\_\_\_\_\_  
Signature of Property Owner

\_\_\_\_\_  
Date



# Site Evaluation for a Discharge Point

---

Completed by private sector or VDH

Slope of discharge channel

Proximity to drinking water intakes, wells, swimming areas, other discharges, utilities

Topographic features (sinkholes, ponds, lakes)

VDH confirms discharge point is compliant with discharge regulations

# Waivers for Failing Onsite Sewage System

## – 12VAC5-640-260

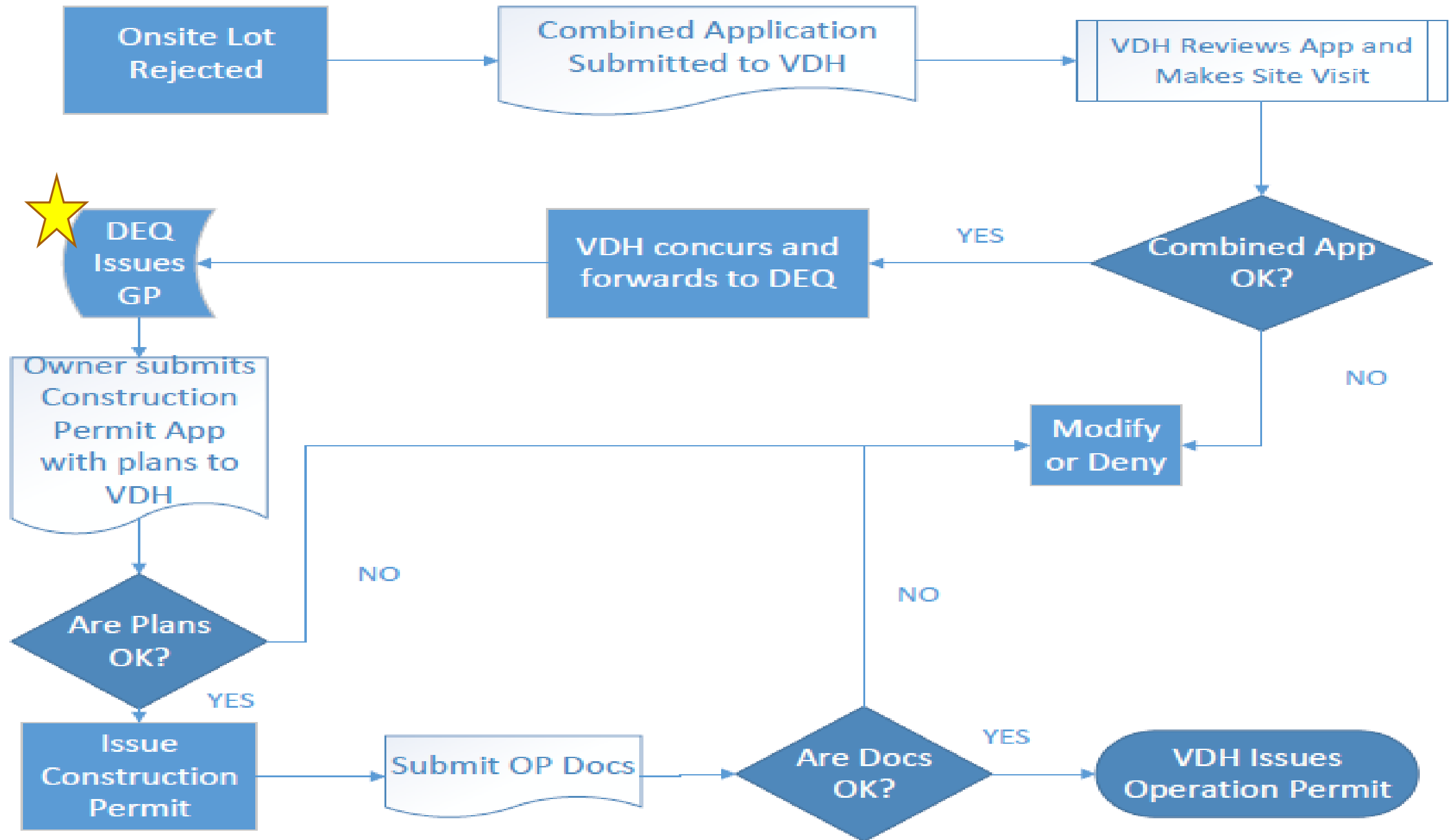
---

### Only when:

- Reduces existing hazard or improves or negates impacts
- No increase in wasteload
- No increase in already permitted flow
- Exception if no facilities (bathrooms) currently exist

### Waivers to

- 400 (discharge point, slope)
- 410 (subdivision easements)
- 420 (setback distances)
- 470H (100 yr flood elevation)
- 450.2 (easements for dry ditches/intermittent stream/wetlands)



# DEQ Issues GP

---

If there are no prohibitions to the discharge point

