

Backout of Low Vegetation BMPs and Septic Connections, WTWG December 2021

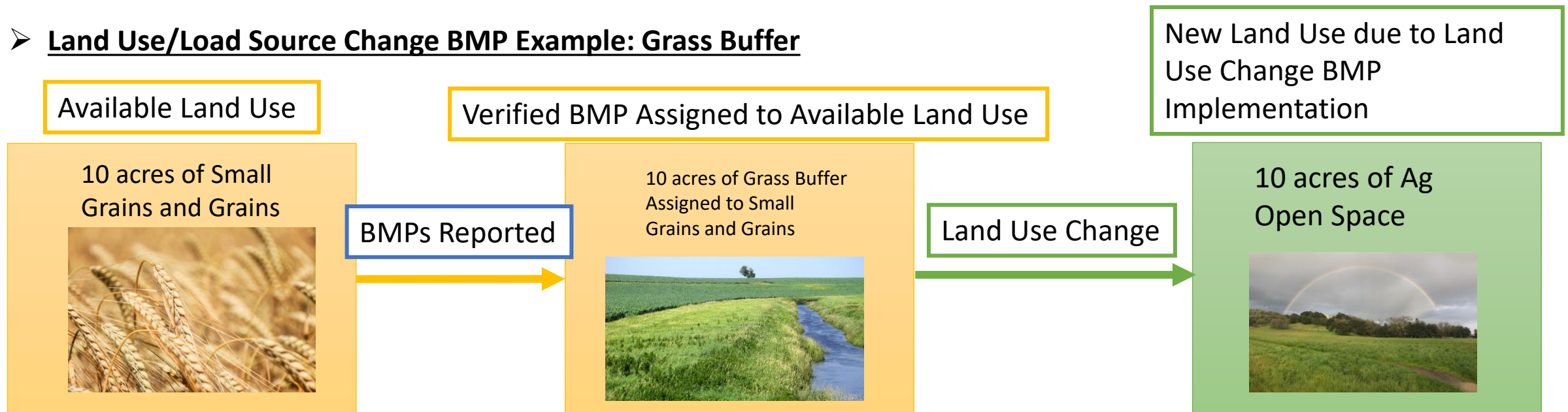
Presented by: Vanessa Van Note, Coordinator, 1/2021

Backout Refresher

Backout **only** applies to **land use change/load source change/land conversion** BMPs that alter a previously-projected load source to a new load source.

- Backout was designed to **prevent double counting**.
- For efficiency BMPs, **backout only affects the land use/load source change credit**.

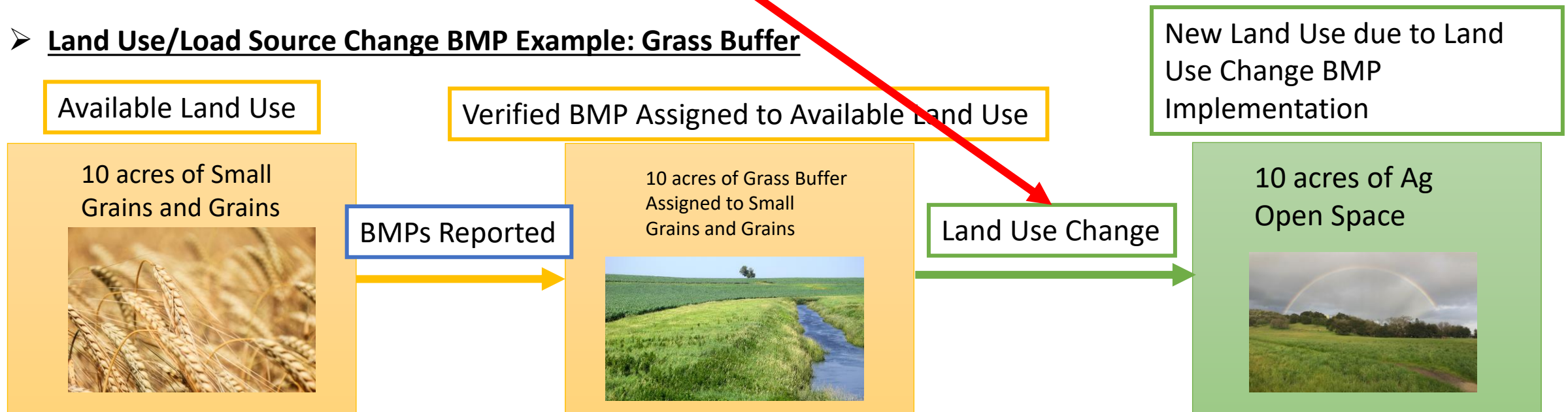
➤ Land Use/Load Source Change BMP Example: Grass Buffer