If the discharge will not affect shellfish growing areas

If the Combined Application is complete

The DEQ Permit is good for a max of 5 years

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS	
	Instantaneous Minimum	Instantaneous Maximum	Frequency	Sample Type
Flow (MGD) <sup>(1)</sup>	NA	NL	1/year	Estimate
BOD <sub>5</sub>	NA	30 mg/l	1/year	Grab
Total Suspended Solids	NA	30 mg/l	1/year	Grab
Total Residual Chlorine <sup>(2)</sup>				
After contact tank	1.0 mg/l	NA	1/year	Grab
Final effluent	NA	0.016 mg/l <sup>(6)</sup>	1/year	Grab
E. coli <sup>(3)</sup>	NA	126 CFU/100 ml	1/year	Grab
enterococci <sup>(4)</sup>	NA	35 CFU/100 ml	1/year	Grab
Fecal Coliform Bacteria <sup>(5)</sup>	NA	200 CFU/100 ml	1/year	Grab
pH (standard units)	6.0	9.0	1/year	Grab
Dissolved Oxygen	5.0 mg/l <sup>(6)</sup>	NA	1/year	Grab

NL = No Limitation, monitoring required

NA = Not Applicable

<sup>(1)</sup>The design flow of this treatment works is less than or equal to 1,000 gallons per day.

Special Limits  
Potomac Embayment

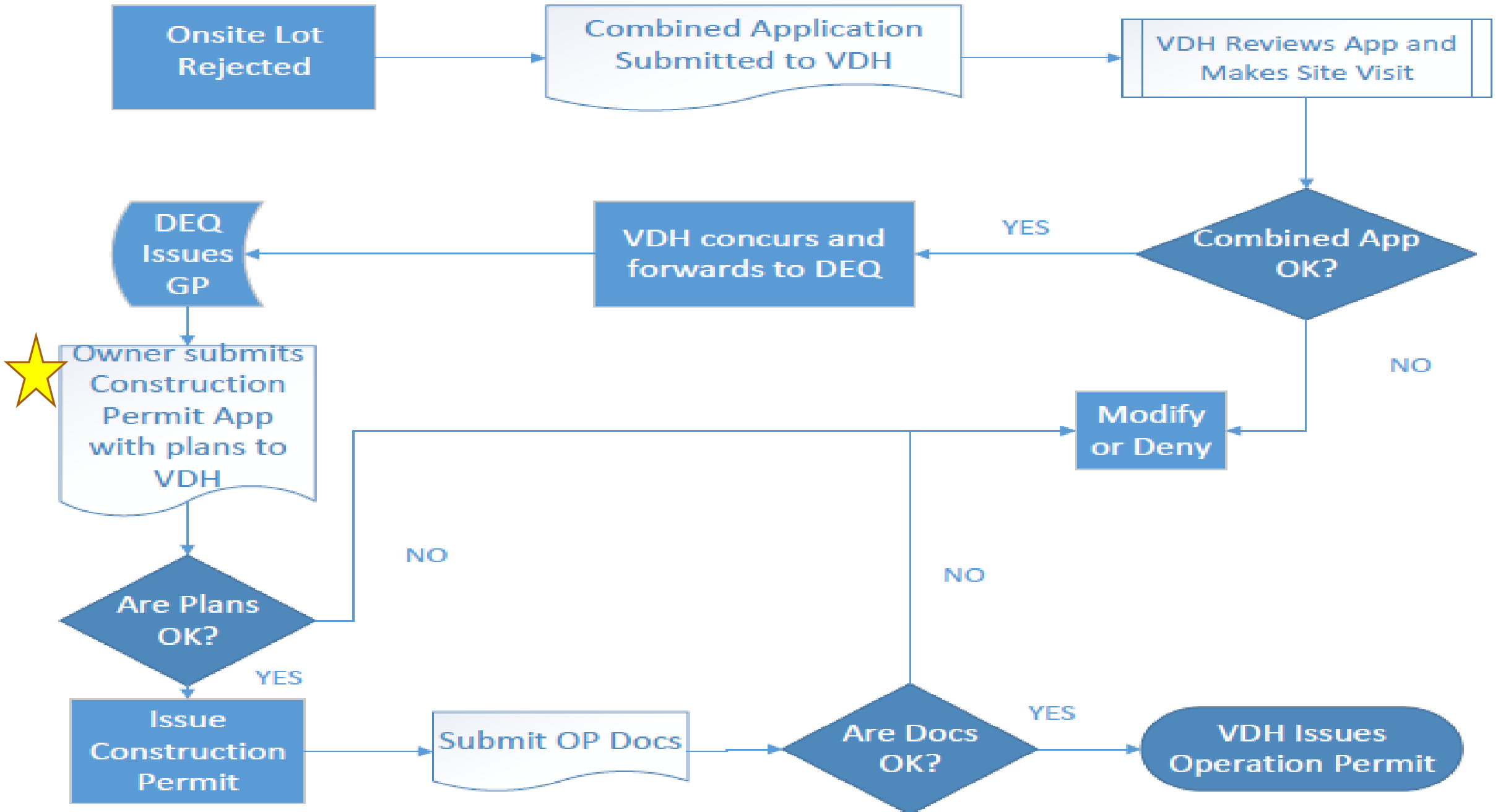
EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS	
	Instantaneous Minimum	Instantaneous Maximum	Frequency	Sample Type
Flow (MGD) <sup>(2)</sup>	NA	NL	1/3 months	Estimate
pH (standard units)	6.0	9.0	1/3 months	Grab
cBOD <sub>5</sub>	NA	5 mg/l	1/3 months	Grab
Total Suspended Solids	NA	6.0 mg/l	1/3 months	Grab
Ammonia as N (Apr 1 - Oct 31)	NA	1.0 mg/l	1/3 months	Grab
Ammonia as N (Nov 1 - Mar 31)	NA	3.1 mg/l	1/3 months	Grab
Dissolved Oxygen	6.0 mg/l	NA	1/3 months	Grab
E. coli <sup>(4)</sup>	NA	126 CFU/100 ml	1/3 months	Grab
enterococci <sup>(5)</sup>	NA	35 CFU/100 ml	1/3 months	Grab
Total Phosphorus	NA	0.18 mg/l	1/3 months	Grab
Total Residual Chlorine <sup>(3)</sup>				
After contact tank	1.0 mg/l	NA	1/3 months	Grab
Final effluent	NA	0.016 mg/l	1/3 months	Grab

Ammonia as N  
1.0 or 3.1 mg/l

Total P  
0.18 mg/l

NL = No Limitation, monitoring required

NA = Not Applicable



# Construction Permits

---

- Construction permits valid for 60 months or when General Permit expires with one time (18 month) renewal option
- Transfer of Permit form provided for Operation and Construction permits – expiration dates remain the same
- OPs expire with the GP unless the facility is in compliance