Backout Refresher

- The purpose of the land use change BMP is to **convert the land use from a higher loading source to a lower loading source.**
- These **land use changes should eventually be accounted for in the base conditions data/land use projection data as it is updated.**

➤ Land Use/Load Source Change BMP Example: Grass Buffer



How Backout and Verification Differ

- Two different concepts with two different functions applied differently in the model.

- **Backout's Purpose:**

- To prevent double counting acres.

Where is it applied?

- A calculation within CAST.

- **Verification's Purpose:**

- To ensure reported practices are on the ground and operating correctly.

Where is it applied?

- Credit Durations are applied in NEIEN.

Important Takeaways on Backout

- **Backout aims to model the real land use change** that occurred from implementing a LU change BMP on the ground.
 - The modeled LU change is typically from a higher (crop) to a lower (forest) loading source.
- Backout **does not** capture specific BMPs with point locations. (Spatial data for BMPs is not available.)
 - Backout is applied at the Irseg-agency-loadsource scale.
- **For Example:** A forest buffer BMP will **convert a cropland land use to a forested land use.**
 - This change is assumed to be **captured as an increase in forested land/tree canopy** in the high-resolution land cover imagery.
 - With the land use change captured in the base conditions of the model, **the land use change BMP should no longer be credited in addition to the base condition land use data** as this may lead to double counting the land use change.



LOW VEGETATION BMPs

Grass Buffers

Wetland Creation and Restoration

Land Retirement

Alternative Crops

BMP	From Land Cover	To Land Cover	Current Backout Method	VA Suggestions to the Workgroup for Backout
Abandoned Mine Reclamation	Barren	Low Vegetation	The backout for land use change BMPs from 2017-2025 is 2017 progress.	n/a
Impervious Surface Reduction	Impervious			
Septic Connections	n/a			
Alternative Crops Grass Buffers Land Retirement Wetland Creation Wetland Restoration	Low Vegetation			

To Note on the Proposal: If backout was discontinued, we would need another process in place to prevent double-counting.

- We should approach this from an angle of how can we improve upon backout for accuracy for each BMP.

To Note on the Argument: The Ag Census is used to estimate agricultural land uses; wetland land uses are informed by ancillary datasets.

VA Proposal: Discontinue the backout of land use change practices that involve a conversion from one low vegetation class to another.

VA Argument: Ancillary datasets (wetlands, NLCD, USDA Cropland Data Layer), parcel boundaries, local zoning and use maps, and geographic cues (proximity of impervious surface, size of vegetated area, etc) do not have the resolution to differentiate between a change from one low vegetation land use to the other.

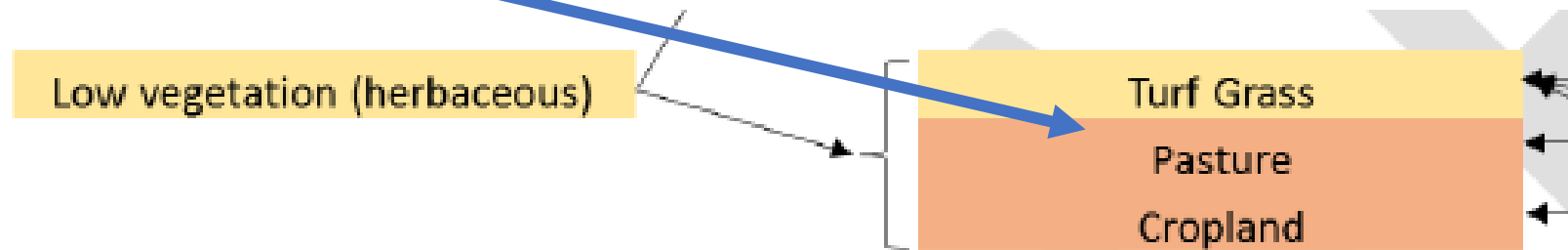
*The natural agricultural
Low Vegetation: Plant material nursery plantings with or without tarp cover and natural ground cover.