# Reliability

Reliability Class	Downstream or Down Channel Distance for Dry Ditch or Intermittent Streams	Wetlands from Discharge Pt along flow path or radially
Reliability Class I	>250 to <500 ft	≥100 to <250 ft
Reliability Class II	≥500 ft	≥250 ft
Reliability Class III	Full flowing stream	

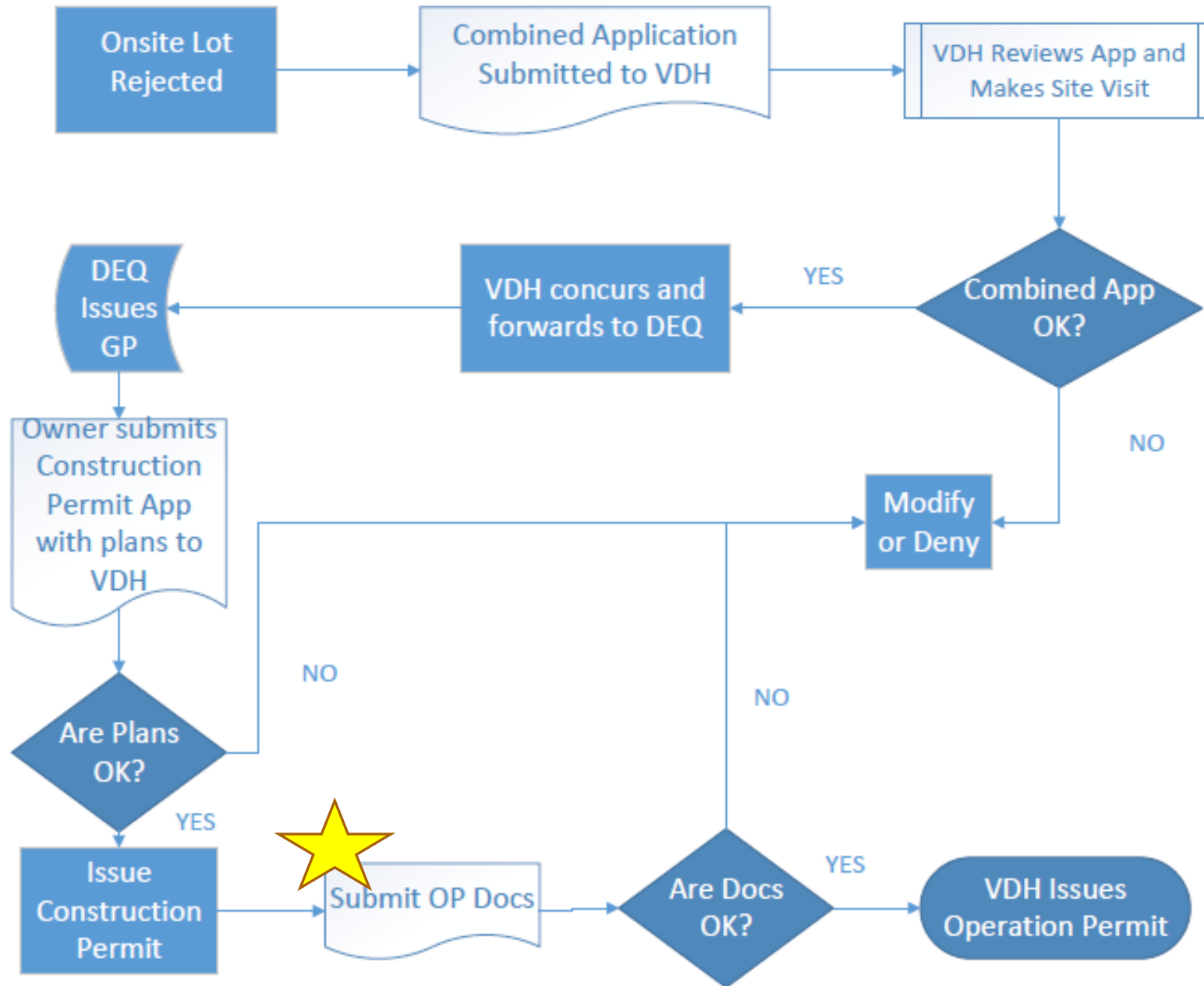
# Reliability

Reliability	Effluent Quality	+ Reliability
I	10/10	Passive unit; generator with ATS; 24 hour holding, etc
II	10/10	II-passive unit; Suspended growth + post filtration; telemetry, etc
III	30/30	None