A landscape photograph showing a grassy buffer strip between a cornfield and a stream. A single tree is visible on the horizon.

Grass Buffers, Land Retirement and Alternative Crops

How is low vegetation classified in CAST?

- **Low vegetation is a land cover designation, not land use.**
- Difference between land cover and land use?
 - **Land Cover** represents observable characteristics of the land surface. (USDA NAIP Imagery for Agriculture)
 - **Land Use** (e.g., residential, commercial, agriculture, mining). represents how humans use the land
- Nutrient and sediment sources are related to land cover, land use, and land management.
- Classified in Phase 6 as:



**Can also include "Mixed Open"

How is low vegetation classified in CAST?

- **Turfgrass:** Herbaceous and barren lands that have been altered through compaction, removal of organic material, and/or fertilization (within road rights-of-way and residential, commercial, recreational, and other turf-dominated land uses (e.g., cemeteries, shopping centers) and a portion of herbaceous and barren lands within federal facilities, parks, institutional campuses)
- **Mixed Open:** Small patches of trees (< 1 acre) outside developed areas, and all scrub-shrub, herbaceous, and barren lands that have been minimally disturbed (e.g., periodically bush hogged, meadows, etc.), reclaimed, or that have internal and/or regulated drainage. These include **active, abandoned and reclaimed mines, landfills, Unconventional Oil & Gas, beaches, waterbody margins, natural grasslands, and utility rights-of-way.**

****County Planning and GIS Office County Land Use data can be used to further distinguish these classifications.**

- **Cropland:** Herbaceous and barren lands that are not classed as turf grass or mixed open. The portion of such lands that are crops is determined by the frequency at which the lands are classified as crops in the **NASS Cropland Data Layers (2008 through 2015).**
 - The Cropland Data Layers is an ancillary dataset.
 - Ancillary data combined with contextual information derived from the high-resolution land cover were used to differentiate among the potential herbaceous land uses and to make help define all other land use classes.
- **Pasture/Hay:** Same as cropland.

Backout of Land Retirement, Alternative Crops and Grass Buffer BMPs

Ex. Grass Buffers

Grass Buffers Convert Land Use From:

- Double Cropped Land
- Full Season Soybeans
- Grain with/without Manure
- Leguminous Hay
- Other Agronomic Crops
- Other Hay, Silage with/without Manure
- Small Grains and Grains
- Specialty Crop High/Low

To:

Ag Open Space (Unmanaged agricultural land that receives no manure, biosolids, fertilizer or other nutrient applications.)

How is Backout Applied to Land Use Change BMPs that convert land to the Ag Open Space Land Use? (Grass Buffers as an Example.)

- 1. Acres of each agricultural land use, which includes crops, are estimated** based upon acres of crops reported by the Census of Agriculture.

 - Ex for Grass Buffers where converted land use is Ag Open Space:

Wild Hay Harvested Area

How is Backout Applied to Land Use Change BMPs that convert land to the Ag Open Space Land Use? (Grass Buffers as an Example.)

2. Estimate of agricultural land use acres is combined with mapped land uses (land cover imagery): Land cover (pasture and cropland land uses) is used to proportion ag land uses from county to the land-river segment scale.

- **4 pasture land uses from Ag Census are fit into the pasture land use provided by land cover imagery and 10 crop land uses from Ag Census are fit into the cropland land use provided by land cover imagery.**
- Ex for Grass Buffers where converted land use is Ag Open Space:

Pasture for Ag Open Space.

How is Backout Applied to Land Use Change BMPs that convert land to the Ag Open Space Land Use? (Grass Buffers as an Example.)

3. Prior to backout being applied, feeding space needs to be added and the data needs to be “trued up”

- Ensures the total acreage aligns with the total acreage available to the LRSeg-agency designation.

How is Backout Applied to Land Use Change BMPs that convert land to the Ag Open Space Land Use? (Grass Buffers as an Example.)

4. The application of Backout: Land use change BMPs reported through the 2017 Official Progress Scenario for CAST-19.

- Ex for Grass Buffers:
 - Grass Buffers reported up until 2017 are backed out. (For CAST-19).
 - The land use change is captured as “Ag Open Space”.