All units require disinfection

For I or II UV: alarm for bulb failure; duplicate units

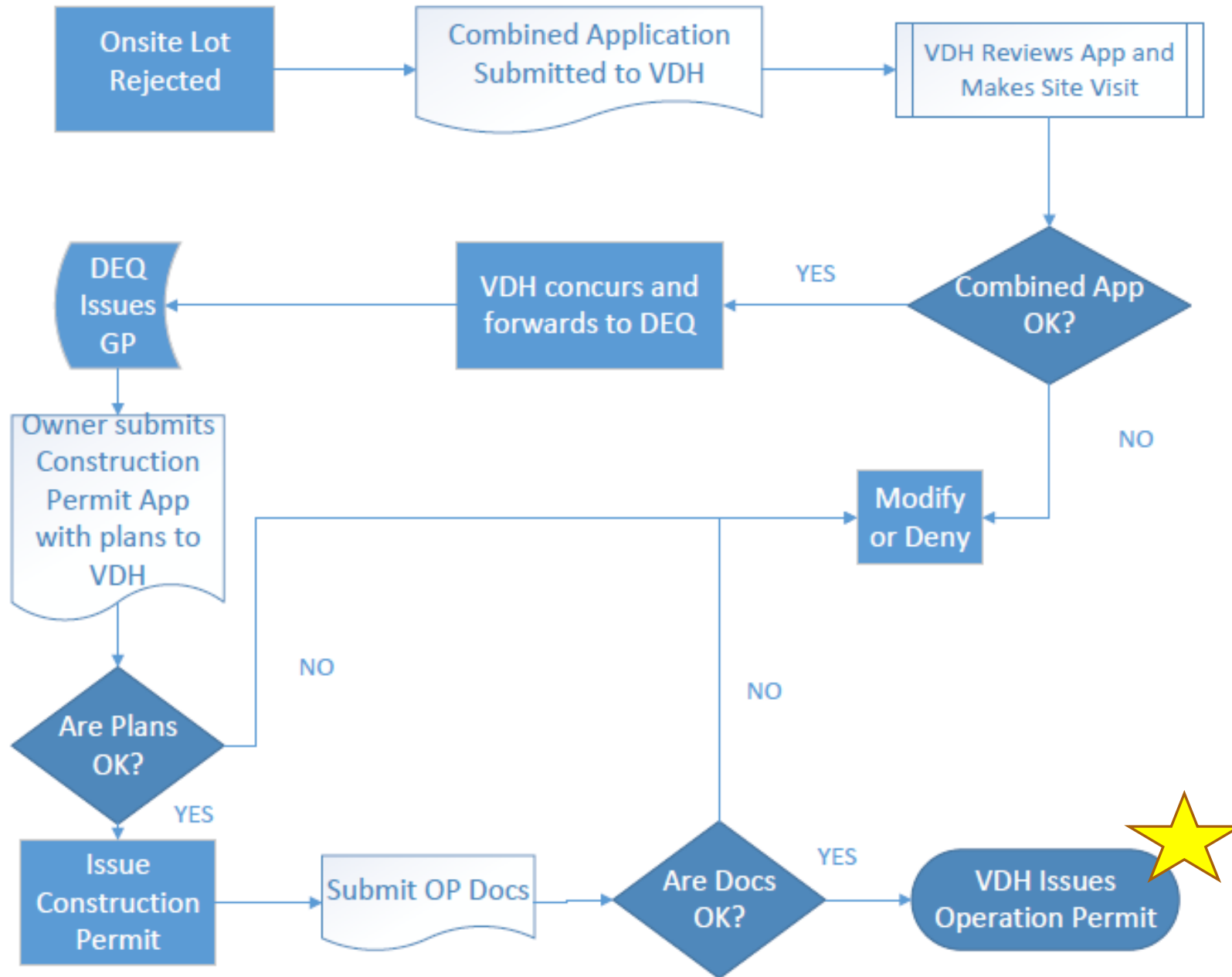
For I or II Chlorine: alarm for empty tablet chamber or duplicate unit with automatic switchover