Some things
to note:

The accuracy assessment on the updated land use/land cover product is due by
June 2022. **This is for the CAST-21 land use/land cover.**



June 2022

Discussion

Initial reactions to the information?

What alternative approaches to backout exist for grass buffers, alternative crops and land retirement?

- Alternative Crops and Land Retirement are ONLY land use change BMPs.
- Grass Buffers have a reduction efficiency in addition to the land use change.

Discussion

Is there an alternative approach to backout for grass buffers?

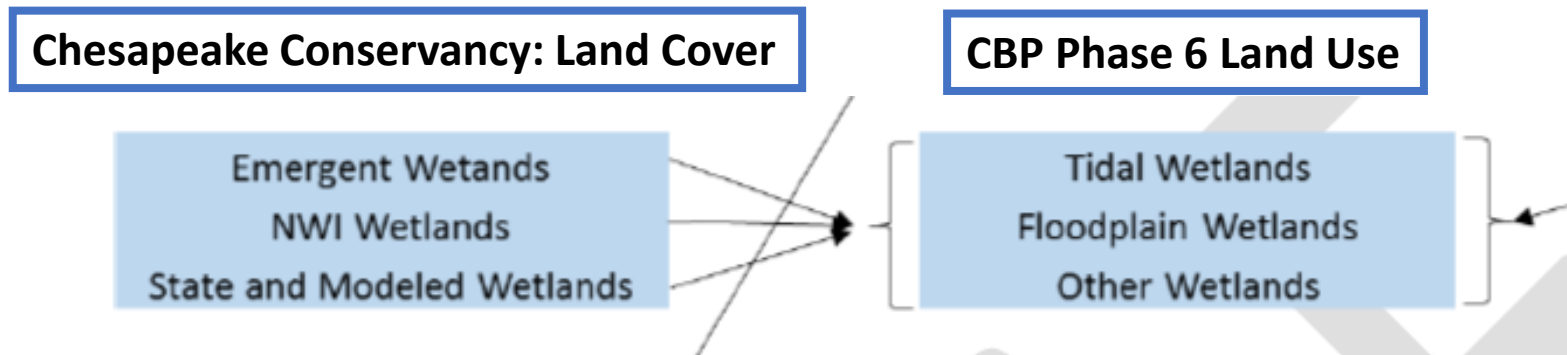
Is there an alternative approach to backout for alternative crops and land retirement?

A wide-angle photograph of a wetland landscape. The foreground and middle ground are dominated by dense, tall reeds in shades of green and yellow. A winding waterway or stream flows through the reeds, reflecting the overcast sky. In the background, the wetland extends to a flat horizon under a heavy, grey, cloudy sky. The overall scene is a natural, undisturbed wetland environment.

Wetland BMPs

Are Wetlands Low Vegetation Land Cover?

- Wetlands have been separated out into the following land use classes:



Are Wetlands Low Vegetation Land Cover?

Wetlands have been separated out into the following land use classes:

- **Floodplain Wetlands** = National Wetlands Inventory (NWI) and state designated wetlands located within the FEMA designated 100-year floodplain or on soils with flooding characteristics.
- **Other Wetlands** = National Wetlands Inventory (NWI) non-pond, non-lake wetlands, emergent wetlands mapped from high-resolution imagery outside Virginia, state designated wetlands, and state identified potential non-tidal, non-floodplain wetlands. These are typically headwater wetlands or isolated wetlands.
- **Tidal Wetlands** = National Wetlands Inventory (NWI) and state designated wetlands classified as marine and estuarine wetland systems, palustrine wetlands with water regime modifiers associated with tidal hydrological conditions (e.g., saltwater tidal or freshwater tidal), and all wetlands mapped from imagery that could be influenced by tidal characteristics/processes by having an elevation less than or equal to 2 meters above sea level.
 - Note: Tidal Wetlands are excluded from the watershed model but are being mapped for input to the hydrodynamic water quality model.

Backout of Wetland BMPs

Wetlands Convert Land Use From:

Ag Open Space
Double Cropped Land
Full Season Soybeans
Grain with/without Manure
Leguminous Hay
Other Agronomic Crops
Other Hay,
Silage with/without Manure
Small Grains and Grains
Pasture
Specialty Crop High/Low

To:

Non-tidal Floodplain Wetland

Headwater or Isolated Wetland

How is the wetlands land use built?