# Operation Permit

## Requirements for Operation Permit

- Operation and Maintenance Manual
- Completion statements from Engineer and Contractor
- As-builts
- No recordation requirements



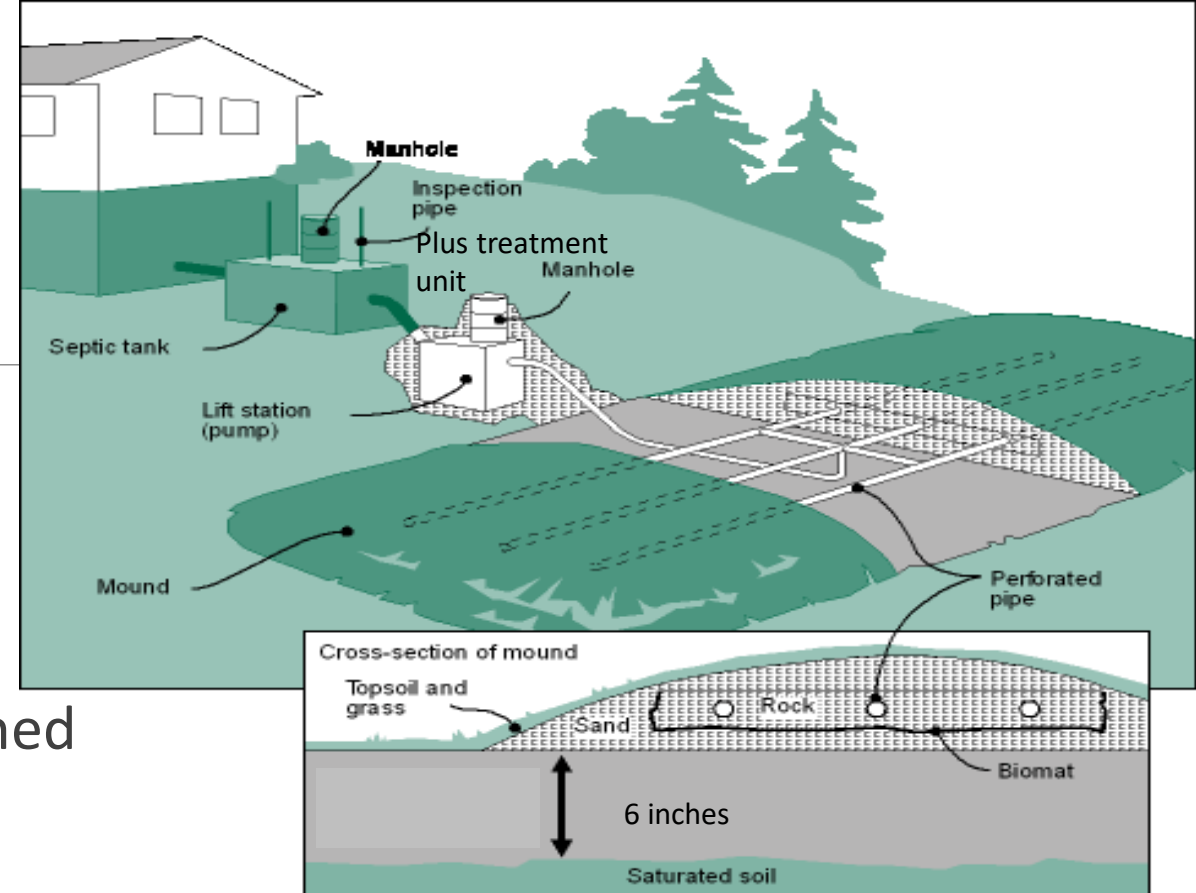
# COMPARE

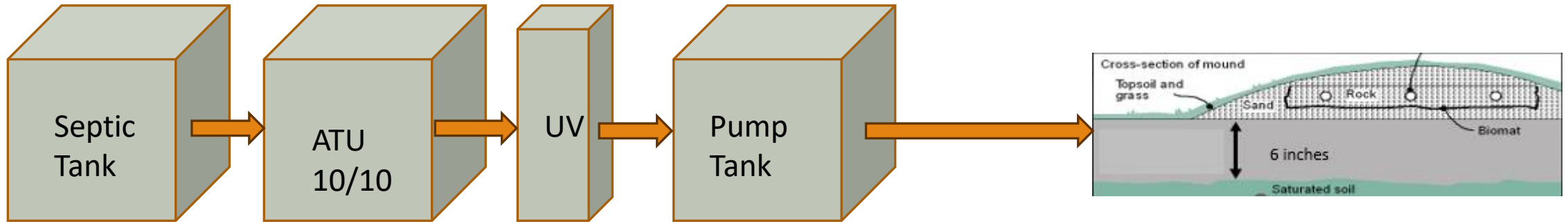