- The LU team uses **static state data, NWI, topographic depressions, and sea-level rise overlays** to differentiate wetlands from forests and other forms of **vegetation and water** (e.g., headwater wetland pond vs stormwater pond).
- They then map **change in land cover through time (2013-2017-2021)** and rely on the static overlays to tell them what is a wetland.
- Note: **Wetlands only change if they become developed.** A change from forest to barren, low veg to forest, etc. within a polygon that has been designated a wetland results in no change.
 - We are only able to map/monitor changes in vegetation. We cannot map/monitor soils, vegetation, and hydrology to determine if an area is a wetland like they do in the field.

The Bottom Line

- Wetlands **only get updated when the states update their maps, often in partnership with NWI.**
- Both MD and DE updated their tidal wetland maps based on field campaigns in the 2014-2018 period.
- In other states, the data may date back to the 1980's and 1990's.

Plans for the Future

For CAST-23 (if agreed to by the WQGIT):

The finalization of the high-res land use for 2017 which **includes three wetland classes: tidal/emergent, floodplain, and terrene.**

- These final land use data will not be available for review until February 2022 (as of early December 2021).

Some things
to note:

Wetland Class Data for CAST-23 available for review.



February 2022

Discussion

Initial reactions to the information?

Is there an alternative approach to backout for wetland BMPs?