---

# Compare Plans Onsite – worst case

Sand mound with 10/10 + disinfection

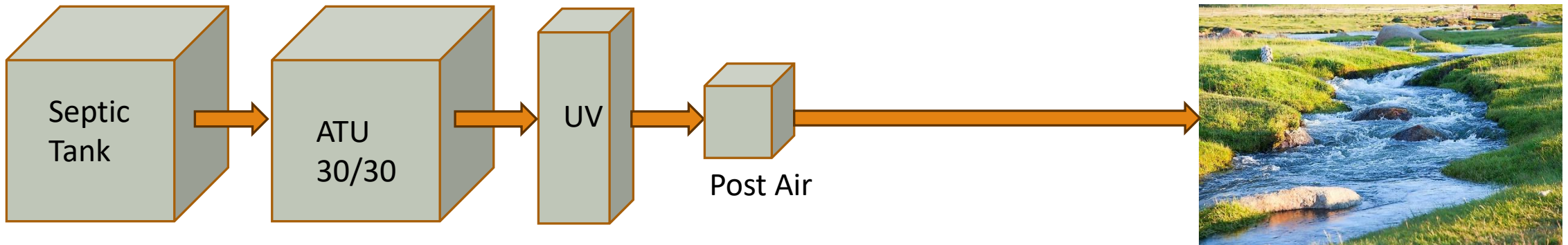
- Septic tank
- 10/10 Treatment unit
  - N reduction in Chesapeake Bay watershed
- UV
- Pump chamber
- Spin Filter
- Sand fill
- Soil cover
- Drip tubing or LPD