SEPTIC CONNECTION BMP

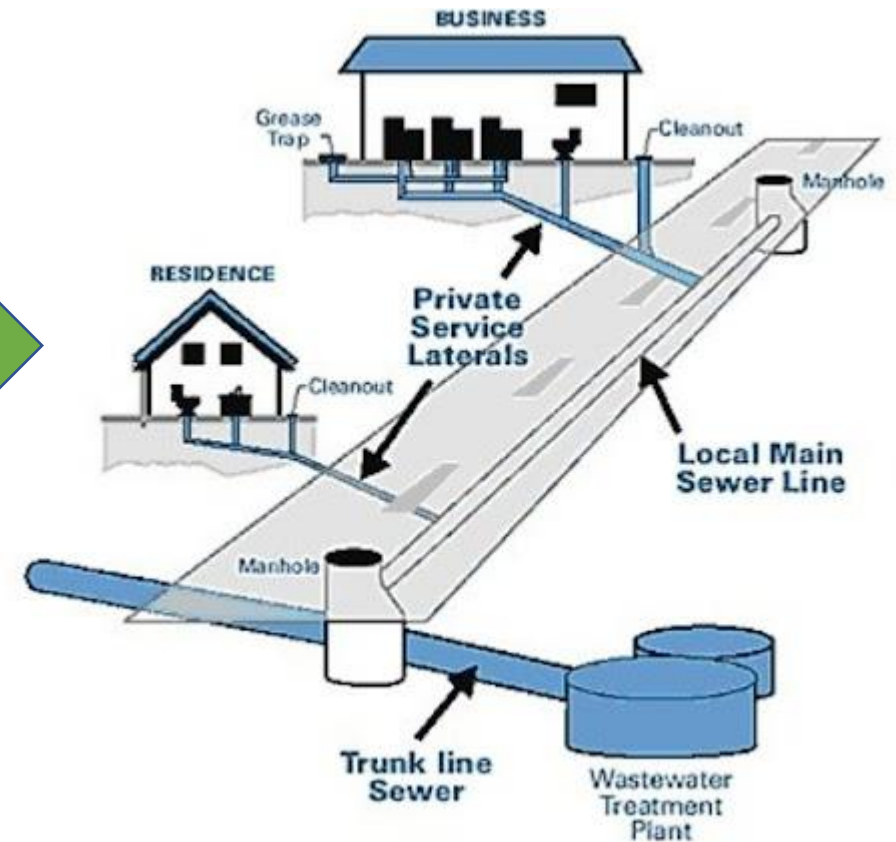
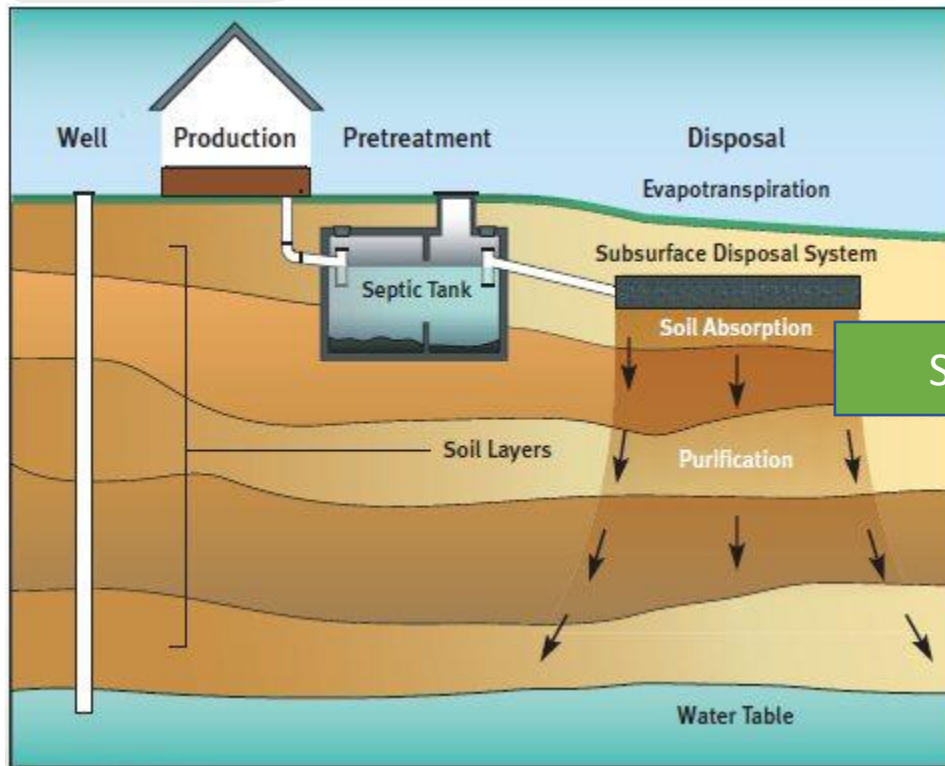
BMP	From Land Cover	To Land Cover	Current Backout Method	VA Suggestions to the Workgroup for Backout
Abandoned Mine Reclamation	Barren	Low Vegetation	The backout for land use change BMPs from 2017-2025 is 2017 progress.	<p>Proposal: VA proposes backout of septic connections be constrained to only the BMPs encompassed by the service areas for which mapped changes are incorporated.</p> <p>Argument: Septic connections in one county may be impacting the septic connections in another county.</p> <p>VA proposes discontinuing all backout of herbaceous BMPs as they are highly unlikely to be properly classified as a land use change when the change is low vegetation to low vegetation.</p>
Impervious Surface Reduction	Impervious	Low Vegetation	The backout for land use change BMPs from 2017-2025 is 2017 progress.	
Septic Connections	n/a	n/a	Backout is determined using census data	
Alternative Crops	Low Vegetation	Low Vegetation	The backout for land use change BMPs from 2017-2025 is 2017 progress.	
Grass Buffers				
Land Retirement				
Wetland Creation				
Wetland Restoration				

*The land cover product from Chesapeake Conservancy does not include a True Forest Category. Tree Canopy is defined as deciduous and evergreen woody vegetation of either natural succession or human planting that is over approximately 3-5 meters in height. Land cover was used for this table instead of land use because it does not incorporate the agricultural census.

What are Septic Connections?

- **Septic connections convert from private septic tanks to a municipal sewer system.**
- *How does this work in CAST?*
- The [septic connection BMP](#) **eliminates the septic load for the number of systems selected.** The load is assumed to be captured in the wastewater data. Wastewater loads are measured, and the measured load is reported. This measured load will include the loads from the newly-connected septic areas.
- *What is the load source change that occurs?*
 - The septic connection BMP **removes the septic load source** once implemented.
 - Septic load goes to 0 lbs and the load is captured in the wastewater data.

The Load Source Conversion that Occurs through Implementing Septic Connections



What informs the Septic Load Source in the Base Conditions?

Base Conditions of Sewer Service Areas in the Model

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graph TD; A[Base Conditions of Sewer Service Areas in the Model] --> B[Sewer Service Area (SSA) Boundaries from Counties/Localities]; A --> C[Septic System Growth by County and/or Model LRS];
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Sewer Service Area (SSA) Boundaries from Counties/Localities

How?

SSAs originally collected by Tetra Tech in 2009.

- Data received for 60% of WWTPs.
- Outside of the SSAs provided, **SSAs were modeled using population density, populated place, and the 1990 Census (last year census collected WW info).**

Septic System Growth by County and/or Model LRS

How?

When the sewer model is updated for each milestone, **Census County-level population is used to control total estimated population on sewer and septic. The future population for 2025 is forecasted.**

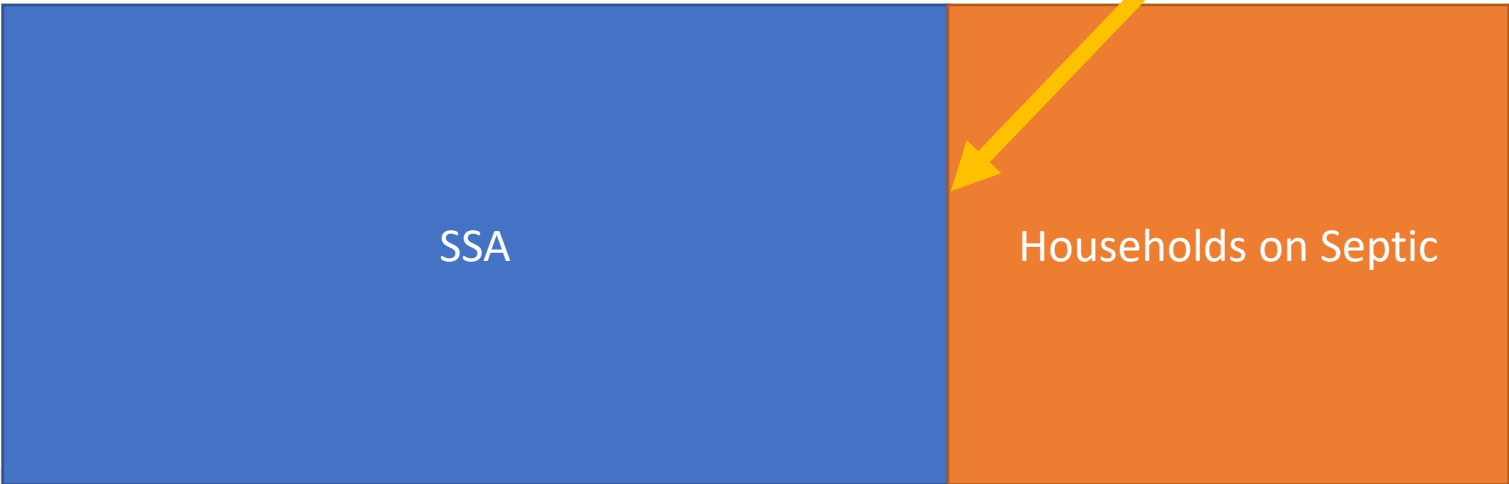
Backout of Septic Connections (SSAs updated biannually)

CAST-19



Septic Connection BMPs Backed Out

CAST-21: SSA Expands, Population on Septic Increases



How is backout applied to Septic Connections?

- Only **estimate septic connections within the mapped sewer service areas provided to us by states or localities** for the Milestone updates.
 - Therefore, there is **no duplication of data** for connections outside the mapped sewer service areas provided to us.
- Count **all households within mapped sewer service areas as being on sewer** and **all single-family detached households outside sewer service areas as on septic.**

Without Backout, How would double counting of Septic Connections occur?

- **Example 1:** If our mapped sewer service areas for CAST-21 show an expansion of sewer service areas but the additional households on sewer are also reported as a septic connection BMP, they will be double counted.
- **Example 2:** Sometimes septic systems are included within mapped SSAs. If these septic systems are later connected to sewer and reported as a septic connection BMP, we will be double counting those connections.

What informs the Septic Load Source in the Base Conditions?

- **For CAST-21**, the Chesapeake Conservancy requested SSA data from localities throughout the watershed in 2019 and 2020.
 - *This data is being assembled and compared to the current data to determine which dataset is more detailed/covers a larger area.*

Questions on Backout of Septic Connections?

Is the Backout of Septic Connections currently constrained to only mapped areas?

Should we wait for an accuracy assessment to be completed on the new land use change product for CAST-21 before making decisions on backout?