Mound

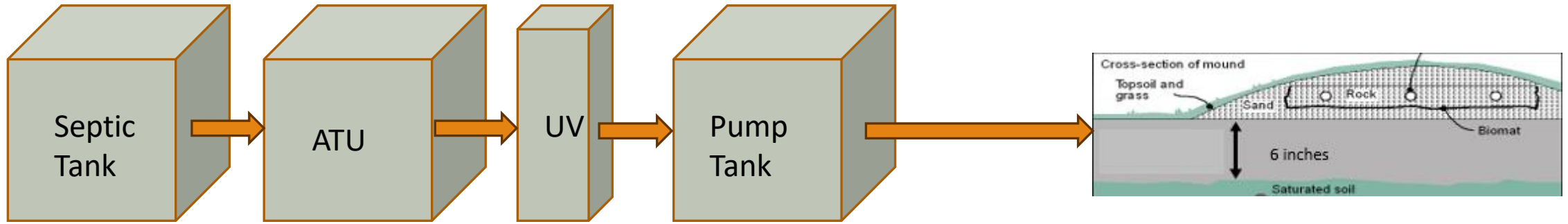
Onsite – Worst Case



Stream

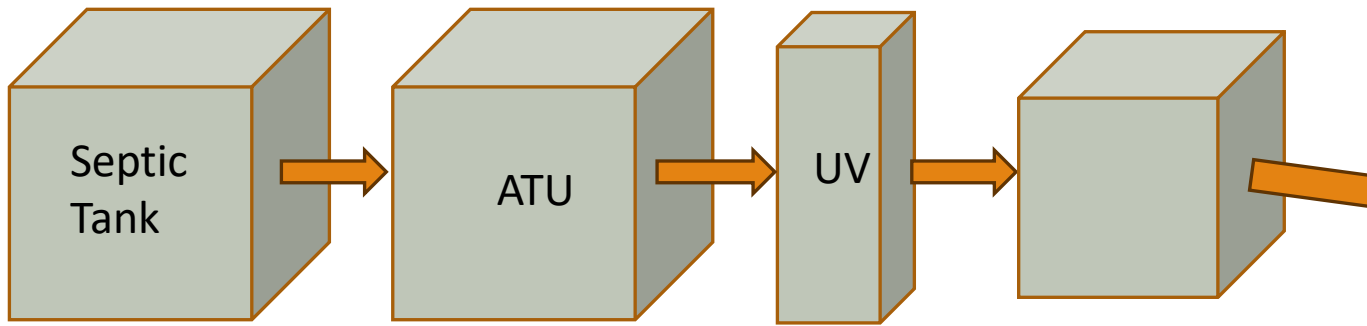
Discharge – Free flowing stream





Onsite – Worst Case

Mound



Discharge – Dry Ditch

Emergency Storage  
w Post Aeration



Dry Ditch/Ephemeral Stream

## Design Comparison

Discharge systems are generally cheaper to install with fewer components

OPERATION  
MAINTENANCE  
MONITORING

---

# ONSITE AOSS

---

## Monitoring

- 1 BOD (+disinfection) w/i 180 days
- Every 5 years after
- Process control tests annually

## O&M

- Minimum once per year

## VDH Inspections

- None required

# DISCHARGE – VPDES PERMIT

---

## Monitoring

- Flow, BOD5, TSS, pH, DO, bacteria w/i 45-90 days
- Flow, BOD5, TSS, pH, DO, bacteria annually
- Process control tests semi-annually

## O&M

- Twice a year

## VDH Inspections

- Once per year (with potential reduction to 1/3YR)
- Fee \$75

## ONSITE

---

No prohibited sites

Higher capital costs

Lower monitoring costs

Lower O&M costs based on No. visits

No mandated VDH visit

Enforcement by VDH alone

## DISCHARGE

---

Prohibited in some areas

Lower capital costs

Higher monitoring costs

Higher O&M costs based on No. visits

VDH inspection \$75 annually

Subject to VDH and DEQ enforcement

O&M  
Monitoring  
Comparison

Onsite systems are generally cheaper to operate and maintain.

## Discharge Pros & Cons

### Pros

- Cheaper capital costs
- No worry about 'failing' in the future

### Cons

- Higher ongoing O&M and monitoring costs
- VDH annual visit + \$75 fee
- Re-sample if out of compliance
- Permit may change in 5 years
- Enforcement by VDH and DEQ

## Summary

---

Discharge is intended to be option of last resort

---

Discharge is only available when no onsite solution exists in accordance with 12VAC5-640-30D

---

Discharge owners have higher monitoring and O&M costs

---

Discharges don't 'fail' but are subject to future changes in regulations

---

Owners must be made aware of long-term costs associated with discharges





[Marcia.Degen@vdh.virginia.gov](mailto:Marcia.Degen@vdh.virginia.gov)